THE ROLE OF TECHNOLOGY LICENSING IN THE INTERNATIONAL BUSINESS OPERATIONS OF UK MULTINATIONALS

VOLUME I

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by

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ABSTRACT

This thesis explores the nature of the international licensing activities of UK-based multinational companies (MNCs). It is concerned with the outward licensing of technology, in the form of patents and know-how, and it assesses the relative importance of a number of variables that motivate MNCs to license their technology to overseas companies rather than to use the more common methods of international business, foreign direct investment (FDI) and exporting.

The thesis analyses the extent of international licensing activity among UK-based MNCs, and its significance in relation to the other two major international business methods. It also describes the characteristics of the technology licensed and of the MNCs involved in licensing, and tests a number of hypotheses about these characteristics that are drawn from a variety of sources in the literatures on the the MNC, FDI, international licensing, technology transfer and transaction cost theory.

The research is broadly deductive in nature as it assesses the validity of various explanations found in the above literatures. Most of the data was collected by means of a mailed questionnaire directed at a carefully selected survey population of 322 UK-based MNCs in 1984, from which 86 useable responses were received. The statistical analysis utilises mainly non-parametric procedures as most of the data is of an ordinal nature, although parametric procedures are also used.

The analysis of government statistics on FDI, exports and royalties over the period 1964 to 1984 revealed that the proportions of the UK's total foreign sales which arose from licensing were consistently lower than those which arose from FDI and exports, but were nevertheless sufficiently large (6.7 per cent in 1984) to merit serious attention.

The analysis of the determinants of the licensing decision using the questionnaire survey data revealed that licensing was viewed by the vast majority of UK MNCs as a 'strategic' decision, in the sense that it was more often than not evaluated against FDI and exporting. Government-created market imperfections were found to be important reasons behind the decision to opt for licensing at the expense of FDI or exporting.

The intercorrelations between the variables listed in the questionnaire were subjected to factor analysis to determine whether a smaller group of key factors could be used to account for the decision of UK MNCs to adopt licensing, and this exercise was successful in isolating a number of such factors. The technique of multiple linear regression analysis was also employed to determine the extent to which nine key corporate characteristics were associated with the level of licensing activity of the sample of UK MNCs.

The intellectual property content of the licensing agreements possessed by the sample were analysed using standard nonparametric tests to determine if their characteristics differed according to whether the agreements were with unrelated or related overseas companies. It was anticipated that differences would exist due to the greater transaction costs that are assumed to arise in unrelated agreements. The results were generally consistent with expectations.

In summary, the key contributions to knowledge made by this study are as follows: firstly, it provides evidence that the licensing decision is not simply a by-product of the FDI and exporting decisions but is often a first-best choice; secondly, it provides insights into the factors which influence the licensing decision and their relative weightings; and, thirdly, it produces evidence which is broadly supportive of the transaction cost school of thought through its examination of the intellectual property characteristics of licensing agreements.

PART I INTRODUCTION TO THE STUDY

INTRODUCTION

The fourteen chapters of the thesis are organized into three parts. The first three chapters make up Part I, which provides an introduction to the research issues and gives background details on the evolution of the UK's international investment, the general nature of the international business environment facing UK companies, and the forms of international business in which they can become involved.

The review of the relevant theoretical and empirical literature is contained in Part II, which spans Chapters Four to Seven inclusive. The remaining chapters make up Part III, which describes the empirical study which was undertaken and reports the results which were obtained from it.

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CHAPTER ONE - INTRODUCTION TO THE RESEARCH ISSUES

1.1 THE RESEARCH ISSUES

1.1.1 Introduction

This thesis is concerned with UK-based multinational companies (MNCs) that license technology to overseas companies. The focus of attention is therefore on outward licensing (licensing-out) rather than on inward licensing (licensing-in). The basic research question which is tackled is the following: under what circumstances is outward licensing preferred over the two main alternative methods of international business, foreign direct investment (FDI) and exporting?

Four main strands of inter-related literature were utilised in developing the theoretical framework for the research: the literatures on FDI, MNCs, licensing and transaction cost theory. A number of hypotheses were developed from the review of these literatures, and were tested using data derived from a questionnaire survey of UK MNCs and from other sources.

The research focuses on companies that have already become multinational through previous FDI, and attempts to explain why these companies choose to exploit their technology in some overseas markets via licensing rather than by further FDI or by exporting. It also examines the relative standing of licensing compared to the main alternative methods of international business, and it identifies the typical characteristics of companies which engage in licensing.

The nature of the technology licensed by UK MNCs also comes under scrutiny in the thesis. The differing characteristics of patents and know-how are used to develop hypotheses, in accordance with transaction cost theory, about the relative proportions of these forms of technology likely to be present in different types of licensing agreements. These hypotheses are then tested using data from the questionnaire survey.

1.1.2 Methods of International Business: The Historical Context

Although exporting and FDI are the dominant forms of international business today, there have been signs that this dominance is lessening. During the 1970s there was an increase in the incidence of what have become known variously as 'non-equity', 'contractual' or 'new' forms of foreign involvement. This section briefly describes the historical evolution of the traditional and the 'new' forms of international business.

Until the nineteenth century most international business transactions took the form of exporting. The internationalization of production began in the latter half of the nineteenth century and continued at a steady pace so that by the outbreak of World War II (WWII) most of today's leading MNCs had formed overseas subsidiaries [Dunning (1972, p11)]. However, it was not until the post-WWII period that worldwide FDI really gathered pace. A prosperous economic climate combined with technological advances and radical improvements in the efficiency of communications and transportation all made it feasible for a parent company to keep close control over a subsidiary located in a distant country, thus helping to establish the MNC as the pre-eminent force in the international economy.

By the end of the 1960s the establishment of the wholly-owned foreign subsidiary had come to be regarded as the classic archetype of foreign expansion. The 1970s, however, witnessed a shift in the manner in which international business took place: the traditional method of international expansion, 100 per cent equity investment, declined relative to other forms of international business [OECD (1981, p33)]. Joint ventures and non-equity forms of international participation, including licensing, became relatively more popular as means of penetrating foreign markets.

1.1.3 The Components of International Business Expansion

The overseas expansion of business operations by means of FDI has traditionally involved the transfer of a bundle of corporate assets consisting of financial capital, technology and management skills.[1] The distinguishing feature of non-equity methods of international business is that they entail the unbundling of the FDI package. Resources are transferred individually, or in a dual combination, rather than in the form of a complete package. Thus, financial capital is transferred via loans, technology via licensing agreements, management skills through management contracts, technology and management skills through turnkey projects, and intermediate products through subcontracting.

These alternative forms of international business have been described as "new" forms of international investment [Oman (1981, 1984, 1988)]. This label is potentially misleading, however, for most of these types of international business arrangement have been in existence for many years. What <u>is</u> new is the extent to which they have been utilised by MNCs, especially in developing country markets.

The ability of a company to engage in non-equity international business is, of course, dependent upon it possessing at least one of the two assets which comprise the non-financial component of the FDI package, ie technology and management skills. The latter are usually acquired over a long period of time, and are most often found in large companies with diverse operations; the former result from investment in research and development (R&D). It is not surprising, therefore, that MNCs are most heavily involved in non-equity business.

This thesis is concerned with the way in which the technology component of the FDI package can be exploited on its own by means of international licensing agreements. It is necessary, therefore, to define what is meant by the term technology, and to define the type of technology that is transferred by means of licensing agreements.

1.1.4 Technology as a Corporate Resource

Technology is an ill-defined concept which can take on a variety of meanings according to the context in which it is used. A review of various definitions of technology can be found in Dunning (1982a), who highlighted differences in the scope and complexity of these definitions. Dunning himself proposed the broadest possible conception of technology, defined as follows:

> "A resource which comprises knowledge applied to improving the efficiency of the production and marketing of existing goods and services and of the creation of new goods and services" [2]

This definition draws a distinction between innovation technology (technology which enables the creation of new goods and services) and production technology (technology which improves the efficiency of producing and marketing existing goods and services). However, it is not sufficiently detailed to identify the various forms which technology may take, apart from noting that it comprises knowledge.

Identification of the various forms which technology may take is important, because licensing is usually only used for transferring a particular class of technology, referred to as intellectual property. The nature of intellectual property will now be described, and this will be followed by a proposed classification of different types of technology, including intellectual property.

The concept of intellectual property is not open to easy definition, largely because the pace of technological change has caused the boundaries of the concept to change over the years. Nevertheless, there are common attributes possessed by all forms of intellectual property which enable the concept to be defined.

At its simplest, intellectual property can be described as an original idea which is capable of being recorded and defined in some way. However, once an idea has been rendered into some tangible form, it is capable of being copied by others. To protect against unauthorised copying, ideas are assigned legally protected property rights, in return for full public disclosure of the ideas. These rights last for a limited period of time, during which the owners of the rights have a monopoly to exploit them.

Intellectual property does not therefore exist in a physical sense. If a company chooses to sell its intellectual property, it does not sell a physical object; rather it sells the right to utilise certain ideas. Because it has this incorporeal quality, intellectual property is often referred to as an 'intangible asset'. It should be noted, however, that the ideas which give rise to intellectual property must be capable of being turned into some tangible form, otherwise they would not be capable of being copied. There is no protection available to mere ideas. The various types of intellectual property are described in detail in Chapter Three.

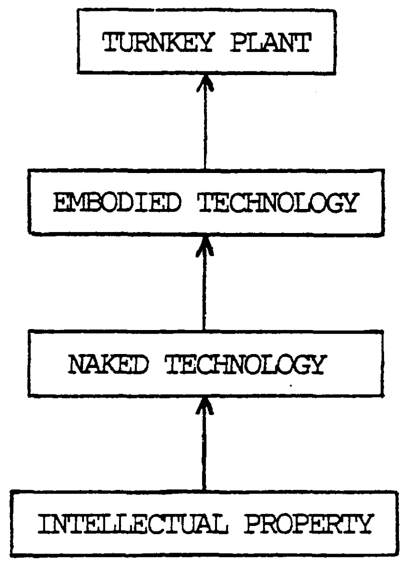
Rather than trade in intellectual property, companies may choose instead to use their intellectual property to create products, which may then be sold to other companies. It is therefore useful to distinguish between the various forms that technology can take when it is transferred between companies.

A proposed classification of forms of technology is given in Figure 1-1. It is based, in part, upon the description of technology transfer mechanisms in Frame (1982, pp73-79):

CHAPTER 1

FIGURE 1

FORMS OF TECHNOLOGY



[SOURCE: Author]

The classification in Figure 1-1 represents a hierarchy of forms of technology, ranging from intellectual property at the bottom, to turnkey plant at the top. Starting at the bottom of the hierarchy, intellectual property may be traded between companies, eg in the form of a patent, or it may be used in the manufacture of a product, which may then be traded. Such a product would be classified as naked technology, an example of which would be a semiconductor. If naked technology is in turn used as part of another product, such as a computer, then that product would be classified as embodied technology. Finally, a number of embodied technologies may be sold as part of a package which involves the contruction of a fully-functioning production facility, in which case technology is transferred in the form of a turnkey plant.

This classification is not the only possible framework which can be used to distinguish between different types of technology. For example, Dunning (1982a, p11) went on to expand his broad definition of technology by distinguishing between three different types of technology: human, material and knowledge technology.[3]

Two of these categories are covered by the classification scheme in Figure 1-1. Material technology captures the first three categories in the proposed hierarchy (ie turnkey plant, embodied technology and naked technology) while knowledge technology corresponds broadly to the intellectual property category.

Dunning's third category, human technology, refers to human capital embodied in the likes of managers, scientists and laboratory technicians. Although it is not explicitly incorporated within the classification scheme in Figure 1-1, human technology is very often transferred along with material and knowledge technology. The extent to which human technology will form a part of the total technology package will depend upon the abilities of the employees in the company which receives the technology. In addition, human technology will tend to be a more significant part of the overall technology package if the technology being transferred is knowledge technology rather than material technology.

1.1.5 The International Business Decision Process

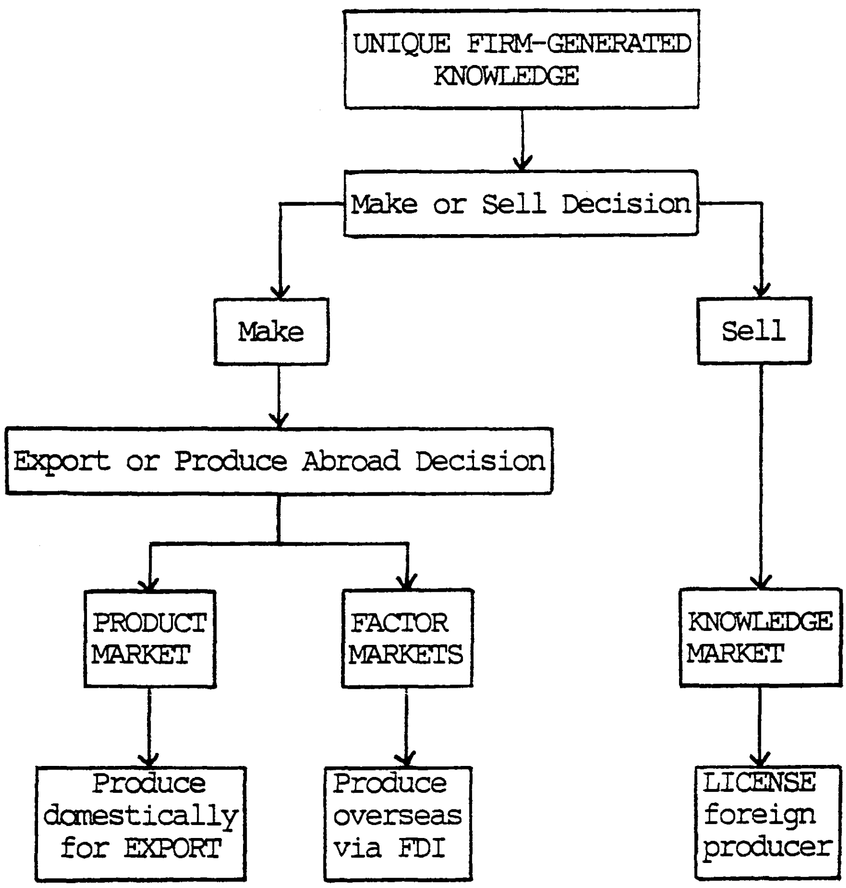
This study concentrates on one particular type of non-equity transaction, the licensing agreement. This option is potentially available to companies which devote expenditure to R&D, thereby creating intellectual property. This type of property is often referred to in the literature on MNCs as proprietary (ie firm-specific) knowledge.

This knowledge can be exploited in either of two ways: it can be used by the company itself to create its own products or it can be licensed to independent producers. The choice is thus between a market transaction (licensing) and one organized internally by the company. Choosing the latter entails another decision: whether to service foreign markets by exports, which entails selling in the international product market, or by FDI, which necessitates trading in the international factor market (for labour, raw materials and other production inputs).

The two-stage nature of the international business decision process facing the knowledge-abundant MNC is illustrated in Figure 1-2.

FIGURE 1-2

THE INTERNATIONAL BUSINESS DECISION PROCESS



[SOURCE: Author]

Proprietary knowledge obtained by corporate investment in R&D (referred to hereafter as industrial property) usually consists of patents or know-how. Other forms of knowledge (not necessarily firm-specific or the product of R&D) are typically possessed by the MNC and can be used to generate income. The managerial and marketing expertise of employees, for example, can be sold by means of management contracts. The sale of management skills may sometimes be linked to the sale of other assets, as in the turnkey agreement where both embodied technology and management are traded.

The thesis is confined to an analysis of that segment of the market for technology which is comprised of patent and know-how licences. Past surveys of the content of technology licensing agreements reveal that these two categories of intellectual property are present in the bulk of agreements.[4] The extent to which trademarks form a part of licensing agreements involving patents and know-how is also explored.

1.2 IMPORTANCE OF THE RESEARCH ISSUES

1.2.1 Ownership and Control

In common with other forms of non-equity business, the use of licensing implies the separation of ownership from control. Oman (1981) alluded to this separation when writing about the probable consequences of the apparent shift away from the use of FDI. He stated that new forms of international investment "may revolutionize international investment in much the same way as the joint stock company did on a national scale" (1981, p13).

While the tone of this prediction may be rather strong, it is not unreasonable to argue that MNCs will be unable to exercise the same degree of control over their foreign licensees as they would be able to exercise over their foreign subsidiaries, and that a preference for licensing over further FDI will therefore limit their ability to maximise profits on a global scale. For example, MNCs will be unable to use foreign licensees as a base through which to move funds for the purpose of minimising taxation via the use of transfer prices.

In a similar vein, Gabriel (1977) highlighted the loss of control involved in the apparent trend away from FDI. He postulated that "new institutional arrangements .... are rendering the traditional mode of foreign direct investment progressively irrelevant - together with its essential assumptions: complete, long-term control; the freedom to locate facilities and activities wherever most convenient; the ability to take full advantage of intercountry cost, tax, market-price and currency differentials." (1977, p30).

Gabriel argued that the persistence of this trend would lead to an increasing amount of the decision-making power governing international resource flows passing from MNCs to governments; market-based criteria would be increasingly transcended by political criteria in the formulation of corporate policy. He went on to conclude that the role of companies in the international arena was shifting from "the pursuit of privately determined purpose to the management of public interests defined not by the 'invisible hand of the market', much less by multinational corporate officials, but by national political will expressed through government action" (1977, p30).

In the context of the present study, Gabriel's prediction highlights the need to find out whether MNCs have opted for licensing to comply with the objectives of host governments or whether they have chosen licensing on their own initiative. The need for such an investigation was also identified by Grosse (1981), who made the following observation: "one trend that has been forecast for the 1980s is a decline in the rate of growth of FDI and a rise in other forms of foreign involvement ... because of increased public distrust of the companies and consequent increased government regulation. This prospective future .... needs to be substantiated by some careful empirical observation" (1981, p37).

Whether or not this prospective future is likely to be induced by host government legislation, or to be actively pursued by MNCs, the consequences of losing ownership over their proprietary assets may not be as damaging to the performance of MNCs as some commentators have contended. John Dunning (1979, 1981, 1982a, 1982b) has led the way in pointing out that the loss of ownership over internationally-transferred assets need not necessarily entail a complete loss of control over the way in which those assets are utilised.

Since licensing is facilitated by the use of contracts, which outline the obligations of both parties, the MNC may have sufficient leverage in negotiations with host country firms to enable it to have clauses written into its contracts which give it some degree of influence over the subsequent use of the assets which it is licensing. Indeed, the bargaining power of the MNC vis-a-vis the licensee may be such that it is able to extract concessions which give it a degree of control approaching that which it would have over a wholly-owned subsidiary. In such a case, the licensee would effectively be integrated with the rest of the MNC's operations.

According to Dunning (1979), the determinants of the locus of control, and how these vary with the modality of resource transfer, is an under-researched topic. It is at least arguable, "that production in which there is no FDI, yet over which there is a de facto control by a foreign firm is as 'international' as that financed by FDI but over which there is little or no such control" (1979, p5).

1.2.2 The Future Environment of International Business

Some commentators have expressed the view that contractual forms of international resource transfer are likely to become a more important feature of the international business environment in the forseeable future. For example, Dunning (1978) expressed the opinion that "the traditional role of MNCs, as providers of entrepreneurial capital, may have passed its zenith. Instead, their future is likely to rest in the provision of technical and managerial services bundled together in a variety of ways, the allocation of which will be increasingly determined by contract or by government fiat" (1978, pp2-3).

Some evidence for this assertion is contained in a study by McGreevy (1978) on the effects of environmental changes on the strategic planning of US-based MNCs. McGreevy gathered data, via a questionnaire, on the particular overseas expansion strategies which his sample of MNCs currently employed, and on those strategies which they expected to adopt in the future.[5] The aim was to find out the methods which were used most in developed countries (DCs) and less developed countries (LDCs) during the 1970s, and the methods which were expected to be used most in both these categories of country in the 1980s.

The respondents ranked FDI as the most used method in both DCs and LDCs during the 1970s. However, in the 1980s the use of FDI in both DCs and LDCs was expected to rank below all other methods of expansion, with the exception of management contracts. The most notable change in ranking was in the use of licensing, which in the 1970s was placed just one rank above management contracts in both DCs and LDCs. In the 1980s, however, it was ranked as the method of expansion expected to be used most in DCs and also, with the exception of exports, in LDCs.

This study explores past and current forms of overseas expansion used by UK MNCs, and also anticipated future developments. Government statistics are used to determine the historic breakdown of international business between FDI, exports and licensing (Chapter Nine), while data from the questionnaire survey are used to determine the relative prevalence of the main forms of international business and of likely changes in the future (Chapter Ten).

1.2.3 Implications For Host Countries

The existence of a trend away from FDI towards non-equity forms of investment generally, and licensing in particular, has important implications for the economies of both home and host countries. Although this study does not assess the effect of UK licensing activity on the UK economy or on host economies, it is important to understand what these effects are likely to be.

For host countries, the domestic economic repercussions of obtaining technology by licence rather than as part of a complete package will be largely determined by the price that they have to pay for it. The search for economic interdependence and selfdetermination may well motivate host countries to demand that MNCs licence their technology, but if the price is too high then the benefits of greater sovereignty may be swallowed up.

From the MNC's point of view, licensing does have a number of advantages, eg the political risk is lower. However, the advantages have to be considered alongside the synergy which is created when technology is bundled-up with other resources in the FDI package. Managerial expertise, for instance, is often dependent upon a delicate mix of organizational support factors which cannot be transferred efficiently via licensing agreements. In many instances the technological infrastructure in host economies is such that licensed technology cannot be used efficiently, eg due to a lack of skilled manpower. Most obvious of all, economies of scale cannot be sold or transferred in small bundles since, by definition, they require large-scale operations.

Despite these handicaps, MNCs may be more likely to licence technology if the balance of bargaining power between host countries and MNCs swings towards the host countries. Dunning (1978, p6) suggested that such a swing has occurred due to the growth of MNCs from countries other than the US and the UK, which has widened the choice available to host countries. Licensing may also be more likely to take place if host countries are more willing to pay a price high enough to approach the returns on FDI.

1.2.4 Implications For Home Countries

The effects of any change in methods of international business on the economies of home countries will be dependent on the degree to which the alternative methods are either complements to, or substitutes for, the traditional mechanism of FDI. If licensing is a substitute for FDI then, ceteris paribus, one might expect there to be an increase in the funds available for either domestic capital formation or portfolio investment. If it is merely a complement then there is no reason to assume that there will be any change in these two variables.

Following any switch towards licensing the economy of the home country will experience, after a time lag, an increase in competition from host countries, assuming that the technology which these countries obtain is effectively utilised. Exports from the home country may be displaced by increased production from the host country, or domestic production for the home market may be replaced by imports produced with the aid of licensed technology. These effects will throw an adjustment burden on the domestic economy; resources in the affected industries will become unemployed or have to accept lower factor returns, or be transferred into other more competitive industries.

This loss to the group of displaced factors will, of course, be offset by the financial returns which accrue to the home country licensors. It is impossible to tell a priori whether the gains made by this latter group will outweigh the losses sustained by the affected industries. All that is certain is that if the gainers and the losers are different groups in the economy then a conflict over international business policy is inevitable.

1.3 SCOPE AND LIMITATIONS OF THE RESEARCH

In pursuing the research agenda the study focuses on the international licensing activities of UK-based MNCs. The extent to which this can be regarded as detracting from the generalisability of the results to non UK-based MNCs depends upon the particular definition of corporate multinationality which one chooses to adopt.

The most basic definition only requires that service or production facilities be located in more than one country. This broad definition has been adopted by the United Nations to ensure that no aspect of the phenomenon is arbitrarily excluded from the studies that it regularly commissions. It is, however, considered too loose a definition by many other research institutions, most of whom generally prefer to define multinationals in accordance with some form of performance yardstick; usually a certain percentage of overseas sales, assets, earnings, employees or some combination of these.

Definitions of this sort take account of the fact that the ownership of a vast number of subsidiaries around the globe is concentrated in the hands of a few major companies. By 1978, for example, it was calculated that less than 5 per cent of all MNCs accounted for at least three quarters of all foreign subsidiaries worldwide, and about the same percentage of foreign investment [Stopford et al (1973, p14)].

In its 1973 Report titled Multinational Corporations In World Development, the United Nations noted that a key characteristic of MNCs was the predominance of large firms, which was closely related to their predominantly oligopolistic character. The report noted that the markets in which MNCs operate are typically dominated by a few sellers or buyers and that they are also frequently characterised by "the importance of new technologies, or of special skills, or of product differentiation and heavy advertising, which sustains or reinforces their oligopolistic nature" (1973, p6).

A third criterion for identifying MNCs, closely related to this oligopolistic environment, is organizational structure. On the basis of their management's orientation, companies which have global operations may be referred to as 'ethnocentric' (home-country oriented), 'polycentric' (host-country oriented) or 'geocentric' (world-oriented). Some authorities regard only this latter category of company as being truly multinational, since they aim to maximise profits on a global scale, and therefore have no preference for any particular country. Defined in this way the nationality of the parent company does not have a major impact upon the strategies pursued by MNCs. The UK, it can therefore be argued, provides as good examples of such companies as any country.

No matter which definition one chooses to adopt, it is beyond dispute that UK MNCs are important actors in the world economy. The UK is second only to the US in its ownership of capital invested overseas, a position it has held throughout the post-WWII period.[6] The findings of this study of UK MNCs should therefore be of interest outwith the UK.

The distribution of a mailed questionnaire constituted the major part of the research effort. It was designed to discover, inter alia, the relative importance of a number of variables in promoting licensing rather than other forms of international business. The review of the theoretical and empirical literature contained in Part II of the thesis identifies the potential explanatory variables which were included in the questionnaire.

Two key limitations of the research are worth noting at this stage. Firstly, the literature which is reviewed, particularly the empirical literature, is heavily US-oriented, and this may therefore have introduced a nationality bias into the variables which were selected for inclusion in the questionnaire. Secondly, the questionnaire data itself is of a cross-sectional nature and may therefore fail to reveal the effects of variables which change over time.

1.4 RESEARCH METHODOLOGY

The bulk of the data analysed in the study were collected by means of the questionnaire survey of a sample of UK-based MNCs. The questionnaire approach was necessitated in part by the sparsity of publicly-available data on international technology licensing by UK companies. Although government data was analysed to provide estimates of the extent of such activity, the conclusions drawn from this exercise can only be considered as tentative. Therefore, in addition to the analysis of this data the study also analyses primary data generated from the questionnaire survey.

The research can be characterised as broadly deductive in nature. As the primary objective was the testing of hypotheses, the questionnaire approach to data collection was selected rather than the case study approach because of the greater amount of data generated by questionnaires and the consequently greater chance of obtaining statistically valid results from them. However, in addition to testing hypotheses drawn from existing theories, a part of the analysis also involved inductive research as it attempted to reduce the number of variables required to explain the international licensing decision by using the technique of factor analysis.

Given the ordinality of much of the questionnaire data, most of the analysis was conducted using nonparametric statistical procedures. However, where parametric procedures could be justified these were also employed. Details of the grounds upon which the statistical procedures were selected can be found in Chapter Eight, which discusses the research methodology in detail.

1.5 OUTLINE OF THE THESIS

Following this introductory chapter, Chapter Two chronicles the historical evolution of international investment (broadly defined) and considers the role of the MNC in the contemporary international business environment.

Chapter Three contains of a brief description of the possible forms which international business may take: from FDI, joint ventures and consortia, through franchising, licensing and management contracts to turnkey agreements, subcontracting and exporting. Two classificatory frameworks are then outlined: one places each of these modes on different parts of a spectrum, depending on the degrees of ownership and control which they involve; the other framework classifies international transactions according to the flows of capital, knowledge and products which they give rise to.

Chapter Four contains a survey of FDI theories. Both positive, normative and organizational/behavioural theories are considered. These theories are then classified into four different categories in accordance with the market imperfections paradigm, as interpreted by Calvet (1981).

Chapter Five considers a set of theories which focus on the internal organization of firms rather than on the functioning of markets. The roots of this theoretical approach are traced back to the concept of transaction costs, as first articulated by Coase (1937) in the context of the theory of the firm. The subsequent applications of this concept to the phenomenon of corporate multinationality are then examined, ie internalization theory and its derivative, appropriability theory, and the Markets and Hierarchies framework of Williamson (1975).

Chapter Six proposes a framework for describing the theory of licensing in international business. This draws upon three main literatures: the international licensing literature, the technology transfer literature and the literature on the theory of the MNC.

Chapter Seven summarises the theoretical and empirical literature considered in the previous three chapters and proposes an analytical framework for analysing the international licensing decision.

Chapter Eight sets out in detail the research methodology employed. It describes the procedure used to select the population of companies for the questionnaire survey, the administration of the survey itself, and the statistical methods employed to analyse the data obtained from it.

Chapter Nine consists of an analysis of official UK data on exports, royalty receipts and direct investment, produced by the Government Statistical Service over the period 1964 to 1984. The analysis identifies trends in the distribution of UK international business modes over time and across industrial sectors and foreign markets.

Chapter Ten describes the characteristics of the sample of companies which responded to the questionnaire, which provides a context for the analysis contained in the subsequent chapters. Chapter Eleven analyses the determinants of the international licensing decision. It reports the extent to which licensing was evaluated by the companies against the key alternatives of exporting and FDI, and it also assesses the relative importance attached by the companies to a number of variables drawn from the literature review.

Chapter Twelve assesses the extent to which certain corporate characteristics were associated with the licensing activities of the company sample. From the literature review nine characteristics were identified, and the extent of association between these characteristics and the level of licensing activity was tested using multiple regression analysis. Chapter Thirteen is concerned with the intellectual property content of licensing agreements, and tests a number of hypotheses derived from the transaction cost literature.

Chapter Fourteen summarises the results of the research and draws out its key implications, as well as proposing some directions for future research.

CHAPTER ONE

NOTES

1. Nowadays, most of the financial capital component of the FDI package consists of the re-investment of profits realised in the host market and of money raised in the international capital market, rather than capital transferred from the host country (OECD, 1981).

2. Dunning, 1982a, p10.

3. Dunning's classification is essentially a re-statement of the distinction drawn by Johnson (1970) between material capital, knowledge capital and human capital.

4. Contractor (1985, p6) summarised the results of these surveys.

5. McGreevy's questionnaire was sent to executives selected from those companies in Fortune magazine's list of the largest 500 industrial corporations and the second largest 500 industrial corporations. Of the 550 questionnaires which he distributed, 121 were returned, and of these only 100 were considered complete enough to be of use in statistical analysis. This effective response rate of 18 per cent was, however, deemed high enough by the author to give validity to his results.

6. In 1978 the stock of direct investments held abroad by UK firms amounted to 11 per cent of the world total (the US accounted for 45 per cent). [Stopford et al (1980, p15)].

REFERENCES

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

COASE, R.H., 'The Nature of the Firm', Economica, New Series, 4, November 1937, pp 386-405.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.: Quorum Books, 1985.

DUNNING, J.H., 'Introduction' to International Investment: Selected Readings, J.H. Dunning (ed.), Middlesex: Penguin Books, 1972, pp 9-23.

DUNNING, J.H., 'Multinational Business and the Challenge of the 1980's', Multinational Business, No. 1, 1978, pp 2-8.

DUNNING, J.H., 'Recent Developments in Research on Multinational Enterprises: An Economist's Viewpoint', in Mattson, L.G., & Wiedersheim-Paul, F. (eds.), Recent Research on the Internationalisation of Business, Almqvist & Wiksell International, Sweden, 1979.

DUNNING, J.H., 'Alternative Channels and Modes of International Resource Transmission', in Sagafi-Nejad T., Moxon R.W., & Perlmutter H.V. (eds.), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 3-26.

DUNNING, J.H., 'Towards A Taxonomy of Technology Transfer And Possible Impacts on OECD Countries', in OECD, North/South Technology Transfer: The Adjustments Ahead, Paris: OECD, 1982a, pp 8-24.

DUNNING, J.H., 'Non-Equity Forms of Foreign Economic Involvement and the Theory of International Production', University of Reading Discussion Paper in International Investment and Business Studies, No. 59, February 1982b.

FRAME, J.D., International Business and Global Technology, Lexington, Mass.: Lexington Books, 1982.

GABRIEL, P., 'Management of Public Interests by the Multinational Corporation', Journal of World Trade Law, Jan-Feb, 1977, pp 15-36.

GROSSE, R., The Theory of Foreign Direct Investment, South Carolina Essays in International Business, No. 3, December 1981.

JOHNSON, H.G., 'The State of Theory in Relation to Empirical Analysis' in Vernon, R. (ed), The Technology Factor in International Trade, New York: NBER, 1970.

McGREEVY, E.R., Some Effects of Environmental Changes on Strategic Plannning of US-Based Industrial Multinational Corporations, University of Arkansas, PhD Dissertation, 1978.

OECD, International Investment and Multinational Enterprises: Some Recent International Direct Investment Trends, Paris: OECD, 1981.

OMAN, C., 'New North-South Investment Strategies', The OECD Observer, September 1981, pp 13-15.

OMAN, C., New Forms of International Investment in Developing Countries, Paris: OECD, 1984.

OMAN, C., 'Cooperative Strategies in Developing Countries: The New Forms of Investment', in Contractor, F.J. & Lorange, P. (eds), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988.

STOPFORD, J.M., HABERICH, K.O. & DUNNING, J.H., The world Directory of Multinational Enterprises, London: Macmillan, 1980.

UNITED NATIONS, Multinational Corporations in World Development, New York: UN Department of Economic and Social Affairs, 1973.

CHAPTER 1

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: Free Press, 1975.

CHAPTER TWO - INTERNATIONAL INVESTMENT & THE INTERNATIONAL BUSINESS ENVIRONMENT

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2.1 INTRODUCTION

This chapter describes the evolution of international investment, the rise of the MNC, and the growth of non-equity forms of investment, including licensing. It also describes the forces which have been most influential in recent years in shaping the international business environment. It therefore provides a backdrop against which the current licensing activities of UK MNCs may be understood.

The chapter begins with an exploration of the way in which the term 'investment' is interpreted, both at a domestic and at an international level. This discussion highlights the range of definitions which are attributed to the term investment, and it focuses upon a broad definition which incorporates non-equity forms of international business. The historical evolution of international investment, broadly defined, is then outlined.

The environment in which international business takes place is then discussed. Three main developments are highlighted, along with their likely consequences. The chapter closes with a re-assessment of the functions of the MNC in the light of the increased use of non-equity forms of international business involvement.

2.1.1 The Concept of Investment

Investment is generally understood as the undertaking of any commitment which involves an initial sacrifice followed by subsequent benefits. When economists use the term it can have two meanings, depending upon whether a 'micro' or a 'macro' perspective is adopted (Gray, 1979). As used by microeconomists, investment means the acquisition of an asset which involves the conversion of monetary resources into illiquid resources (either capital goods used directly in a productive process, or securities representing claims upon these assets). Possession of the former is referred to as direct investment, ie investment in 'real' assets, while ownership of the latter is referred to as indirect or financial investment.

When economists adopt a macroeconomic perspective they use the word investment to signify an addition to the capital stock of society (real or financial). Thus the sale of securities by one member of society to another cannot be considered as an investment since it does not increase the number of securities in the economy. From the individual's point of view an investment has been made, but from a macroeconomist's viewpoint nothing has changed. The basis for this difference in meaning is thus the size of the reference group. In either sense investment means the acquisition of an asset from outside the reference group, but in the macroeconomist's sense the group is so large that the only way investment can occur is for a new asset to be created.

Irrespective of the economic viewpoint which one adopts, the distinction between investment in real assets and investment in financial assets remains. The key difference between these two types of investment concerns the degree of control which investors are able to exercise over their assets. Entrepreneurs who invest directly in capital equipment automatically gain control over the decision-making process governing the use of their assets. In developed market economies, however, the dominant form of corporate enterprise is the public company, and investment decisions are therefore taken by groups of managers who earn their living by operating businesses on behalf of the security holders.[1]

2.1.2 International Investment

International investment can be regarded as simply the foreign extension of domestic investment. Thus, overseas investment in financial assets (portfolio investment) occurs when firms, financial institutions or individuals acquire an asset that is the liability of a foreigner. They may do this by purchasing the securities of firms which are incorporated in a foreign country, or by purchasing bonds denominated in a foreign currency.

FDI refers to the setting-up, extension, or acquisition of overseas production or service facilities (real assets). There are two main features of FDI which distinguish it from portfolio investment. Firstly, the firm which makes a direct investment overseas purchases the power to exert control over decision making in the subsidiary which it either creates or acquires. Dunning (1981) identified two motives which explain the desire of parent companies to control the decisions made by their subsidiaries: they may either perceive their own management to be more efficient in their decision making than subsidiary management, or the goals of the parent company may diverge from those of its individual subsidiaries. In this case control is exercised for reasons that have nothing to do with managerial shortcomings, but rather because decisions taken by subsidiaries will not always be in the interests of the MNC of which they are a part. This scenario is particularly likely in the case of MNCs that pursue global production and marketing strategies.

The second distinguishing feature of FDI is that it usually involves the transfer of a complete package of resources (ie technology and management skills, as well as financial capital). Exceptions may occur where a firm chooses to expand abroad by acquiring an existing foreign firm. From a purely global macroeconomic perspective, FDI by acquisition would not be classified as an investment since it would not represent an addition to the world's total capital stock; only the ownership, not the magnitude, of real assets would have changed. However, from the corporate viewpoint, ownership of real assets abroad, no matter how obtained, represents an investment.

It is theoretically possible, however, for firms which expand abroad via the acquisition route to do so without transferring any of their own resources overseas. They could utilise the technology of the firm taken over, as well as the skills of the incumbent management. It is also possible for acquiring firms to raise some or all of the capital used to finance such takeovers on the international capital market, or in the country in which the acquisition is being made, as an alternative to using their own internal cash reserves. Such cases are rare, however; most FDI takes the form of greenfield investment, ie the construction of fresh operating capacity.

The key characteristic of FDI, then, is that it involves the international transfer of knowledge within the firm, accompanied by control over decision-making. It is possible, however, for a firm's proprietary (ie unique) knowledge to be transferred abroad to independent firms as individual factor inputs, rather than as an integrated package incorporating control over decision-making. These 'non-equity' transfers are consistent with the concept of investment, for MNCs which enter into non-equity arrangements earn a return from doing so in the same way as they earn profits from equity investment. These returns compensate the providors of proprietary knowledge for the sacrifice involved in making it available to potential competitors.

Although these forms of international exchange do not result in real asset formation in the recipient nation, they do increase the 'knowledge capital' of that nation, whether it be in the form of human capital (ie management) or technological capital. FDI can thus be regarded as an aggregated form of international investment, accomplished internally (ie within the firm), while non-equity forms of resource transfer can be regarded as discrete forms of international investment, undertaken externally (ie in the arm's-length market).

Non-equity forms of investment may, however, enable the supplier to exercise some degree of control over the operations of the recipient. Many licensing agreements, for example, contain clauses which restrict the exporting potential of the licensee in order to limit competition with the licensor in its established markets. Another clause typical of many licensing agreements is a tied purchase provision obliging licensees to purchase intermediate products, capital goods or spare parts from the licensor.

A key feature of non-equity forms of international business, then, is that the distribution of effective control need not coincide with the distribution of risk among the parties involved. This point is made by Oman (1984) in his evaluation of the characteristics of non-equity forms of international business. He argues that it is the ability of suppliers to exercise control over the operations of recipients that distinguishes non-equity modes from sales operations, and thus allows them to be classified as forms of international investment.

Oman explains the significance of this characteristic as follows: "whereas an investment is normally undertaken by the investor with the intention of increasing the value of the resource (capital) he controls, that is, with the intention of using the resource he supplies to create and appropriate new value ('value-added'), a sale is normally carried out to realise (monetise) value already created. Whether or not a given international business operation involves at least an element of investment from the standpoint of the firm supplying the resource thus depends ... on whether or not the supplying firm seeks to use the resource to gain access to, and control at least part of, the new value to be created in the host country with that resource" (1984, p19).

Thus, according to Oman, the key characteristic of non-equity modes which allow them to be regarded as forms of international investment is that the supplier's profit is derived, at least in part, from the value created by the recipient. In the case of technology licensing agreements, for example, payments are often based upon the sales volume generated by the licensee; they do not depend upon the marginal cost of producing the technology for the licensee, as would be the case in an arm's-length sale under competitive market conditions.

MNCs considering the use of non-equity modes must, however, take account of the long-term implications of their adoption, for although the rights of control assigned to a supplier by the recipient may not in practice be very different from those which occur in a direct investment, the latter form of resource transfer does have the merit of lasting for as long as the firm wishes it to, whereas contracts are usually for a limited period of time.

The various forms of international investment which involve little or no equity participation are identified and described in the following chapter. For the moment it is sufficient to note that they constitute an alternative to the two traditional and most widespread means of servicing foreign markets: exporting and FDI.

2.2 THE HISTORICAL EVOLUTION OF INTERNATIONAL INVESTMENT

2.2.1 International Investment Pre-1945

The contemporary MNC has its roots in the British, Dutch and French merchant companies of the sixteenth and seventeenth centuries. However, these companies were essentially trading rather than manufacturing organizations, with relatively few overseas investments in manufacturing facilities, and their activities were limited to the colonial empires of their mother country. The international expansion of production did not take off until the latter half of the nineteenth century, shortly after the emergence of the joint-stock company had vastly increased the amount of capital available to UK firms.

The half century up to 1914 has been called the "golden age" of international capital movements, during which time the UK was the most important creditor nation, investing abroad up to seven per cent of its GNP [OECD (1981, p5)]. Indeed, the UK's annual investments abroad began to exceed her net capital formation at home after 1870 and continued to do so until 1914 [Stopford (1974, p314)]. Most of this, however, consisted of portfolio investment; in 1914, 90 per cent of all international capital movements took this form [Dunning (1972, p10)].

The inter-war years witnessed a steady increase in the global stock of FDI, particularly in the 1930s when protectionist policies spurred firms to jump trade barriers by replacing exports with foreign production. Nevertheless, FDI still lagged behind portfolio investment as the dominant form of international capital movement. This situation was reversed after 1945. Approximately 90 percent of all private capital flows between 1951 and 1964 took the form of direct investments [Hood and Young (1979, p12)].

2.2.2 International Investment During 1945-1970

This post-war transformation in the pattern of international capital flows is generally attributed to two main factors. The first of these is the revolution which took place in the field of communications technology. The advent of the era of cheap passenger air travel and the development of the computer provided the means by which a firm's headquarters could maintain a meaningful degree of control over its overseas subsidiaries. Subsequent scientific advances in the 1970s (the arrival of supersonic air travel, the development of the microprocessor-based computer, and the use of satellite technology for communications) served to reduce still further the problems of organizing large firms over great distances.

The other major impetus to the post-war internationalization of production was provided by the favourable economic conditions which prevailed in the 1950s and 1960s. During these two decades almost all of the industrialised countries and many of the less developed countries experienced unprecedented rates of sustained economic growth. In this period of virtually uninterrupted expansion of output and trade, foreign firms experienced little opposition when penetrating and developing new overseas markets. This situation changed in the 1970s with the onset of persistent 'stagflation' in advanced industrial economies. The resulting contraction in the rate of growth of output and international trade prompted host countries, especially the less developed ones, to seriously question the appropriateness of FDI to their particular needs. By that stage, however, MNCs had already established an indelible presence in most countries.

Most FDI in the early postwar years originated from the United States. This was due, in part, to the operation of the Marshall Aid scheme for postwar reconstruction, inaugurated in 1948. This plan, which entailed massive transfers of US government funds in the form of grants and loans to the European economies, favoured US firms in their efforts to gain access to recipient countries. The US soon became the principal source of private flows of direct capital investment to the recovering economies, with Europe the major recipient.

The dominant position attained by US firms in the immediate postwar era is also partly attributable to the technological lead which they had built up during the war years, and also to their superior management and organizational expertise. These latter advantages were products of the more competitive environment in the United States, and of the US's longer experience with large-scale firms.

In particular, the US was the birthplace of what has been described by Williamson (1981) as "the most significant organizational innovation of the twentieth century", ie the creation of the multidivisional (or M-form) structure. Created by Pierre Du Pont and Alfred Sloan in the early 1920s, this new corporate management structure involved the creation of semi-autonomous operating divisions organized along product, brand, or geographic lines. It superceded the traditional unitary (or U-form) structure, under which decision-making for all departments of a firm was centralised.

Although this new corporate structure was imitated slowly at first, adoption by US firms proceeded rapidly during the 1945-1960 period. In contrast, most large European firms administered their domestic operations through U-form structures until the late 1960s. Since the possession of an M-form capability made it easier for firms to extend asset management from a domestic base to include foreign operations, Williamson (1981) has suggested that their early adoption of the M-form structure gave US firms them the ability to engage in FDI at an earlier stage.

FDI continued to expand throughout the 1950s, with resource-based investments (raw materials and oil) accounting for the bulk of the investment. The rate of growth of FDI would have been even faster in this period were it not for the existence of controls on capital movements, in particular the lack of convertibility between major currencies. The gradual reduction of these restrictions towards the end of the 1950s helped contribute towards an acceleration in the growth of FDI. Much of this growth represented the response of US firms to the threat posed to their markets, previously developed through international trade, by the European custom unions (the EEC and EFTA). There was thus an evolution towards import-substituting manufacturing investment, with Western Europe the major recipient.

2.2.3 International Investment Post-1970

The position of the US as the leading exporter of direct investment capital began to be challenged in the 1960s by European countries other than the UK, and by Japan. It was only in the 1970s, however, that European and Japanese companies started to significantly erode the lead established by the US. Between 1971 and 1978 the share of the total FDI stock of the developed market economies held by the US fell from 49.3 per cent to 45.5 per cent, while that of Germany, Japan, the Netherlands and France rose from 19.4 per cent to 26.3 per cent. The UK's share dropped 3 per cent during this period [Stopford, Haberich and Dunning (1980, p15)].

This change in geographic distribution reflected the increasing financial strength and technological spohistication of non-US firms. In addition, environmental factors were not as favourable to US firms as they had been in the past. For example, higher European labour costs made the option of exporting more attractive for US firms.

The postwar trend of expansion in worldwide FDI, which gathered pace during the 1960s, continued on course until the mid-1970s. Since then, however, the growth of FDI among the OECD countries (ie the developed market economies) has slowed down sharply in real terms. The average annual growth rate of FDI from 13 OECD countries in the 1974-79 period was slightly less than that in the 1960-73 period (11.9% instead of 12.6%). Given the notably higher rate of inflation during the latter period (9.1% annually compared with 4.0% previously) this represented a sharp deceleration in real terms [OECD (1981, pp11-12)].

This slowdown in FDI growth occurred simultaneously with a general weakening of domestic investment in most OECD countries. In fact, FDI remained more buoyant than domestic investment, suggesting that MNCs adjusted better to the less favourable economic circumstances. However, the most significant change that has taken place in the international investment scene since the mid-1970s has not been the drop in the aggregate rate of real growth of FDI, but rather the way in which international investment is now carried out. According to the OECD's 1981 report Recent International Direct Investment Trends:

> " International direct investment through wholly-owned subsidiaries can no longer be thought of as the typical way of engaging in international business."[2]

The OECD report suggested that the era of the MNC as a major transporter of financial capital may have ended. It reported that most MNCs obtained financing for FDI via the internal cash flows of their already established foreign subsidiaries. Funds borrowed locally and on the international capital market represented the second most important source of finance. Paralleling this development, firms had become more involved in forms of international business that involve a lessening of their ownership rights over the resources which they transfer abroad.

Thus, the role performed by the MNC in the late 1970s would appear to have changed from that which it performed in the 1960s and early 1970s. The statistics compiled by the OECD appeared to confirm the contention of Gabriel (1977) that:

> " The basic function of the MNC is shifting from the mobilisation of capital, in which the company's reward is an entrepreneurial one for risks taken, to the sale of it's corporate abilities, in which its reward is a managerial one for services rendered."[3]

2.2.4 Conclusions

In reviewing the history of international investment one can identify a number of distinct evolutionary phases. The first phase began with the Industrial Revolution and lasted throughout the nineteenth century. During this era most resources were transferred across national boundaries as separate and independent factor inputs, their prices being determined at arm's-length between buyers and sellers. Financial capital flows were the dominant form of international resource transfer in this period. Human capital was transferred abroad via population migration, while technology (predominantly embodied in the form of plant and machinery) was exported. The exchange of these resources was accompanied by a transfer of ownership and control from buyer to seller.

In the nineteenth century firms were generally small and unincorporated and because of transport and communications constraints they only rarely ventured into overseas markets. On the other hand, the predominantly 'laissez faire' approach to international trade in the nineteenth century served to promote inter-firm trade. While there were thus inadequate mechanisms for the transfer of resources within firms, the international trading environment ensured that there were few barriers to the international transfer of resources between firms.

The twentieth century witnessed the start of a new phase as the gradual movement towards protectionism in international trade forced many firms to consider the intra-firm route of resource transfer. It was in the post-WWII period, however, that the intra-firm route came into its own, as dramatic improvements in transportation and communications made the territorial expansion of business a practicable proposition.

The decades of the 1950s and 1960s witnessed a period in which FDI grew rapidly, spawning the modern MNC in the process. This so-called "honeymoon period" came to an end in the early 1970s as the rate of growth of FDI slowed down and "new" modes of international resource transfer began to emerge. The increasing use of non-equity methods of international investment prompted Dunning (1978, p8) to comment that "the wheel of history is turning full circle".

Possible explanations for this shift in the behaviour of MNCs can be found in changes which have occurred in the international business environment. These are now considered.

2.3 THE INTERNATIONAL BUSINESS ENVIRONMENT

In the 1970s and 1980s major changes occurred in the economic, social and political environments within which MNCs operate. The implications of four of the key developments for the modality of international business are now examined.

2.3.1 Government Regulation of FDI and MNCs

During the 1970s many host governments, especially those from LDCs, became increasingly aware of the fact that MNC strategies which focussed on regional or global objectives often conflicted with their national objectives. Host country industries which are dominated by foreign subsidiaries tend to have few links with local industries since they are locked into the global production network of the MNC. The tension between MNCs and governments also derives from the tendency of MNCs to centralise their technology-creating (ie R&D) activities in the home country, and from their ability to use their internal accounting systems to transfer income out of countries, thereby reducing local value-added.

Throughout the 1970s these anxieties began to express themselves more and more in legislative and regulatory measures. In virtually all host countries certain sectors became closed to FDI. Although such restrictions have been in existence for many years in the defence and communications industries of most countries, a number of developing countries extended them to cover other sectors; notably power generation, retailing, and certain basic industries (eg petrochemicals in Mexico). In many other sectors, developing countries only permit a limited amount of FDI, although several do allow higher degrees of foreign capital participation in priority or 'pioneer' industries, and in industries which are export oriented and which manufacture products with a high degree of value-added.

Industries from which FDI is excluded may, nevertheless, be dependent upon MNCs if local firms have to resort to non-equity arrangements in order to purchase the technological or managerial expertise which they lack. In countries where the assets of MNCs have been expropriated there are many instances of continuing involvement with the nationalised companies through the use of contractual arrangements.

In many host countries, including some developed countries, investment proposals by MNCs are increasingly screened by government agencies. Following such screening the conditions of entry are defined, eg the extent of import substitution or export orientation. If foreign subsidiaries fail to meet the performance criteria laid down for them, they may be liable to expropriation.

As well as seeking to ensure that the control which MNCs are allowed to exercise is consistent with national priorities, many host governments have begun to actively seek foreign resources without acquiring foreign control over the use of those resources. Attention has thus been focused upon the task of limiting the equity stake of incoming FDI and of 'unbundling' the resources which they provide.

Some developing countries only permit MNCs to enter their country if they do so by forming a joint venture with a domestic partner. In 1974, for example, Indonesia announced that all new foreign investment would require 51% local equity. India generally limits foreign ownership to 40%, although companies engaged in certain priority sectors are premitted majority foreign participation. Similar equity restrictions on foreign firms have been imposed by many other developing countries, eg Mexico (49%), Nigeria (40%), Malaysia (49%) [United Nations (1978)].

Joint ventures are sometimes favoured by host countries as they are believed to provide most of the benefits of FDI, while permitting shared decision-making. The foreign partner normally contributes technology and initial management expertise, while the domestic partner provides specialised knowledge of domestic market conditions, legal requirements, labour management and other local factors.

In addition to stipulating that MNCs engage in joint ventures when entering their countries, some host nations (most notably India, Nigeria and Ghana) have enacted legislation to reduce the percentage of existing foreign shareholdings to stipulated levels within a prescribed time-limit, depending on the nature and character of their activities. Others such as Mexico, Indonesia and the Andean Pact countries have applied ownership requirements only to new investments, while Malaysia set itself an overall target of 70 per cent domestic and 30 per cent foreign ownership by the year 1990.

The desire for national ownership and control has led many developing countries to accord increasing emphasis not just to joint ventures, but also to arrangements with MNCs which do not involve any foreign equity participation. Some countries have formulated policies designed to screen foreign technology inflow and to develop indigenous technological capacity. Governmental agencies in countries such as Argentina, Brazil and Mexico aim to ensure that the terms and conditions of technology licences entered into by domestic enterprises are not unduly restrictive.

International trade in technology[4] has risen rapidly in recent years from around $2,700 million in 1965 to over $11,000 million in 1975 [United Nations (1978)]. This growth rate exceeds by a wide margin that of FDI over the same period. However, most of this trade, in the form of lump sum payments, royalties and fees, took place among developed countries and within MNCs. In 1975 developing countries accounted for only a small portion (less than ten per cent) of total technology payments. Nevertheless, although they are small in global terms, the technological fees paid by developing countries are large in the context of their economies, and they constitute a substantial figure when compared with exports.

Hidden within the aggregate statistics detailing the rapid growth of legislation from developing countries, there exists a wide range of policy responses towards the MNC. The attitudes of particular countries are inevitably a reflection of their unique political and cultural complexions, their resource endowments and their levels of economic activity. Countries rich in resources, for example, tend to be more selective when dealing with MNCs than do those which are less well endowed. Countries which have undergone significant levels of industrialisation tend, similarly, to have different attitudes towards MNC involvement in their economies than do countries which have not.

In many instances the increasing regulation of MNCs stems from concern over their impact on national culture rather than on national economic welfare. The pervasive influence of MNCs over the choice of products, consumption patterns and lifestyles of indigenous populations is perceived by many host nations to constitute an erosion of national identity. The hostile attitudes of many developing countries have also been nurtured by the sense of common purpose which these countries have built up through supranational organisations, particularly the United Nations.

This solidarity first began to express itself in the early 1970s when, over strong protests from the developed countries, a 40-nation working group under the United Nations Conference on Trade and Development (UNCTAD) formulated a set of proposals which sought redistribution of the world's wealth. Their proposals were developed into a resolution entitled "The Charter of Economic Rights and Duties of States", and was adopted by the General Assembly in 1974. 120 nations voted for the resolution, ten abstained and only six voted against (the US, the UK, the German Federal Republic, Denmark, Belgium and Luxembourg).

Among other things, the resolution recognised the right of host nations to abrogate any agreements protecting the interests of foreign investors whenever such action was deemed to be in their own interests. The resolution reflects the search for a so-called "new international economic order" (NIEO), an ideal which has continued to exercise the imagination of developing countries, aided by publications such as the Brandt Commission's report (1980) and its sequel (1983).

2.3.2 The Growth of Transnational Banking

The spread of non-equity arrangements in the late Seventies and Eighties was greatly facilitated by the growth of international lending by transnational banks (TNBs).[5] This expansion originated with the quadrupling of world oil prices in 1973/74. Since then, the major Western banks have been the conduit through which OPEC countries have channelled their large surpluses into the world's financial markets. In the years immediately following this first "oil shock" the bulk of these surplus funds were made available through the medium of the Eurodollar market. The most needy recipients of these funds were the non-OPEC developing countries, who went heavily into debt in 1973 and have stayed there since.

Unlike the developed market economies, the non-OPEC LDCs did not find it so easy to counter the first round of oil-price increases by expanding their export volumes and increasing their export prices; they had to resort to the international capital market in order to finance their current account defecits. However not all developing countries had equal success in securing funds from this source. The 'middle-income' oil-importing countries (which comprise mainly the 'newly industrialising countries') found international banks more willing to finance their payment imbalances than did the 'low-income' oil-importers. This latter group had to rely more on loans from official inter-governmental agencies - principally the World Bank and the International Monetary Fund. The oil-exporting countries, with their improved international credit standing, encountered the least difficulty in obtaining loans from private sources.

The total debt of all developing countries to commercial banks grew from $43 billion in 1973 to $117 billion in 1977 and $331 billion in 1981 [Blake (1983, p18)]. As of 1981, more than four fifths of the debt was concentrated in twenty developing countries, most of which were either oil-exporters or 'middle-income' oil importers. The annual rate of TNB lending to developing countries also considerably exceeded the annual inflow of FDI to these countries at the beginning of the 1980s.

In the 1970s bank lending increased at a faster rate than technology transactions or FDI; the latter actually declined by one per cent in constant terms [Girvan (1982, p7)]. In 1970-72, equity financing amounted to 31 per cent of developing countries' aggregate borrowing; by 1978-80 it had fallen to 22 per cent [Voss and Stoll (1982, p48)]. In parallel with this decline in the relative use of equity, the assets of the major banks increased dramatically over the 1970s; as of the early 1980s, the top 100 TNBs had combined assets of $4.4 trillion, equivalent to half the global gross domestic product [Cavanaugh and Clairmonte (1983, p19)]. This growth of international lending had the effect of increasing the opportunities for providing the 'capital' component of the FDI package independently of the other elements, thus facilitating the spread of non-equity investment.

This displacement of FDI by private lending not tied to the ownership of production facilities in the borrowing countries was hailed by Girvan (1982, p34) as "one of the most important developments in the 1970's related to the role of transnational corporations in the world economy." He argued that it had altered the established structure of power relationships in the international economy, eroding the dominant position of MNCs. Since many developing countries were now more dependent on bank financing than on foreign equity, Girvan argued that the location of decision-making had effectively shifted from MNCs to TNBs.

This shift was not to be permanent, however. The international economic climate prevailing in the early 1980s, characterised by slowing inflation and worldwide recession, effectively served to erode the ability of developing nations to service their huge debt burden, amassed in the 1970s on the assumption that inflation would erode its real value as growth generated the revenues to pay it off. As a number of advanced developing nations (notably Argentina, Brazil and Mexico) were forced to have their debts rescheduled, a new phrase was coined by commentators to describe the situation: the "debt crisis".

Alarmed by the growing number of debt reschedulings, TNBs subsequently exercised more caution in extending new loans and there has been a general slowdown in international lending by TNBs since 1982. In these circumstances equity financing grew in relative importance once again in the 1980s, reversing the trend of the 1970s, as developing nations sought alternative avenues of finance.

The reported response of MNCs to the harsher conditions facing their subsidiaries in LDCs suggests that equity will indeed play a more prominent role in the 1990s. Some MNCs have stepped up their existing shareholdings in joint ventures in LDCs by converting their subsidiaries' debt to equity, thereby overcoming two of the major obstacles which the debt crisis has thrown up: exchange controls and currency shortages. The shortage of currency is so severe in some developing nations that some MNCs have resorted to barter in order to sell products and maintain market share. For example in the early 1980s the West German multinational Volkswagen was reported to have taken payment in coffee for local car sales in Mexico and then sold the coffee in West Germany to obtain Deutschemarks.[6]

The possibility of equity financing playing a relatively more important role in LDCs was described by the Brandt Commission's (1983) report as a potentially "desirable" development (p82). If FDI flows do become relatively more important in response to world economic conditions, then the ability of developing nations to participate in non-equity arrangements may be diminished, for they will have to find alternative sources of funding to enable them to purchase separately the non-financial components of the FDI package, ie technology and managerial expertise.

2.3.3 Diversification of the Country of Origin of MNCs

A major feature of the international business environment in the 1970s was the relative decline of the US, and to a lesser extent of the UK, as sources of FDI. Their dominant positions were eroded by the rapid international expansion of Japanese and continental-European firms. This geographic diversification of host country origin has important implications for the modality of international resource transfer, for many of the new MNCs have shown a greater willingness to contemplate non-equity investment and joint ventures than have the established MNCs. Japanese firms, for example, have traditionally been more inclined to accept minority ownership in overseas ventures, especially in LDCs.

Although the bulk of FDI is still accounted for by a small number of countries, many new countries have emerged as sources of FDI, including a few oil exporting countries such as Saudi Arabia, Libya and Kuwait. Most FDI from these latter nations has tended to flow into Western Europe and the United States, and has most often taken the form of minority equity participation in existing firms or the acquisition of commercial property. Far more significant has been the entrance into the international investment scene of firms from LDCs. Although still of minor importance in terms of the world's stock of FDI, so-called "Third World multinationals" (based predominantly in newly industrialising countries) have grown at a rapid pace. Forty of the 500 largest companies outside the US in Fortune's 1982 list had their headquarters in LDCs, compared with only sixteen in 1975.

As a consequence of the growing internationalization of firms from LDCs, MNCs based in developed countries can expect to face growing levels of competition, particularly in LDC markets. The growing number of new multinational entrants from LDCs will also serve to increase the potential for competition in the international market place. As a result, LDCs are likely to find the balance of bargaining power swinging towards them, thus increasing their ability to demand that MNCs from the developed countries transfer their resources separately, rather than as a package.

2.3.4 Changes in the Technological Environment

The 1970s and 1980s have witnessed a number of major changes in the technological environment. These have increased the risks associated with technology production, which has in turn increased the attractiveness of non-equity business ventures.

A number of industries have been characterised by rapid technological change; semiconductors and computers are obvious examples. Escalating R&D costs in such industries have been exacerbated by shrinking product life cycles, reducing the time over which these costs can be amortized. The cross-licensing of technology is one response to this situation as it enables companies to gain access to emerging technologies and to the territorial rights which accompany them [Contractor and Lorange (1988, p13)].

The more rapid pace of technological change has been accompanied by an increase in the number of technology suppliers and a corresponding increase in the level of competition. An indicator of this global trend is the declining US share of world patents and the increased number of foreign (particularly Japanese) companies filing patents in the US. In 1987, for example, Japanese companies occupied the top three places for the number of new patents issued in the US.[7] The increased competition in the supply of technology and the much higher risk of failure has made it more appealing for companies to co-operate through cross-licensing agreements, joint ventures or other forms of collaborative ventures.

2.4 THE FUNCTIONS OF THE MNC RE-ASSESSED

The apparent emergence of a worldwide trend away from FDI as a method of servicing foreign markets towards various non-equity modes of involvement has prompted a reconsideration of the role that has traditionally been assigned to MNCs. The conception of the MNC as exclusively a transporter of financial capital, technology and managerial expertise in a single package is no longer appropriate, since MNCs also provide technological or managerial skills without any equity involvement.

It is important, therefore, that the role of MNCs as providors of resources on a non-equity basis is recognised in definitions of the MNC. The most commonly used definition of the MNC fails to take account of this role. The UN's Group of Eminent Persons, for example, defined MNCs as:

> "Enterprises which own or control production or service facilities outside the country in which they are based."

The need to provide a new definition of the MNC that takes account of the growing role of non-equity investment was acknowledged by Contractor and Lorange (1988). They argued that the traditional "stereotype" of the MNC as a "monolithic entity, controlling or owning its inputs and outputs, and expanding alone into foreign markets" was outdated and that the MNC should be viewed instead as a "coalition of interlocked, quasi-arm's-length relationships" (Op cit, pp 4-5).

This need to provide a more up-to-date definition of the MNC was also acknowledged in an earlier paper by Billerbeck and Yasugi (1979). In their review of the changing characteristics of FDI in developing countries, the authors stated that "traditional definitions based on equity participation now tend to underestimate actual foreign investment activity in developing countries. If the trends continue, foreign investment statistical series based on equity definitions will no longer reflect the economic realities of foreign investment flows unless they are combined with financial flows and information about the new types of arrangements" (1979, pp 7-8).

The following four modifications were suggested by Billerbeck and Yasugi:

(i) The principal criterion of traditional FDI, equity participation, should be maintained as a precondition, but with a lower limit.

(ii) The second criterion, an effective voice in the management of an enterprise, should be extended to allow for the attainment of this influence not only through equity participation, but also through contractual arrangements.

(iii) Loans and supplier credits from other foreign parties should be regarded as foreign investment because they are usually induced, and often guaranteed, by equity investors.

(iv) Other forms of co-operation between firms in host and home countries should be taken into account if they establish a lasting interest through technical assistance agreements or long-term supply contracts.

With these alterations, the authors argue that FDI could then be loosely defined as follows:

> "A form of intensive cooperation between enterprises in home and host countries which involve equity and management participation."[8]

Such a definition would apply regardless of whether there was only one foreign party (the parent) involved, or a multipartite joint venture with various foreign parties providing different financial or non-financial elements of a 'package'. Although Billerbeck and Yasugi's re-definition of FDI, and therefore of the functions of MNCs, accurately reflects the greater variety of international business transactions which now take place, a simpler (and no less accurate) re-definition of corporate multinationality can be achieved if only a slight alteration is made to the wording of the widely-used UN definition quoted earlier. Substituting the phrase "income-generating assets" for the phrase "production or service facilities" in this definition takes account of the various types of transaction now undertaken by MNCs; the term "income-generating assets" can refer to capital, technology and management skills in either their 'unbundled' form or in some 'bundled' format.

A more appropriate definition of the MNC would thus read as follows:

> "Enterprises which own or control income-generating assets outside the country in which they are based."

This definition recognises the fact that MNCs may obtain revenue by transferring abroad income-generating assets in the form of individual factor inputs, or in some combination that does not entail 100 per cent equity involvement. The essence of this transformation was concisely summarised by Gabriel (1977) as follows:

> "The basic function of the MNC is shifting from the mobilisation of capital, in which the company's reward is an entrepreneurial one for risks taken, to the sale of its corporate abilities, in which its reward is a managerial one for services rendered."[9]

CHAPTER TWO

NOTES

1. However, according to Michael Jensen (1989) the days of the public company are numbered in many sectors of the US economy. This prediction is based upon the changes in the ownership structure of companies following the junk-bond financed LBO boom in the US in the late 1980s. However, the sharp downturn in LBO activity in 1989 and 1990 suggests that this prognosis is premature.

2. OECD, 1981, p33.

3. Gabriel, 1977, p28.

4. Defined in the widest sense to embrace the skills and resources needed to create and sustain an efficient, competitive business. See United Nations (1978, p69).

5. The phrase has been coined by the United Nations Centre on Transnational Corporations.

6. Business Week, July 25 1983, pp 52-54.

7. Economist, October 8 1988, p83.

8. Billerbeck and Yasugi, 1979, p8.

9. Gabriel, 1977, p28.

REFERENCES

BEVAN, T.H., 'Some Problems of International Bank Lending', Barclays Review, February 1983, pp 10-14.

BILLERBECK, K. & YASUGI, Y., Private Direct Foreign Investment in Developing Countries, World Bank Staff Working Paper, No 348, July 1979.

BLAKE, D., 'Banks on the Brink', New Statesman, 7 January 1983, pp 18-19.

BRANDT COMMISSION (THE), North-South: A Programme For Survival, London: Pan Books, 1980.

BRANDT COMMISSION (THE), Common Crisis North-South: Cooperation For World Recovery, London: Pan Books, 1983.

BUSINESS WEEK, 'How the Debt Crisis is Battering Multinationals', Business Week International, July 25 1983, pp 52-54.

CAVANAGH, J. & CLAIRMONTE, F., 'From Corporations to Conglomerates: A Review of Multinationals over the last Twenty Years', Multinational Monitor, January 1983, pp 16-19.

CONTRACTOR, F.J. & LORANGE, P., 'Why should Firms Cooperate? The Strategy and Economics Basis for Cooperative Ventures' in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988.

DUNNING, J.H., 'Introduction' to Dunning, J.H. (ed), International Investment: Selected Readings, Middlesex: Penguin Books, 1972, pp 9-23.

DUNNING, J.H., 'Multinational Business and the Challenge of the 1980's', Multinational Business, No. 1, 1978, pp 2-8.

DUNNING, J.H., 'Alternative Channels and Modes of International Resource Transmission', in Sagafi-Nejad, T., Moxon, R.W. & Perlmutter, H.V. (eds), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 3-26.

GABRIEL, P., 'Management of Public Interests by the Multinational Corporation', Journal of World Trade Law, Jan-Feb, 1977, pp 15-36.

GIRVAN, N.P., 'Transnational Corporations in a Changing World Economic Environment: Some Issues for Research and Policy', The CTC Reporter, Fall 1982, pp 6-7 & 33-35.

GRAY, H.P., International Trade, Investment and Payments, Boston: Houghton Mifflin Co., 1979.

HOOD, N. & YOUNG, S., The Economics of Multinational Enterprise, London: Longman, 1979.

JENSEN, M.C., 'Eclipse of the Public Corporation', Harvard Business Review, September-October 1989, pp 61-74.

OECD, International Investment and Multinational Enterprises: Some Recent International Direct Investment Trends, Paris:OECD, 1981.

OMAN, C., New Forms of International Investment in Developing Countries, Paris: OECD, 1984

STOPFORD, J.M., 'The Origins of British-Based Multinational Manufacturing Enterprises', Business History Review, Vol 48, Autumn 1974, pp 303-335.

STOPFORD, J.M., HABERICH, K.O. & DUNNING, J.H., The world Directory of Multinational Enterprises, London: Macmillan, 1980.

UNITED NATIONS, Transnational Corporations in World Development: A Re-Examination, New York: UN Economic and Social Council, 1978.

VOSS J. & STOLL J., 'The World Bank Group and Foreign Direct Investment in Developing Countries', The CTC Reporter, Fall 1982, pp 47-49.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

CHAPTER THREE - FORMS OF INTERNATIONAL BUSINESS

CHAPTER THREE - FORMS OF INTERNATIONAL BUSINESS

3.1 INTRODUCTION

This chapter describes the main features of each of the possible forms of international business in which companies can become involved. Licensing is analysed in more detail than the other methods since it forms the central focus of the thesis.

It is possible to classify forms of international business activity into eight broad categories:

TABLE 3-1

FORMS OF INTERNATIONAL BUSINESS

(1) Foreign direct investment
(2) Joint ventures and consortia
(3) Franchise agreements
(4) Licensing agreements
(5) Management contracts
(6) Turnkey Agreements
(7) Subcontracting
(8) Exporting

[SOURCE: Author]

Although each of these forms is presented as a discrete alternative to each of the others, any given project or enterprise may simultaneously involve two or more of them. Turnkey contracts, for example, are more often than not accompanied by licensing agreements.

A new term has emerged in the literature in the 1980s to describe forms of international business which involve some form of collaboration between two or more companies: 'strategic alliances'. A variety of other terms are also used to describe the same types of collaborative ventures: terms such as 'cooperative arrangements', 'coalitions' and 'strategic partnerships' are commonly employed. For ease of understanding, the term 'strategic alliance' will be used here.

The term does not describe a new form of business which has emerged in the 1980s; rather, it is simply a general term which encompasses all forms of international business which fall between FDI and exporting in Table 3-1, ie categories (2) to (7) inclusive. Thus, strategic alliances may be regarded as combining non-equity forms of international business, categories (3) to (7) inclusive, with equity joint ventures and consortia, category (2).

However, the term strategic alliances is also used to describe additional non-equity agreements over and above those indicated in Table 3-1, especially agreements which are not related to the servicing of a particular market. For example, agreements between two companies for the long-term supply of raw materials, or agreements providing for the pooling of R&D (very common among computer companies) are both regarded as strategic alliances.

The topic of strategic alliances is dealt with in more detail in Section 3.6, and the chapter concludes by outlining possible frameworks which may be used to classify all of the forms of international business listed in Table 3-1.

3.2 EQUITY INVESTMENT

3.2.1 Foreign Direct Investment

FDI involves a transfer of capital that creates, adds to, or acquires a controlling interest in a foreign enterprise. Control is the key feature which distinguishes this form of investment from foreign portfolio investment. This control is usually accompanied by the transfer of resources other than simply finance capital, ie management, technology etc.

The most clear-cut example of FDI occurs when a company constructs a new factory overseas (greenfield investment). FDI may also occur via the take-over of existing foreign companies or domestic companies with foreign subsidiaries.

3.2.2 Joint Ventures and Consortia

Joint ventures exist when companies are owned by more than one organization, and are usually referred to as consortia when more than two organizations participate. Organizations may include both companies and governments. The distribution of shares in a joint venture may be determined according to each partner's financial contribution, or it may be based on other forms of contribution such as the provision of technology and management.

The essential feature of a joint venture is that no one participant holds a sufficient shareholding to exercise effective managerial control. If this latter case does arise, then the venture takes on many of the characteristics of an independent operation for the dominant partner, and becomes largely a portfolio investment for the other partner(s).

A particular form of joint venture is the 'fade-out' agreement. This generally involves an initial equity participation by the foreign investor of more than fifty per cent followed by a gradual transferrence of ownership to one or more local parties. Once the fade-out process has been completed, the foreign investor may retain minority participation or no equity whatsoever. Even in this latter case, however, the foreign investor may retain a direct interest in or even control over certain aspects of the business, eg international marketing.

3.3 LICENSING AGREEMENTS

3.3.1 Introduction

A survey of the literature on licensing reveals that there is no commonly accepted definition of the term. This ambiguity is due, in part, to the fact that licensing is often part of a larger contractual package. Discussion of the pros and cons of various definitions of licensing can be found in Contractor (1985) and Buckley (1985).

Perhaps the most basic definition of licensing is that it represents a "covenant not to sue."[1] This legal conception of licensing derives from the fact that it usually involves a company granting another permission to use its legally-protected intellectual property, such as patents or trademarks. However, licensing agreements may also grant permission for the use of intellectual property that has no statutory protection, ie know-how. In addition, licensing agreements often involve the transfer of related marketing and management services. These services are usually transferred via the supply of personnel to the licensee, often with the intention of training the licensee's personnel.

If related marketing and management services are included within the definition of know-how, then licensing may be defined as follows:

> "a contractual agreement whereby a company provides another with the right to use its intellectual property in return for some form of remuneration."

This definition of licensing is wider than some definitions. For example, Business International (1977) identifies licensing with only a subset of intellectual property. However it is also narrower than some other definitions. For example, Rugman et al (1985) view licensing as a more general term covering a number of non-equity modes of business.[2]

In licensing terminology, the company providing the intellectual property is known as the licensor, and the company obtaining the right to utilise that property is referred to as the licensee. When a company acts as a licensor it is engaging in the business of 'licensing-out' or 'outward licensing'. Conversely, when it acts as a licensee it is involved in 'licensing-in' or 'inward licensing'.

The remuneration received in licensing agreements may take a number of forms: an initial lump-sum fee, a percentage of sales, a shareholding in the licensee (and hence a share of profits), goods bought from the licensee at a discount, or reciprocal access to the licensee's technology.

A key characteristic of licensing agreements is that the ownership of intellectual property remains with the licensor. The licensee is only given carefully defined rights of access to and use of the licensor's intellectual property. The use of the term "technology sale", which is sometimes used to describe licensing, is therefore misleading. As Oman (1985, p15) points out, a sale implies the transfer of property rights from the seller to the buyer. In a licensing agreement, these rights are retained by the licensor.

A similar point was made by Dunning (1982, p10) in the more general context of technology transfer. He questioned the suitability of the word transfer in the term 'technology transfer', on the grounds that dictionary definitions of the word suggest that the transferor loses what is being transferred. Dunning suggests that the word 'transmit' is more appropriate as it focuses on the communication aspect of the acquisition process.

Given the above definition of licensing, any consideration of the range of possible licensing agreements must necessarily involve a description of the types of intellectual property which companies might possess.

TABLE 3-2

TYPES OF INTELLECTUAL PROPERTY

. Patents
. Know-how
. Trademarks
. Copyright
. Registered Designs

[SOURCE: Author]

The types of intellectual property which are amenable to licensing are listed in Table 3-2. Each of them will now be considered in turn.

3.3.2 Patents

A patent is a document issued by a government which gives statutory protection for a limited period to a technical concept. To secure a patent in most countries, a technical concept must pass three tests:[3]

1) it must be patentable;
2) it must be new;
3) it must be inventive in relation to what is already known.

To pass the first of these tests, it must be demonstrated that a technical concept is capable of industrial exploitation. To pass the second test, the concept must not have been disclosed anywhere in the world prior to the application for a patent. This test has become of increasing importance in view of the tendency for concepts to be subjected to "test sales" to determine if there is a market for them [Baillie (1984, p73)]. In many countries, this constitutes prior disclosure and would prevent the concept from obtaining a patent. The third test involves determining whether or not a concept represents a significant development over the existing state of knowledge.

Any disputes which arise in the granting of patents are settled in the law courts. Each country therefore possesses a body of case law arising from these disputes. Those involved in the filing of patent applications can consult this case law to assess their chances of success if there is a likelihood of a dispute arising.

Although many seemingly worthless inventions achieve patented status every year, there are some significant areas of knowledge which have failed to become patented in many countries. Perhaps the two most well-known are computer software and the micro-organisms produced by genetic engineering. Development of an area of technology which is inherently unpatentable can have important consequences for the mode of business employed to exploit that technology since patents are aften the "peg" on which many licensing agreements are hung [Lowe and Crawford (1984, p9)].

The legal protection afforded by a patent lasts for a limited period of time. In most European countries, including the UK, the time span is 20 years (in the US it is 17 years). Patents are granted by individual countries. To ensure adequate patent protection on an international basis, companies must file patent applications in each country where they wish their patents to operate. This task has been made easier by the existence of a number of international conventions and treaties which have fostered international agreement and co-operation on patent protection.

The first of these agreements to be signed was the Paris Convention for the Protection of Industrial Property, which dates from March 1883. The convention commits member states to ensuring that the same protection is accorded to the industrial property emanating from other member states as is accorded to that produced by their own nationals. Under the convention inventors are generally given a 12-month period from the time of filing in the original country in which to file in other countries. A patent may therefore be issued in the home country without it being invalidated in another country on the grounds that the novelty of the patent had been previously disclosed.

The Paris Convention has been revised on several ocassions since 1883, the last revision occuring in 1967. The number of states which have joined the Paris Union, the organization set up by the Paris Convention, has steadily increased over time from the original 11 founding states.[4] As of March 1983 some 92 states were members of the Paris Union [WIPO (1983, p15)].

The main achievement of the Paris Convention was that it established a set of very elementary rules, which subsequent agreements have built upon [Maddison (1981, p6)]. Perhaps the two most significant of these later agreements are the Patent Co-operation Treaty (PCT) and the European Patent Convention (EPC).

The PCT, signed in 1970, reduced the complication of applying for patents in a number of different countries by enabling patents to be filed on a multiple basis. The EPC, signed in 1973, was the first agreement to effectively create a supranational patent, covering the eleven states which were signatories to the convention.

Patent protection does not come cheap. The cost of taking out a patent on a worldwide basis has been estimated at a sum "often in excess of £30,000" [Lowe and Crawford (1984, p8)]. Firms must therefore determine whether the benefits derived from patent protection are worth the costs. In some industries patent protection may be the only protection available. In the mechanical engineering industry, for example, disclosure of a mechanical system very often involves disclosure of all of the principles involved. Patent protection is therefore the only practical means of protection.

A key determinant of whether or not a novel technical concept is patented is the strength of protection afforded. If a company believes that it is not going to obtain adequate protection, it may deliberately keep its knowledge a secret. This knowledge would then be classified under that category of intellectual property referred to as know-how.

3.3.3 Know-how

There exist a number of different definitions of know-how, reflecting the fact that it is an "inherently imprecise term" [DTI (1986, p27)].

A succinct definition of the term was provided by the Banks Committee, which reported in 1970 on the UK patent system and patent law. It defined know-how as:

> "... all confidential (secret) technical information having industrial significance." [5]

Technical information may be kept secret either because it cannot be patented, or because the proprietor of the information wishes it to remain confidential. These two reasons are reflected in the definition of know-how adopted by UNIDO (1979):

> "... information that is either unpatentable (ie lacks the legal definition of novelty) or is purposely left unpatented." [6]

The information that constitutes know-how may be capable of being embodied in tangible objects. Examples of such information would include manuals for plant operating instructions, formulae for chemical processes and blueprints of factory layouts. Not all information, however, is capable of being rendered into a tangible form. Some may only be imparted by means of personal instruction and demonstration. Examples of this type of information would include techniques used in the production process (such as laboratory practice) and the sales and marketing methods used to promote final products.

The distinction between these two categories of information (tangible and intangible) is reflected in the definition of know-how adopted by Creed and Bangs (1960):

> "... inventions, processes, formulae or designs which are either unpatented or unpatentable; it may be evidenced by some form of physical matter such as blueprints, specifications or drawings; ... and it may involve accumulated technical experience and skills which can best, or perhaps only be communicated through the medium of personal service." [7]

Some authorities have formalised this distinction between tangible and intangible know-how by defining a separate category of unpatented information, known as 'trade secrets'. Although the term is used loosely by different authors in different ways, it is generally employed when referring to specific items of information that can be expressed in a tangible form, such as a set of instructions or a manual. According to UNIDO (1979, p12) for example, a trade secret is "any formula, pattern, device or compilation of information". Unpatented information which cannot be defined in the form of a document, but which resides in the knowledge of individuals, is therefore categorised as know-how.

This ability to classify specific items of unpatented information as trade secrets can have important consequences for companies, because many countries have laws which recognise the existence of trade secrets (or industrial secrets, as they are sometimes referred to). For example, Mexico's penal code contains a chapter on the disclosure of trade secrets [UNIDO (1979, p12)].

Although trade secrets are sometimes distinguished as a separate category of intellectual property, it is more common to find know-how used to refer to the whole field of unpatented information, whether embodied in people or tangible objects. This more general definition will therefore be adopted here.

No matter what definition of know-how is adopted, the common factor in all of them is secrecy. It is secrecy which makes know-how a valuable asset. However, because know-how remains undisclosed it is not generally afforded the legal protection which is automatically given to other forms of intellectual property. Unless know-how can be articulated in a form which enables it to be protected by legislation governing trade secrets, its owner has no legal recourse to prevent third parties from utilising it.

In the UK the Patents Act 1977, the Trade Marks Act 1938 and the Copyright Act 1956 define patents, trademarks and copyright as property rights which are afforded legal protection. There is no equivalent act covering know-how, and no legal provision for the protection of trade secrets. Nevertheless, know-how is treated for tax purposes in the same manner as other forms of intellectual property (ie income received from know-how is taxed as trading income rather than as a capital receipt).

In fact, the only item of UK legislation in which a definition of know-how can be found is the Income and Corporation Taxes Act 1970. This Act defines know-how as:

> "... any industrial information and techniques likely to assist in the manufacture or processing of goods or materials ..." [8]

Despite the fact that know-how is not specifically recognised in law as a property right, it is nevertheless possible to obtain legal redress for know-how that has been disclosed against the will of the proprietor. This is due to the fact that know-how is transferred by means of a legal contract which defines the nature and content of the know-how in question. Any suspected breach of confidence can therefore be the subject of a common law action to obtain compensation.

Commenting on the strength of the protection afforded by English common law, Hearn (1987, p148) stated that the owners of know-how are "well-protected against infringement of their property". He also noted that the "same protection is afforded in many other countries, but not all."

It is unusual to find know-how licensed on its own, just as it is also uncommon to find patents licensed in isolation. Most licensing agreements involve some combination of patents and know-how. Contractor (1985, p6) reports the results of a number of surveys of the content of licensing agreements which provide evidence of this. The reason for this pattern is that the information contained in a 'bare' patent is often not sufficient to produce a marketable product. It is therefore necessary to obtain additional know-how, ie that "body of information which emerges from the practical experience of working the patent" [UNIDO (1979, p11)].

3.3.4 Trademarks

Unlike know-how, there is little disagreement about what constitutes a trademark. The following description, from UNIDO (1979) provides a suitable definition:

> "... distinctive visual and sometimes aural devices, words or emblems (symbols), or a combination of them, that a firm applies to the goods it trades in, or the services it performs, to indicate to the public that they are the firm's goods or services." [9]

Like patents, trademarks constitute legally protected property rights. In most countries, a trademark is established when it is accepted by the government authority responsible for the registration of trademarks. It is then entered on an official register which contains lists of existing trademarks (classified according to the goods or services to which they relate) and the proprietors of these trademarks.

Protection of trademarks on an international basis is provided by the Paris Convention, which covers trademarks as well as patents. The convention allows for trademarks to be granted a six month priority period after registration in the home country, so that registration can be repeated in any convention country. The convention also gives protection for what are defined as "well-known trade marks" [Hearn (1987, p190)]. If a firm can obtain a certificate in its home country stating that its trademark meets this description, then it will be entitled to protection against infringement in a convention country, although not registered.

In addition to the Paris Convention, some 25 countries (excluding the UK) are signatories of the Madrid Agreement which provides facilities for trademarks to be registered on an 'international' basis, ie in all of the member states. Although the UK is not a signatory of the agreement, subsidiaries of UK MNCs which are located in any of the member states can apply for 'international' registration under the agreement.

It is interesting to note that up until 1984 the UK was out of line with many other countries in not having any legal protection for services, such as banking. Until then, only goods were protected by trademarks. This situation changed when the Trade Marks (Amendment) Act 1984 was passed. This act created a new class of mark, the service mark, which extended the protection afforded to goods in the original 1938 Act to services.

The protection afforded to trademarks by legislation is supplemented in many countries by unfair trading laws. In the UK, for example, firms which attempt to trade unfairly on a reputation previously established by others can be the subject of a common law action for 'passing off' their goods as those of another firm. Common law suits for 'passing off' are often brought alongside those for trademark infringement, on the grounds that if one fails the other may succeed.

According to Hearn (1987, p190) unfair trading laws in most developed countries provide protection which is "largely effective", although there are countries "which offer considerable scope to the infringer". Relying on unfair trading laws is, however, much riskier and more time-consuming than relying on statutorily registered trademarks. As Gallafent et al (1981, p35) point out, the burden of proof in 'passing off' cases rests with the plaintiff. They must prove that any unregistered trademarks had been used by them and that they had acquired a reputation as a result. Not only is this a difficult case to prove, but in attempting to do so it may be necessary to reveal trading information that would be of benefit to competitors.

The UK Government's Green Paper <u>Intellectual Property Rights and Innovation</u> made the following comparison between common law protection and trademark protection: "Relying on common law in the event of one business passing off its services as those of another does not offer sufficient protection. Taking such action is expensive and difficult when compared with enforcing a clearly registered property right. Common law has not been considered sufficient protection for goods, hence the existence of trademarks" [HMSO (1983, p19)].

The survey evidence on the content of licensing agreements, summarised by Contractor (1985, p6) reveals that trademarks are very seldom licensed in isolation, but are often part of agreements that involve the licensing of patents and/or know-how. Despite this apparently minor role, the value of trademarks in composite licensing agreements may often be substantial. This is largely due to the fact that, whereas patents have a finite life, there is generally no statutory limitation on the life of a trademark, so long as the proprietor keeps it in force by making use of it and by paying periodic renewal fees. Know-how also has, in theory, an infinite life span because it is not a property right. This is, however, dependent upon the know-how being kept confidential. Once it becomes public knowledge it loses its value. Trademarks, on the other hand, retain their value as long as they remain registered.

Trademarks may sometimes be included in composite licensing agreements with patents and/or know-how in order to prolong their life. For example, when a patent has a short unexpired life (say three years) its licensor may be able to extend its life artificially by linking it with a trademark in a composite agreement covering a longer period [UNIDO (1979, p35)]. Even when the patent has expired, if the goods produced by the patent come to be identified in the public mind by means of a trademark, then consumers will continue to prefer that good to competing products which must be sold under different trademarks.

It is this ability of trademarks to differentiate products which makes them valuable. As Skelton (1984, p6) puts it, trademarks are the means whereby the owners of a particular technology are able to distinguish the products of that technology. They enable consumers to distinguish between different products and thus come to recognise those products that are consistently of a certain quality.

Because the value of trademarks is dependent upon their reputation as a guarantor of quality, the exercise of quality control over the output of licensees is a key constituent of licensing agreements involving trademarks. The provision of quality control by licensors is, in fact, written into the trademark laws of many countries [UNIDO (1979, p34)]. The objective of these provisions is to ensure that the goods produced by licensees are of the same quality as those emanating from licensors, and that the reputation of goods bearing the licensor's trademark is therefore upheld.

3.3.5 Copyright

This form of intellectual property gives protection to what may be described as original "literary, dramatic, artistic and musical" works [Maddison (1981, p4)]. These works can take a variety of forms, eg novels, paintings, music, sculptures, photographs, or some combination of these forms.

Like patents and trademarks, copyright is a legally protected property right. There is, however, one important difference between copyright and these other two categories of property right. Whereas patents and trademarks are voluntary in nature (ie they only exist if someone chooses to apply for them) copyright exists automatically whenever material that can be copyrighted is created.

In many countries (including the UK) the duration of copyright protection is limited to 50 years after the death of the orginator, although exceptions exist for certain kinds of works. Protection is provided for copyright on an international basis through the existence of a number of international treaties, the most important being the Berne Convention, which dates from 1886.

Because copyright is concerned with the protection of literary and artistic property it is not usually classified as a form of industrial property (eg WIPO, 1983). Nevertheless, in a few countries (notably the UK) copyright protection is afforded to designs which are capable of industrial exploitation. This form of copyright protection has come to be termed 'design copyright'.

In the UK design copyright came into existence with the Design Copyright Act 1968. Prior to the introduction of this Act, it was not possible to sue for infringement of copyright relating to designs under the Copyright Act 1956 because there already existed an act which protected industrial designs, namely the Registered Designs Act 1949. This act, discussed in more detail below, created a new class of legally protected intellectual property, known as a registered design. If a design was registered, or was capable of being registered under this Act, then it was not eligible for copyright protection.

All this changed with the introduction of the Design Copyright Act 1968 which extended copyright protection to designs irrespective of their status, or potential status, as registered designs. The duration of protection under this act is 15 years for any reproduction of design drawings in a material form, and the full 50 years for any copying of the design drawings themselves.

3.3.6 Registered Designs

This category of intellectual property is comprised of designs which are capable of industrial exploitation. To be eligible for legal protection designs must be new or original and must be registered in a government office.

In the UK industrial designs are defined by the Registered Designs Act 1949 as "features of shape, configuration, pattern or ornament applied to an article by any industrial process or means being features which, in the finished article, appeal to and are judged solely by the eye" [Gallafent et al (1981, p26)]. Protection for registered designs lasts for 15 years in the UK, as it does in most other countries. At an international level, industrial designs are covered by the provisions of the Paris Convention.

Despite the fact that designs are automatically protected by copyright legislation in the UK, there is still an advantage to be gained by registering a design. This advantage arises from the fact that a registered design is infringed if someone produces an article looking the same, whether or not copying has taken place. There is thus no necessity to prove that copying has taken place if a design is registered. If a design is protected solely by copyright then proof of copying must be provided.

3.3.7 Conclusions

This section has described the different types of intellectual property which may be transferred by means of a licensing agreement. It is common for more than one type of intellectual property to be transferred in a licensing package; know-how, for example, is often licensed along with patents. These two categories of intellectual property, along with trademarks, provided the focus for the investigation of technology licensing by UK MNCs which is reported in the thesis.

The licensing of copyright and registered designs is not explored in the thesis. However, it should be noted that the industrial property which is protected by these two property rights, design drawings, often forms a part of the know-how package. Indeed, copyright and registered designs have in the past been of "less importance than know-how" [Lowe and Crawford (1984, p10)].

3.4 OTHER FORMS OF NON-EQUITY INVESTMENT

3.4.1 Franchising Agreements

Franchising is a form of business arrangement which involves one company (the franchisor) providing another company (the franchisee) with a standard package of components or ingredients together with management and marketing services. This type of agreement entails a greater degree of control than licensing. In return, the franchisee provides capital and usually some market knowledge, and will pay some form of royalty.

This type of transaction is commonly entered into by companies which own products that are not patentable. Pepsi-Cola, for example, rely heavily on franchising. Their franchise holders own the bottling plants, employ local staff, and control their own advertising budgets. Pepsi-Cola International sells the Pepsi-Cola concentrate to these bottling plants, who are denied access to the syrup's formula. Through the pricing of the syrup and the franchising fee charged for the use of it's trademark the company is able to capture its economic rent.

3.4.2 Management Contracts

Management contracts are agreements which enable companies to use part of their management personnel to assist other companies in return for a fee or a share in the company's profits.

This type of business agreement is common in service industries, such as the hotel industry. A typical example is provided by Hilton International. This company has management contracts with hotels abroad, enabling fees to be earned for consulting and management services with little or no equity participation [Dunning (1981, p20)].

A contractual arrangement which is similar to the management contract is the "technical assistance contract" [UNIDO (1979, pp 5-7)]. This enables a company to sell the technical expertise of its personnel to other companies. It is sometimes mistakenly labelled as a know-how contract, since both involve the transfer of packages of technical information needed for carrying out a project. The basis for distinguishing between them lies in the fact that a substantial portion of the technical information contained in a know-how agreement is held in secret. The information provided via a technical assistance agreement, on the other hand, may be well-known or fully available in the public domain [UNIDO (1979, p14)].

The value of technical assistance therefore lies in the expertise of its supplier in a specific production area, whereas the value of obtaining information from a supplier of know-how is that it gives its possessor some advantage over those using information that is not secret. Seen in this manner, technical assistance is a separate but complementary service to know-how, even though the supplier of both may be the same.

3.4.3 Turnkey Agreements

Turnkey agreements exist when two or more parties enter into a contract for the construction of operating facilities that are transferred to the customer when the facilities are ready to commence operations. Thus the owners only have to 'turn the key'.

These agreements first appeared in the 1960s and initially involved Western companies constructing manufacturing facilities for Eastern bloc customers. By the end of the 1960s they were also being used by a number of developing countries. The recycling of petro-dollars in the 1970s, through multi-million dollar contracts to develop industry and infrastructure in OPEC countries, caused an upsurge in demand for this type of contract. Payment for turnkey projects is usually in stages, as construction develops.

In developing countries many of these agreements involve a particular form of turnkey agreement, known either as "trilateral co-operation" or "tripartite industrial co-operation" [Oman (1981, p15)]. These agreements involve the participation of at least three companies or organizations: one or more domiciled in a centrally planned economy of Eastern Europe, at least one in the OECD bloc, and one or more in the "South" (a developing economy of Africa, Asia or Latin America).

3.4.4 Subcontracting

A subcontracting relationship exists when a company (the 'principal') places an order with another company (the 'subcontractor') for the manufacture of components or the assembly of finished products with inputs provided by the principal. Subcontracting will therefore be internationalized when either the principal and the subcontractor are located in different countries, or when the principal is located in the same country as the subcontractor but is of foreign origin. This latter form of business is sometimes referred to as 'offshore' production or assembly.

Although international subcontracting (ISC) entails the trading of products (usually intermediate products) it is classified separately from direct exporting as a form of market servicing because the principal retains full control over the distribution and marketing of the final product, which is sometimes sold in its home market and sometimes in third-country markets. ISC thus relieves exporters of the problems of marketing and distribution.

Sharpston (1975, p119) points out that the scale of investment required in overseas marketing and distribution facilities is often far beyond the capabilities of many developing nations, and that ISC therefore benefits these nations by permitting them access to markets which would not otherwise be available to them. Another feature which distinguishes ISC from direct exporting is the fact that the products manufactured by the subcontractor are intended for a definite customer (the principal). As a result the goods produced by the subcontractor are very often required to conform to specifications which make it very difficult or impossible to sell them to other customers. Michalet (1980, p41) characterises this bond between supply and demand which links subcontractors and principals as being "out of market".

Some authors trace the growing importance of international subcontracting to the existence of tariff regulations in the developed countries and to the rapid proliferation of 'free-trade zones' in developing countries [eg see Oman (1984, p17)].

3.5 EXPORTING

Exporting involves the sale of products across national boundaries and is usually classified into two categories: direct and indirect exporting. It is accomplished indirectly if independent export agents or merchanting houses act as purchasers for foreign buyers. Alternatively, a company may sell its products directly to an importer or buyer located in a foreign market.

In the case of indirect exporting the manufacturer does not have direct control over the export of his products and their marketing and distribution. Most MNCs have their own export departments or export sales subsidiaries and therefore do not generally resort to this method of exporting. It is predominantly small and medium-sized companies, particularly those just starting to export, which use the indirect approach.

Exporting may take place between independent parties at arms-length prices, or it may occur between subsidiaries of the same company, in which case prices will be largely determined by the accounting procedures of the MNC in the form of transfer prices. In the former case full ownership and control is transferred from the seller to the buyer at the point of exchange, while in the latter case neither is relinquished.

Exporting may involve the sale of either final or intermediate products. Where the export of intermediate products involves some kind of subcontracting relationship, it cannot be regarded as a form of exporting. International subcontracting excepted, exporting is most easily distinguishable from alternative methods of international business by the fact that production takes place outside the country of consumption. (Although it is possible for this to occur with licensing, ie a foreign company may be licensed to serve another market, this is not very common).

3.6 STRATEGIC ALLIANCES

As stated at the beginning of the chapter, a strategic alliance may be regarded as a collective term to describe a number of international business activities which fall somewhere between exporting and 100 per cent equity investment. An examination of various definitions of strategic alliances supports this view.

For example Root (1988, p69) defines a strategic alliance as:

> "any form of long-term cooperation between two or more independent firms headquartered in two or more countries that undertakes or supports a business activity for mutual economic gain." [10]

Strategic alliances are defined by Porter and Fuller (1986, p315) as:

> "formal, long-term alliances between firms that link aspects of their businesses but fall short of merger."

The authors go on to list joint ventures, licensing agreements, and supply agreements as examples of strategic alliances.

Harrigan (1988, p205) defines strategic alliances as:

> "partnerships among firms that work together to attain some strategic objective."

The author goes on to distinguish between strategic alliances which create a "jointly owned entity" (ie joint ventures) and those which involve non-equity forms of cooperation.

Although the forms of international business activity which collectively comprise strategic alliances are not new, there are a number of features of more recent collaborative arrangements which are noticeably different from those which have occurred in the past and which have prompted the growth of the literature on strategic alliances in the 1980s. These features can therefore be used to differentiate between strategic alliances and what might be called the more 'traditional' forms of international cooperation.

The first of these features is the fact that, whereas the more traditional forms of cooperation typically take place between companies of unequal strengths and resources, strategic alliances tend to take place between companies of comparable strengths and resources [Young et al (1989, p273)]. As a consequence, they generally involve a more balanced contribution of resources from each of the parties. Another differentiating characteristic of strategic alliances is that they often take place between partners which are in direct competition with one another; in more traditional international business relationships there is little or no direct competition between the parties.

This feature is closely related to what is perhaps the most important characteristic of strategic alliances, namely that they appear to be motivated by considerations of a 'strategic' nature, eg the desire to reduce competition through collusion with competitors. Porter and Fuller (1986, p315) argue that strategic alliances serve the purpose of "linking major competitors together to compete worldwide", and they contrast this with the more traditional arrangements which "were often tactical, involving tie-ups with local firms to gain market access or to transfer technology passively to regions where a firm did not want to compete directly". The authors go on to develop six generic categories of strategic alliance, based upon the different motivations behind them [see Porter and Fuller (1986, pp330-338)].

3.7 FRAMEWORKS FOR CLASSIFYING FORMS OF INTERNATIONAL BUSINESS

3.7.1 Introduction

The growth in the use of non-equity methods of international business prompted the UN to recommend in its 1978 report <u>Transnational Corporations In World Development: A Re-Examination</u> that the "so-called alternatives to the transnational corporation ... together with equity investments, should be regarded as collectively defining the spectrum of possible ways in which enterprises involve themselves across national borders" (p68).

In the remainder of the chapter three schemes are proposed for classifying the "spectrum" of international business transactions. These schemes highlight properties common to each of the modes of international business discussed in the chapter, thus focusing attention on the key differences between them.

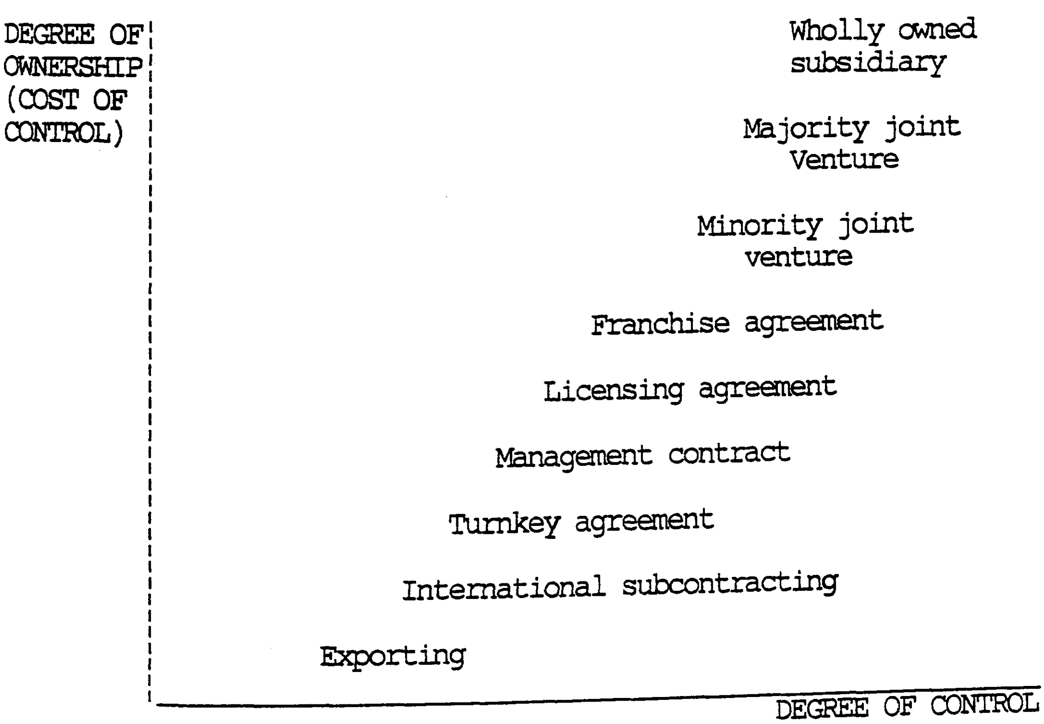
3.7.2 Ownership and Control

The first classification scheme employs the concepts of ownership and control to construct a two-dimensional framework within which forms of international business are placed. The framework is illustrated in Figure 3-1.

Complete ownership and control is embodied in the wholly owned subsidiary at the top right hand end of the diagram. The absence of any ownership or control by the transferor once a transaction has been completed is represented by exporting at the opposite end. The intervening modes of international business involve varying degrees of post-transactional ownership and control.

FIGURE 3-1

FORMS OF INTERNATIONAL BUSINESS CLASSIFIED BY DEGREES OF OWNERSHIP AND CONTROL



[Source: Adapted from Mason (1981, p31)]

It should be noted that this scheme is not intended to imply a direct functional relationship between ownership and control. It merely suggests that international business might be considered as a matrix in which each cell represents a combination of degrees of control and equity involvement ranging from high/high through low/low to zero/zero.

3.7.3 International Flows

Modes of international business can also be classified according to the flows of capital, knowledge and products which they typically give rise to. Such a classification scheme is shown in Table 3-3.

It is evident from this table that licensing agreements and management contracts have a common characteristic, in that they both entail the transfer of knowledge, in some form or other. One can therefore categorise these modes of business under the heading of 'knowledge transfers'. Similarly, the modes of subcontracting and direct exporting can both be labelled as 'product sales' since they entail the sale of tied and final products respectively. (Tied products are those products that are sold subject to the condition that the vendor retains a degree of control over the use to which the products are subsequently put. Much of the trade in tied products is in intermediate goods).

Franchising and turnkey agreements fall somewhere between these two as both entail the sale of products (tied and final) and managerial expertise, though the latter is only provided for a limited period of time. The remaining two methods of international business, FDI and joint ventures, involve the transfer of all three forms of corporate resource within the firm, rather than through the external market. They cannot therefore be said to give rise directly to product sales or knowledge transfers, and are best described collectively by the term "equity investments" since both involve a flow of equity.

From the foregoing analysis, one can construct three broad categories of international business transaction:

TABLE 3-3

INTERNATIONAL FLOWS OF CAPITAL, KNOWLEDGE AND PRODUCTS TYPICALLY ASSOCIATED WITH MODES OF BUSINESS

	INTERNATIONAL FLOWS					
	CAPITAL		KNOWLEDGE		PRODUCTS	
MODE OF BUSINESS	100% Equity	<100% Equity	Technological	Managerial	Tied	Final
FOREIGN DIRECT INVESTMENT	X		X	X		
JOINT VENTURE		X	X	X		
FRANCHISE AGREEMENT				X	X	
LICENSING AGREEMENT			X			
MANAGEMENT CONTRACT				X		
TURNKEY AGREEMENT			X	X		X
SUBCONTRACTING					X	
EXPORTING						X

[SOURCE: Author]

(a) Equity investments
(b) Knowledge transfers
(c) Product sales.

3.7.4 Value-Added

The concept of the "value chain" [Porter (1985)] can be used to construct a third scheme for classifying forms of international business. This concept was advanced by Porter as a means of identifing a company's sources of competitive advantage. It involves disaggregating a company into the series of discrete value-adding activities which it performs: R&D, production, marketing, distribution, etc.

A classification scheme based upon a typical value chain is shown in Table 3-4. The rows of the table define the activities in the value chain, while the columns classify the type of ownership according to whether or not equity participation is involved. Each of the numbers in the table represent a 'cell' which combines one of the ownership types with one of the links in the value chain.

TABLE 3-4

FORMS OF INTERNATIONAL BUSINESS CLASSIFIED BY LINK IN THE VALUE CHAIN AND BY OWNERSHIP

VALUE CHAIN	OWNERSHIP	
	Non-equity Venture	Equity Venture
R&D	1	2
Raw Materials/ Component Manufacture	3	4
Assembly	5	6
Marketing	7	8
Distribution/ Customer Service	9	10

[Source: Adapted from Root (1988, p71)]

Each form of international business can be regarded as combining one of the ownership types with one or more links in the value chain. Table 3-4 can therefore be used to define a particular form of international business by ownership and by the location on the value chain of the resources obtained by one of the participants. A typical licensing agreement, for example, would occupy cells 3,5,7 and 9 for the licensor, since the activities associated with these cells are carried out on its behalf by the licensee. The licensee, on the other hand, would occupy cell 1 since it gains the right to use the technology resulting from the licensor's R&D.

International subcontracting would typically occupy cells 3 and 5 for the firm contracting out production. Joint ventures would occupy some combination of cells 2,4,6,8 and 10 depending upon the relative contributions of the parties; for example, a MNC which obtaining marketing and distribution skills from a joint venture partner would occupy cells 8 and 10. Both FDI and exporting would occupy cells 2,4,6,8, and 10 since all of the value-adding activities are carried out by one company.

3.7.5 Conclusion

Given the variety of ways in which international business can be conducted, the classification schemes outlined here are helpful in that they highlight key factors which companies should consider in determining the method which suits them best.

Companies should thus consider what level of control they wish to exercise over their resources which they transfer abroad, and also how much ownership is necessary to achieve this given level of control. In addition, they should examine the activities which comprise their value chain and only carry out those activities which cannot be better performed by an external party.

CHAPTER THREE

NOTES

1. This quote originated in a book by Finnegan (1976), and was subsequently referred to by Prasad (1981) and Buckley (1985). It can also be found, unattributed, in Business International (1977).

2. Business International (1977, p20) defines licensing as a form of business which is concerned with patents, trademarks and know-how. Rugman et al (1985, p94) define licensing as a generic term which also covers management contracts, franchising and subcontracting. The latter of these business modes is described as contract manufacturing by Rugman et al.

3. Baillie, 1984, p73.

4. The Paris Convention is administered by the World Intellectual Property Organisation (WIPO), a UN agency based in Geneva.

5. Banks Report (1970, Cmnd. 4407, Para 493) as quoted by Cawthra (1986, p140).

6. UNIDO, 1979, p11.

7. Creed and Bangs (1960, p93) as quoted by Cawthra (1986, p140).

8. Income and Corporation Taxes Act (1970, s386(7)) as quoted by Gallafent at al (1981, p115).

9. UNIDO, 1979, p34.

10. Root uses the term 'international cooperative arrangement' rather than the term 'international strategic alliance'. The latter term is used throughout this chapter in order to ensure consistency of terminology. Also note that "long-term" in Root's definition does not refer to a specific period of time, but, rather, to a duration exceeding that needed to complete arm's-length, open-market transactions.

REFERENCES

BAILLIE, I., 'The Legal Framework of Licensing', Ch 7 in Lowe, J. & Crawford, N., Technology Licensing and the Small Firm, Aldershot: Gower, 1984, pp 71-81.

BANKS COMMITTEE, The British Patent System, Report of the Committee to Examine the Patent System, Cmnd. 4407, London: HMSO, 1970.

BUCKLEY, P.J., 'New Forms Of International Industrial Co-operation', Chap 3 in Buckley, P.J. & Casson, M., The Economic Theory of the Multinational Enterprise, London: Macmillan, 1985, pp 39-59.

BUSINESS INTERNATIONAL, International Licensing: Opportunities and Challenges in Worldwide Technology Management, New York: Business International Corporation, 1977.

CAWTHRA, B.I., Patent Licensing in Europe, London: Butterworths, 1986.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.: Quorum Books, 1985.

CREED, J.F. & BANGS, R.B., 'Know-how Licensing and Capital Gains', The Patent, Trademark and Copyright Journal of Research and Education, Vol 93, 1960, pp 93-107.

DEPARTMENT OF TRADE AND INDUSTRY (DTI), Intellectual Property and Innovation, White Paper presented to Parliament, Cmnd. 9712, London: HMSO, 1986.

DUNNING, J.H., 'Towards a Taxonomy of Technology Transfer and Possible Impacts on OECD Countries', Ch 1 in OECD, North/South Technology Transfer: The Adjustments Ahead, Paris: OECD, 1982, pp 8-24.

DUNNING, J.H., 'Alternative Channels and Modes of International Resource Transmission', Ch 1 in Sagafi-Nejad T., Moxon, R.W., & Perlmutter H.V. (eds.), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 3-26.

FINNEGAN, M.B., Current Trends in Domestic and International licensing, New York: Practising Law Institute, 1976.

GALLAFENT, R., EASTAWAY, N. & DAUPPE, V., Intellectual Property Law and Taxation, London: Oyez Publishing, 1981.

HARRIGAN, K.R., 'Strategic Alliances and Partner Asymmetries', in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988, pp 205-226.

HEARN, P., International Business Agreements: A Practical Guide to the Negotiation and Formulation of Agency, Distribution and Intellectual Property Licensing Agreements, Aldershot: Gower, 1987.

HMSO, Intellectual Property Rights and Innovation, Green Paper presented to Parliament by The Prime Minister, Cmnd. 9117, London: HMSO, 1983.

LOWE, J. & CRAWFORD, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon, 1984.

MADDISON, R., Patent and Patent Licensing Law in Europe: Recent Trends and Current Developments, Economist Intelligence Unit Special Report No 97, London: Economist Publications, 1981.

MASON, R.H., 'Comments on J. Dunning's "Alternative Channels & Modes of International Resource Transmission"', in Sagafi-Nejad T., Moxon, R.W., & Perlmutter H.V. (eds.), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 27-36.

MICHALET, C.A., 'International Subcontracting: A state of the Art', in Germidis, D. (ed.), International Subcontracting: A New Form of Investment, Paris: OECD, 1980.

OMAN, C., 'New North-South Investment Strategies', The OECD Observer, September 1981, pp 13-15.

OMAN, C., New Forms of International Investment in Developing Countries, Paris: OECD, 1984.

PORTER, M.E. Competitive Advantage: Creating and Sustaining Superior Performance, New York: The Free Press, 1985.

PORTER, M.E. & FULLER, M.B., 'Coalitions and Global Strategy' in Porter, M.E. (ed.), Competition in Global Industries, Boston, Mass.: Harvard Business School Press, 1986, pp 315-343.

PRASAD, S.J., 'Technology Transfer to Developing Countries through Multinational Corporations', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981, pp 193-218.

ROOT, F.R., 'Some Taxonomies of International Cooperative Arrangements', in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988, pp 69-80.

RUGMAN, A.M., LECRAW, D.J. & BOOTH, L.D., International Business: Firm And Environment, New York: McGraw-hill, 1985.

SHARPSTON, M., 'International Subcontracting', Oxford Economic Papers, March 1975, pp 94-135.

SKELTON, R., 'Negotiating and Pricing Licences', Ch 4 in Lowe, J. & Crawford, N., Technology Licensing and the Small Firm, Aldershot: Gower, 1984, pp 43-50.

UNITED NATIONS, Transnational Corporations in World Development: A Re-Examination, New York: UN Economic and Social Council, 1978.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO), Guidelines for Evaluation of Transfer of Technology Agreements, Development and Transfer of Technology Series, No 12, New York: United Nations, 1979.

WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO), General Information, Geveva: WIPO, 1983.

YOUNG, S., HAMILL, J., WHEELER, C. & DAVIES, J.R., International Market Entry and Development: Strategies and Management, Hemel Hempstead, Herts.: Harvester Wheatsheaf, 1989.

PART II REVIEW OF EXISTING THEORY AND EMPIRICAL EVIDENCE

INTRODUCTION

The following four chapters review the theoretical and empirical literature which is relevant to the aims of the thesis set out in Chapter One. Chapter Four contains a review of theories of FDI. Although the thesis is not concerned with FDI per se, but with licensing, it is necessary to review the FDI literature due to the fact that licensing and FDI are alternative methods of servicing a foreign market. In a sense, when we have a theory of FDI we also have a theory of licensing since the absence of factors which promote FDI are likely to lead to licensing being chosen as the market servicing method, or exporting if conditions promoting free trade were to hold. In the words of Rugman (1982) "once the reasons for MNE's [ie FDI] are explained then the alternatives of exporting and licensing are themselves explained (as redundant cases). No separate theory is required" (p16).

A common theme running through many of the theories of FDI is that firms make the decision to invest abroad as a result of imperfections which exist in world product and factor markets. The market imperfections concept has been suggested as a unifying paradigm for the various explanations found in the FDI literature. Chapter Four therefore concludes with a description of four classes of market imperfection, suggested by Calvet (1981), which embrace existing theories of FDI.

Chapter Five reviews the literature which extends the 'theory of the firm' to the multinational setting. This literature is founded upon the ideas of Ronald Coase (1937) who explained the existence of firms in terms of transaction costs. The subsequent development of what is commonly termed the 'Coasian theory of the firm' by Williamson (1975) in a domestic context, and its extension to the MNC by Buckley and Casson (1976), among others, is described in this chapter.

It is appropriate at this stage to explain why the FDI literature (Chapter Four) and the literature on the theory of the MNC (Chapter Five) have been reviewed separately, given that there is some overlap in their respective contents. In a sense this overlap is only to be expected since FDI is the process whereby MNC's are created. Indeed, in many articles one tends to find the terms 'FDI theory' and 'theory of the MNC' used interchangeably.

The reason for distinguishing between the two literatures is that there are major differences in the emphases which they adopt. The theory of the MNC is concerned with the factors which lead to the creation of firms spanning national boundaries, rather than with the factors which promote FDI. It emphasises the role of one particular class of market imperfection, namely market failure, whereas FDI theory places more emphasis on market structure imperfections. In the words of Dunning (1979) the shift in emphasis which occurred with the renewal of interest in the Coasian theory of the firm in the 1970's reflected "a switch in attention from the act of foreign direct investment ... to the institution making the investment" (p274).[1]

Chapter Six reviews the literature on international licensing. Despite Rugman's argument that no separate theory is required to explain licensing (op cit) there exists an identifiable, if disparate, literature on the subject. Four sets of factors are identified from this literature as key influences on the licensing decision, and these are then used as categories under which the various theories and empirical studies are discussed. The factors identified are as follows: technology and product-specific factors, industry-specific factors, country-specific factors and firm-specific factors.

Chapter Seven draws together the various theories which have been discussed and proposes an analytical framework within which the licensing decision can be understood. This framework includes industrial organization theory, transaction cost theory and location theory, and is articulated by Dunning (1977) in his 'eclectic' paradigm of international production, later refined (1988) into the 'factor endowments/market failure' paradigm. In addition, the chapter highlights a number of the problems involved in testing the validity of the paradigm and it outlines some ways in which the market-servicing decision may be modelled.

NOTES

1. As quoted by Calvet, 1981, p48.

REFERENCES

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

COASE, R.H., 'The Nature of the Firm', Economica, New Series, Vol 4, November 1937, pp 386-405.

DUNNING, J.H., 'Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach', in Ohlin, B., Hesselborn, P.O. & Wijkman, P.M. (eds.), The International Allocation of Economic Activity, London: Macmillan, 1977, pp 395-418.

DUNNING, J.H., 'Explaining Changing Patterns of International Production: In Defence of Eclectic Theory', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 269-295.

DUNNING, J.H., 'The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions', Journal of International Business Studies, Vol 19, No 1, Spring 1988: pp 1-31.

RUGMAN, A.M., 'Internalization and Non-Equity Forms of International Involvement', in Rugman, A.M. (ed), New Theories of the Multinational Enterprise, London: Croom Helm, 1982, pp 9-23.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: The Free Press, 1975.

CHAPTER FOUR - THEORIES OF FOREIGN DIRECT INVESTMENT

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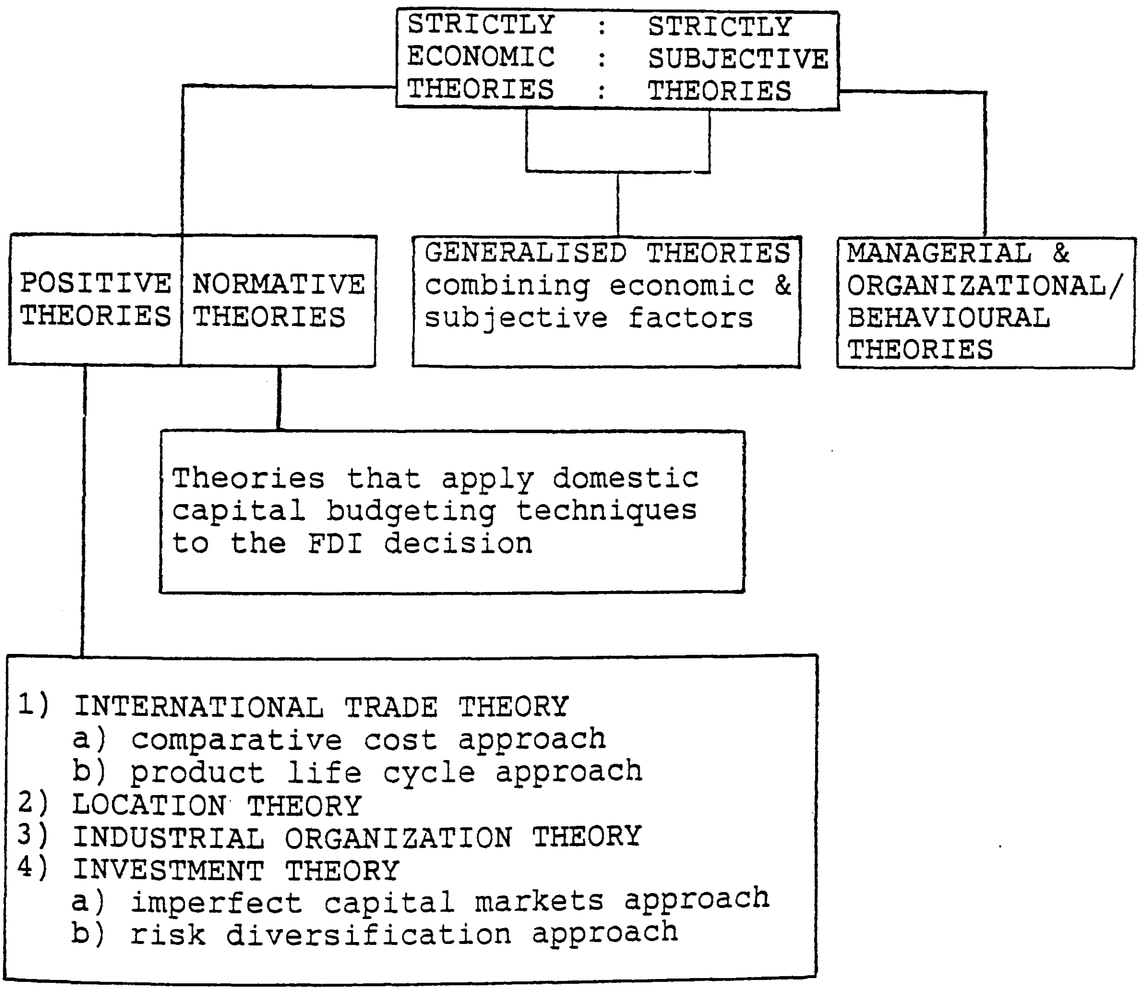
CHAPTER FOUR - THEORIES OF FOREIGN DIRECT INVESTMENT

4.1 INTRODUCTION

The review of FDI theories which follows will be based upon the classification scheme shown below.

FIGURE 4-1

THEORIES OF THE FOREIGN DIRECT INVESTMENT DECISION



[SOURCE: Author]

This classification was constructed from a number of the categories suggested by Grosse (1981) and Koutsoyiannis (1982). The 'strictly economic' theories consider only economic factors as determinants of FDI, whereas 'strictly subjective' theories emphasize the attitudes of management. The latter group of theories are broken down into organizational/behavioural theories and managerial theories.

The remainder of this chapter provides a description of the types of theories contained within each category. The strictly subjective theories and the generalised theories are only briefly described since it is the economic explanations of FDI which are of direct relevance to the aims of the thesis. Of the two categories of economic explanations, normative theories are only surveyed very briefly since we are more concerned with the insight which positive theories of FDI have for the market servicing decision. The chapter then concludes with a description of the market imperfections paradigm, which captures all of the (positive) economic theories previously described.

4.2 MANAGERIAL THEORIES

Managerial theories of the firm are based on the separation of ownership from control which exists in the typical modern firm. The consequences of this separation were first noted by Adam Smith in his book The Wealth of Nations (1776), although it was another 157 years before the issue gained prominence. This occurred with the publication of Berle and Means's book The Modern Corporation and Private Property (1932). They highlighted the fact that economic power was becoming concentrated in a few large manufacturing firms, and that decision-making power in these firms had shifted from shareholders to a small self-perpetuating groups of professional managers. Since ownership of companies was diffused among a range of different shareholders, managers had the opportunity to maximise their own interests at the expense of their shareholders' interests.

This diffusion of share ownership is, however, a necessary but not a sufficient condition for the existence of managerial discretion, since managers may be forced to maximise shareholder wealth under pressure from capital and product markets. Managerial theories are therefore based upon the presumption of imperfections in these markets which allow managers to diverge from the objective of maximising shareholders' wealth.

In capital markets, imperfections take the form of monitoring costs and enforcement costs. The former are expended by shareholders in monitoring the performance of managers; the latter are incurred if shareholders make any attempt to sanction managers. Both costs insure that 'shareholder inertia' tends to predominate in the capital market. When combined with the absence of competitive pressures from the product market, these imperfections allow managers to pursue alternative goals, such as sales maximisation, as suggested by Baumol (1959), or growth maximisation, suggested by Marris (1964), or the maximisation of multiple objectives. For example, Williamson (1964) proposed that managers seek to maximise a utility function whose components are salary, security, status, power, prestige and professional excellence.

Subsequent contributions to the managerial literature have derived their inspiration from the pioneering work of Coase (1937) who provided a rationale for the existence of the firm. The ideas of Coase are described in detail in the following chapter, along with the later insights provided by Alchian and Demsetz (1972), Jensen and Meckling (1976) and Fama (1980). What these contributions have in common is their identification of the relevant costs and benefits which result from the utility maximising behaviour of management.

The assumptions upon which managerial theories of the firm rest are clearly applicable to MNCs, since such firms typically have a degree of monopoly power in their product markets, and most are large enough to enable managers to resist shareholder pressures. Despite the relevance of such theories to MNCs little work has been done to directly test the extent of their applicability in a multinational setting, eg the possibility that FDI may be motivated by the desire of managers to maximise growth, or to enhance their status within the firm. More effort has been expended in applying organizational/behavioural theories of the firm to the multinational case. These are now considered in the following section.

4.3 ORGANIZATIONAL/BEHAVIOURAL THEORIES

These theories differ more fundamentally from traditional neoclassical theory than do managerial theories since they dispense with the assumption that firms maximise anything, even utility. The behaviouralists reject the notion that the individual has a well defined set of preferences and a willingness to choose the best alternative available. Their only assumption is that the individual has expectations about what is satisfactory and that he accepts the first alternative which satisfies his expectations. According to the phrase coined by Simon (1957), individuals are not optimisers but satisficers.

Simon's pioneering work on individual behaviour was extended by Cyert and March (1963), who analysed group behaviour within a firm. Their findings called into question the traditional belief that firms can be looked upon as having one major decision-maker. They found firms to be complex 'organizational coalitions' operated by groups (managers, directors, shareholders etc.) who, although having a common interest in the survival of the firm and a consequent willingness to co-operate, nevertheless pursue their separate interests once survival is assured. The final goals of the firm are thus arrived at via an informal bargaining process which results in a compromise solution. This compromise will nearly always produce sub-optimal efficiency within the firm. The 'organizational slack' which exists enables excess payments (in cash or kind) to be distributed among the coalition members, thus ensuring acquiesence.

A basic feature of firm behaviour, therefore, is its unpredictability, since changes in the power structure of the coalition will inevitably produce variations in the firm's objectives. Nevertheless, it will often be reasonable, in the short run, to take many of the goals of the firm as given. If the variables that affect the decision process can then be identified, testable predictions about the conduct of firms can be made.

Just such a specification of variables was produced by Cyert and March who outlined, in The Behavioural Theory of the Firm, their goals-expectations-choice trichotomy (linked together by their associated relational concepts) to explain coalition behaviour. Upon this basic framework a computer simulation of the price and output decisions of a large retail department store was constructed, and it performed remarkably well in predicting company behaviour. The authors came to the conclusion that decisions are mainly determined by the application of 'rules of thumb' and standard operating procedures. Subsequent empirical studies have achieved similarly satisfactory results with this model.

Hood and Young (1979) have outlined some ways in which an MNC may behave as a 'Cyert and March firm'. A shift in the balance of power between coalition members in the parent company, for example, may lead to an expansion or contraction of foreign investment. At the subsidiary level, different power structures may lead to compromises that produce numerous types of organizational slack.

The behavioural approach to the study of corporate decision-making was specifically applied to MNCs in a study by Aharoni (1966). He analysed 38 companies that had considered direct investment in Israel and came to the conclusion that, contrary to the profit maximising model, these firms did not compare several countries in seeking the best investment, but made decisions in terms of a specific project in a specific country. This result supports Cyert and March's concept of 'problematic search', which holds that the solution to a problem is typically sought in the area of the problem itself and in the area of the most obvious alternative.

The foreign investment decision process was characterised by Aharoni as a sequence of steps, namely: the decision to look abroad, the investigation process, the commitment to invest, and follow-up reviews and refinements. He argued that the strength of commitment to proceed depended more on the strength of the initiating force (such as the threat of losing an export market or the drive of a top executive) than on hard information about profit and market growth prospects. The first step is thus the most critical stage in the process.

Aharoni traced the decision process through to completion, noting how information passed within the firm was often distorted to serve the goals of the sender, and how perceptions of the project changed over time and at different levels of the managerial hierarchy. He concluded that the decision to invest abroad, if repeated, was often institutionalised in an international division within the firm. This was a significant development in creating both expertise and a vested interest in further foreign investments.

The work of Aharoni demonstrates that theories of FDI derived from the organizational/behavioural school of thought can provide important insights when we are studying the complex decision-making processes of MNCs since they build models of corporate behaviour using variables and relationships obtained through the observation of actual decision-making behaviour.

4.4 NORMATIVE THEORIES

Normative theories seek to guide firms in their analysis of the unique aspects of the FDI decision. In general, they are concerned with the application of domestic capital budgeting techniques to the more complex international sphere in order to take account of political and foreign currency risks and parent-subsidiary relationships. They therefore tend to be found in textbooks on international financial management. Such theories offer opinions on how firms ought to make FDI decisions: for example, whether the parent or the subsidiary's cash flows should be regarded as relevant or, if a discounted cash flow technique is to be used, whose cost of capital should be employed.

Normative theories of FDI are not directly relevant to the aims of the thesis since they are not concerned with explaining why firms engage in FDI. They are not therefore considered any further. We turn now to consider positive theories of FDI, which are concerned with explaining why FDI takes place rather than how foreign investments ought to be evaluated.

Figure 4-1 defines four main branches of positive theory, all of them drawn from the existing body of economic literature, namely: international trade theory, location theory, industrial organization theory and investment theory. Each of these is now considered, along with the results of empirical tests which have been carried out, so that their respective explanatory powers can be compared.

4.5 INTERNATIONAL TRADE THEORY

4.5.1 Introduction

International trade theory can be divided into two separate viewpoints, each of which provide explanations for the existence of FDI [Grosse (1981, p10)]. Firstly, there is the 'comparative cost view', which focuses on the supply side and has a macroeconomic orientation, and secondly there is a 'product life cycle view', which focuses on the demand side and is more descriptive in its approach. Each of these is now considered.

4.5.2 Comparative Cost Approach

This approach explains FDI by eliminating the assumption of international capital immobility from the Hecksher/Ohlin/Samuelson model of international trade. It proposes that, in the presence of trade restrictions between countries, capital will flow between countries and effectively act as a substitute for final product flows (exports). For example, firms from capital abundant countries would find it profitable to export capital in order to take advantage of the higher returns available abroad (resulting from the relative deficiency of capital in foreign markets). This transfer would have the effect of raising the price of capital in the donor country, thus contributing towards the equalization of interest rates and the restoration of international equilibrium.

Capital will move internationally, therefore, so long as its marginal product differs from country to country. Given that the usual criterion of capital productivity is the domestic interest rate, 'real' international interest rate differentials can be regarded as the most important stimulus to foreign investment, according to this viewpoint.

This approach does not, however, provide a very convincing explanation of FDI, for as well as lacking general empirical support it has several theoretical deficiencies. Although it discards one of the assumptions of neoclassical international trade theory (capital immobility) it retains all the others. Included among these are the propositions that information is freely available and that perfect competition prevails. The presumed existence of trade barriers makes the latter of these assumptions suspect, while the introduction of information costs and the existence of interest rate risk makes the calculation of equal interest rates difficult. In addition, any variations in risk preferences will make interest rates unsuitable for predicting capital movements, for investors with differing risk preferences and information needs may be indifferent to a wide range of prevailing interest rates, or they may react differently.

As outlined above, the comparative cost model provides a theoretical structure for explaining international capital flows, but it fails to distinguish conceptually between direct investment and portfolio investment. It does not acknowledge that FDI involves the transfer of a package of resources which includes technology and management as well as equity capital. In addition, it is unable to explain the observed pattern of FDI which is concentrated in a few countries and industries.

Several empirical studies conducted in the US [eg Kwack (1972)] have found that actual interest rate differentials between home and host countries are small, and that no significant relationship exists between foreign investment flows and interest rates. Other studies have attempted to test for a relationship between trade barriers and capital flows, but have produced conflicting results. Balassa (1967) and Scaperlanda & Mauer (1969) attempted to measure the impact of tariff discrimination by the EEC on US FDI into the region; neither study showed a positive relationship between tariffs and FDI. Nevertheless, Dunning (1958) and Horst (1972) did find a positive correlation for US investment flows into the United Kingdom and Canada respectively.

Recent contributions to the theory of international trade have addressed themselves to the criticisms levelled at neoclassical trade theory by Leontief (1953). By applying input-output analysis to US trade data for 1947, Leontief found that US exports required a higher proportion of labour to capital than the production of import-competing goods. The data thus appeared to show that the US was a capital-deficient country which specialised in labour intensive production.

Leontief explained away this apparent paradox by suggesting a number of alterations to traditional theory. He dispensed with the assumption that similar consumption patterns prevail at different income levels. The higher price of capital in the US, in spite of relative capital abundance, could therefore be explained by a stronger demand for capital in the US than in other countries. In particular, Leontief criticised neoclassical theory's reliance on only two factors of production (capital and labour). A more realistic model of international trade would have to incorporate factors such as human capital endowments, natural resources and technological sophistication.

Multi-factor models of international trade were subsequently developed along the lines outlined by Leontief. Two basic types of theory emerged: 'neo-factor' trade theories, which focused on the role of human capital and natural resources in determining comparative advantage; and 'neo-technology' trade theories, which concentrated on the role of technological advantages and economies of scale.

As these theoretical innovations moved international trade theory closer to the realities of the international trading environment, so trade theory began to overlap with FDI theory. The variables involved in neo-factor theories, for example, have many similarities with what FDI theorists term 'location-specific' endowments. Similarly, the development of neo-technology theories paralleled the use of 'ownership-specific' assets as explanatory variables for FDI.

4.5.3 Product Life Cycle Approach

This second strand of international trade theory represents a more radical departure from the traditional Hecksher/Ohlin/Samuelson analysis since it takes a different view of the key factors determining both trade and FDI. As first presented and subsequently elaborated by Vernon (1966, 1971), this theory describes a number of distinct stages in a product's life (new, mature and standardised) and relates these stages to the locational decisions made by firms and to the choice between exports and overseas production.

The starting point of Vernon's theory is that firms established in the western developed economies have a strong incentive to acquire a technological advantage over producers in less developed markets. Since firms operating in advanced economies typically have access to a more abundant supply of capital, but incur higher labour costs, they will find it advantageous to develop products and processes which are relatively more capital intensive. In addition, the existence of higher per capita incomes in such markets creates a demand for newer and better products which firms will respond to by increasing their R&D expenditure. Thus, while many FDI theorists assume that multinationals have an ownership-specific advantage, Vernon explains theoretically, on the basis of these market characteristics, how this advantage is acquired.

Once a specific advantage (in the form of a new product or process) is acquired its exploitation commences in three separate stages, all of them related to sequential developments in the home market. In the first phase of a product's life cycle, the innovating firm will establish production facilities in its original home market. Cost differences between locations will be relatively unimportant at this early stage because the price elasticity of demand in the high-income, home market will tend to be fairly low. This gives a degree of monopoly power to the firm, which can pass on the higher initial costs of production to buyers by charging a high price. In addition, the innovating firm will want to keep in close contact with customers and suppliers at this early stage to iron out teething troubles with the product, or to change product specifications.

In the second stage of the life cycle the new product (or process) becomes 'mature' as it becomes widely accepted, and demand in the innovating market expands rapidly. As production techniques become increasingly standardised, technical economies of scale are achieved and hence unit costs are lowered. This cost advantage will tend to be offset, however, by a reduction in the firm's monopoly power as competitors develop substitutes and buyers become more price-responsive. During this stage the firm will satisfy foreign demand by exports, but as its share of foreign markets grows it may encounter challenges from local producers (or face government trade restrictions) and so it may begin to reconsider its initial production location decision.

In the last stage of this model the product becomes completely 'standardised' as the innovating firm finally loses its competitive advantage. Comparative costs now become the over-riding determinant of production location. Overseas markets will be serviced by exports only if marginal production costs at home plus transport costs and tariffs are higher than average local production costs. Foreign investment is thus seen as a function of economies of scale and growth in local markets.

Vernon developed his product life cycle theory to explain the pattern of early post-war manufacturing investment by US companies in Europe. Although his theory may still have some applicability for firms expanding abroad for the first time, it is less appropriate for explaining the behaviour of established MNCs, which typically operate in segmented markets and aim to maximise global profits. Realising this, Vernon updated his model (1974, 1977) to accomodate the oligopolistic behaviour of MNCs.

Vernon described a variety of entry barriers that firms in various stages of the product cycle may create to insulate themselves from competition. In the first stage of the cycle there is still a strong economic incentive for 'new-product' firms to locate production in their home market. 'Maturing-product' firms, however, will be more responsive to market structure and will base their location strategy primarily upon the actions and reactions of other MNCs. In order to reduce the risk of losing market shares worldwide they will seek to erect entry barriers (for example, via product differentiation).

The behaviour of MNCs at this stage of the cycle provides an explanation for the phenomenon of the 'multinational fad', observed in some industries. This term refers to 'imitative' FDI, undertaken by firms which tend to view their share of the market in global terms, and therefore invest abroad because they believe that they are losing ground to competitors which have undertaken FDI. (This explanation is developed in more detail in Section 4.7).

In the final 'standardised product' stage of the cycle, competitive pressures are assumed to re-emerge as barriers to entry weaken. Production locations are then more closely determined by cost differentials than by oligopolistic reactions. MNCs will locate their manufacturing plants at the lowest-cost supply points (often less developed countries) and will divest from locations that become uncompetitive.

Vernon's model provides an important contribution to the study of the FDI decision for three principal reasons. Firstly, it highlights the close links between trade, FDI and the growth of the firm. FDI is seen as the successor to foreign trade and is undertaken to protect the share attained in a foreign market by exports. This sequence is seen as inevitable in the life cycle of a product and cannot be reversed. Secondly, Vernon's model explains how the investing firm acquires a specific advantage over producers in a foreign market. And finally, the model is significant because it introduces time considerations into static international trade theory, thus rendering it dynamic.

The product life cycle approach has not, however, been conclusively verified by empirical studies. An early investigation by Gruber, Mehta and Vernon (1967) analysed a sample of nineteen US manufacturing industries for the year 1962. They broke down the industries into two groups (high research intensity and low research intensity) and discovered a high correlation between exports and the R&D activity of the various industries. They also found that the propensity to invest abroad was higher in the research-intensive industries. Finally, the authors compared the exports of these US industries to the sales of their foreign subsidiaries and concluded that FDI had substituted exports to a large extent in the research-intensive industries.

Although these results are compatible with the product life cycle hypothesis they must nevertheless be treated with caution, for it can be argued that a cross-industry sample in a single year is not adequate enough to test the dynamic aspects of Vernon's theory. Stobaugh (1971) used a longer time series for his study of nine products in the highly research-intensive US petrochemicals industry. He found that exports generally begin some twenty five years after production commences, and that as new plants are constructed abroad US exports begin to decline as a percentage of total output. He failed to find many examples, however, of less developed countries (with lower production costs) becoming major sources of supply late in the life of the products.

In a survey by Klein (1973) of another highly research-intensive US industry (pharmaceuticals) it was found that comparative advantage eventually shifted to lower wage countries in all four companies studied. A study of UK pharmaceutical firms by Parry (1976) found that "the product cycle effect ... does have a systematic impact on the degree of international production" (p27).

Apart from the inconclusive empirical evidence noted above, there are theoretical grounds for exercising caution about the usefulness of Vernon's model for studying the behaviour of MNCs, because his theory is essentially concerned with the activities of home-based firms, rather than with the operations of MNCs, which are generally able to innovate in <u>any</u> of their markets. This is a point acknowledged by Vernon in a later (1979) evaluation of his hypothesis. He also acknowledges in this paper that the explanatory power of the product life cycle concept has weakened as a result of changes in the international economic environment, ie a reduction in the technology and income gaps which had previously existed between advanced industrialised countries. Nevertheless, Vernon asserts that the product cycle concept is "likely to continue to provide a guide to the motivations and response of some enterprises in all countries of the world" (p267).

Despite it's reduced empirical validity, Vernon's model does have many unique features which can be incorporated into other models to enrich their static predictions.

4.6 LOCATION THEORY

The second category of positive economic theory depicted in Figure 4-1, location theory, is concerned with the supply and demand variables which influence the spatial distribution of production. Although many of its conclusions are similar to those derived from international trade theory, it remains a distinct branch of theory in its own right because it approaches the phenomenon of FDI from the opposite direction, emphasizing the factors which promote the centralization of production rather than those factors which lead toward decentralized production.

Location theory identifies three types of 'agglomeration' economies which allow firms to reduce costs in certain locations [Grosse (1981, p17)]. Economies of scale in production allow <u>single</u>

firms to reduce costs at particular facilities. Localization economies reduce costs for <u>all</u> firms in a single industry at a particular location because of shared production factors. Finally, urbanization economies reduce costs for all <u>industries</u> at a single location by raising demand for their output. The existence of these economies will stimulate firms to locate production in areas that offer such benefits. The latter two agglomeration economies offer an additional explanation for the 'imitative' oligpolistic-reaction type of FDI mentioned earlier.

Location theory also considers the roles played by natural resource availability and transportation costs in determining where production should be sited. It predicts that production will be located in or near major population centres unless the raw materials used are heavy or bulky, in which case some processing will take place at or near the raw material sources. Although this reasoning does not directly distinguish between domestic and foreign investment, it can clearly be extended across national frontiers.

Other related factors which may influence production location include the size of particular markets and their growth potential, and the strength of local competition. The existence of trade barriers and other host government policies (eg relating to profit remittances) can also effect the outcome.

Several empirical studies have sought to discover which locational variables are the most important determinants of FDI. The results of both regression studies [eg Horst (1972)] and opinion surveys of businessmen [eg Dunning (1973)] reveal that the size and growth of markets are the single most important demand variables, while trade restrictions represents the most significant supply variable.

4.7 INDUSTRIAL ORGANIZATION THEORY

4.7.1 Introduction

This category of positive economic theory views FDI as a process brought about by uncompetitive market structures. The approach was pioneered by Stephen Hymer (1960, published 1976), whose thesis is widely regarded as a path-breaking work from which the existing theory of FDI and the MNC has emerged.[1] Indeed, Hymer's ideas have been described by Charles Kindleberger (1984) as representing a "Khunian transformation of direct investment" (p183). Hymer's ideas about the causes of FDI are described below, and this is followed by a review of subsequent contributions which followed his lead.

4.7.2 The Hymer Approach

The reason why Hymer's ideas were regarded as so radical is that, up until 1960, international capital movements were explained in terms of the neoclassical theory of international trade, as outlined in Section 4.5.2. In this perfectly competitive world, capital moved internationally in response to real interest rate differentials. Thus, MNC's were viewed simply as arbitrageurs of capital, moving equity capital from countries where returns were low to those where returns were higher.

Hymer pointed out, however, that neoclassical trade theory was inconsistent with the observable patterns of FDI at that time. The existing theory could not explain the fact that MNCs had financed a large proportion of their foreign investments in the foreign country's capital market, nor could it explain the existence of cross-flows of direct investment (eg the fact that UK firms were investing in the US at the same time as US firms were investing in the UK).[2]

In order to provide an explanation for FDI, Hymer disregarded the macroeconomic approach of neoclassical trade theory, opting instead for a microeconomic approach based largely upon the ideas of the industrial organization theorist Joe Bain. He utilised the ideas contained in Bain's (1956) book Barriers to New Competition which argued that the main determinant of an industry's profitability was the existence of barriers to entry. Bain identified three main advantages possessed by firms which enabled them to construct entry barriers: firstly, absolute cost advantages; secondly the existence of product differentiation; and thirdly, the existence of scale economies.

Hymer argued that firms contemplating a direct investment overseas also needed to possess one of these Bain-type advantages in order to overcome the inherent disadvantages of producing abroad. FDI would only be undertaken by firms if they expected to earn higher returns abroad than their foreign competitors. Merely to earn higher returns abroad than at home was not a sufficient condition for FDI.

Hymer contended, therefore, that FDI was associated with the possession of an advantage by the investing firm, which its competitors abroad could not obtain. As a result, firms involved in FDI would be found in oligopolistic markets, in which only relatively large firms could survive. This reasoning implied that there must exist imperfections in domestic product and factor markets in order for FDI to take place.

4.7.3 Post-Hymer Contributions

Kindleberger (1969) identified a number of departures from perfect competition in product and factor markets which bestow monopolistic advantages and so lead to FDI. In product markets, for example, he identified product differentiation and the possession of special marketing skills, and in factor markets, access to patented technology and differences in access to capital. Kindleberger also acknowledged that the investing firm's compensatory advantage may stem from internal and external economies of scale, or from government limitations on output or entry.

At this stage in its development, what some authors have termed the 'Hymer-Kindleberger' school of thought had a major limitation: it did not attempt to assess the relative importance of these various monopolistic advantages in explaining foreign investment patterns. This defect was remedied by the work of Caves (1971), whose research indicated that product differentiation in the home market was the critical element giving rise to FDI.

Caves also extended Hymer's original hypothesis by arguing that the special advantage possessed by the firm undertaking FDI must have the characteristics of a public good within that firm in order to explain the advantages of producing abroad. He reached this conclusion by observing that successful firms, producing a differentiated product, control knowledge about servicing the domestic market that can be used at little or no cost in other markets. The existence of this 'intangible' capital provides the motivation for investing abroad, as long as the product can be protected (typically via patents and copyrights).

In a later study (1974), Caves tested the explanatory power of three ownership-specific advantages: intangible assets (defined as advantages accruing from product differentiation), multi-plant economies and the availability of under-utilised entrepreneurial resources within the firm. He analysed data on US manufacturing investment into the UK and Canada. The results of his multiple regression analysis confirmed his original finding; intangible assets represented the most significant determinant of FDI. The multi-plant hypothesis appeared to be a significant determinant for Canada, but not for the UK, a result which reflects the geographical proximity of Canada to the United States. No support was found for the entrepreneurial resources approach in either country.

The results of this study must be treated with some caution, however, for Caves used proxy variables (R&D expenditure and advertising intensity) to measure the intangible assets possessed by the firm. In another regression study on US investment into Canada, Horst (1972) found that his independent variables (principally the levels of advertising and R&D expenditure) varied between industries, but were fairly constant within any given industry. Once these inter-industry differences were eliminated from the analysis, firm size emerged as the only other significant influence on FDI.

This correlation between multinationality and firm size can be readily explained in terms of industrial organization theory. A company which expands rapidly in its domestic market may, in so doing, gain the necessary attributes in terms of management skills and other forms of experience which will enable it to develop its overseas operations at a faster rate than smaller firms. The costs of entering new markets may therefore diminish as company size increases and more knowledge is gained.

In addition to these intangible assets, the firm which expands abroad can exploit the more complex financial mechanisms available to it as a result of the integration of its activities over several countries. It can, for example, transfer funds rapidly across national frontiers to take advantage of short-term interest rate differentials and currency fluctuations, and it has the ability to circumvent host-country tax legislation via the use of transfer prices. The size variable, therefore, encompasses all or most of the possible ownership-specific advantages which explain FDI.

This line of reasoning can, however, be criticised on the grounds that the direction of causality is wrongly specified. Hood and Young (1979, p75) point out that large firm size may well be the by-product of multinational expansion rather than its cause. They also argue that, far from R&D intensity stimulating FDI, the reverse may actually occur. Increased foreign investment may cause an expansion in R&D expenditure because the results of such expenditure could be spread over more foreign markets.

The oligopolistic markets framework for explaining FDI has been adopted by John Kenneth Galbraith (1973). For Galbraith, however, the existence of imperfect markets is only a necessary, not a sufficient, condition for FDI; the firms operating in such markets must have reached a stage of organization mature enough to form what he calls a "technostructure".

This term refers to an apparatus for group decision-making which pools and tests the information provided by the numerous specialists hired by the firm, enabling decisions to be reached that are beyond the knowledge of any one individual. It is defined by Galbraith (1973) as a "complex of scientists, engineers and technicians; of sales, advertising and marketing men; ... and of coordinators, managers and executives" who become the "guiding intelligence of the business firm" (p82).

The over-riding objective of this group is the elimination of the uncertainty associated with markets. They strive to control the prices at which the firm buys factor inputs and sells final products, and to ensure supply and demand at these prices. The expansion of the firm overseas is a natural extension of these activities to the international market; by establishing production facilities overseas the firm reduces the uncertainties associated with barriers to trade. According to Galbraith:

> "The function of the multinational corporation is .... simply, the accomodation of the technostructure to the peculiar uncertainties of international trade. It transcends the market internationally as it does nationally .... By re-creating itself in other countries the technostrucure, in effect, follows its product to those countries."[3]

It is Galbraith's opinion, therefore, that FDI is a product of the unique organizational form of the modern firm, found exclusively in oligopolistic markets.

The mainstream industrial organization theories, with their examinations of the various imperfections in market structure which promote FDI, must logically include the 'oligopolistic-reaction' type of foreign investment mentioned in Sections 4.5 and 4.6. A comprehensive study of this 'multinational fad' phenomenon was conducted by Knickerbocker (1973), who found that "follow-the-leader" behaviour was prevalent in 12 out of the 20 US standard industrial classifications which he studied.

Another study which explored a similar hypothesis was conducted by Graham (1974), who utilised data on direct investment by European firms in the US over the period 1950-1970. He produced results that were "generally consistent" with the hypothesis that FDI is a manifestation of retaliatory, defensive behaviour, undertaken in the expectation that if foreign firms can be threatened in their home markets then they might cease their rivalrous behaviour in the investing firm's market.

Graham's results must be treated with some caution, however, for he has described his model of rivalrous behaviour as "coarse", and conceded that although his results were "generally consistent" with his stated hypothesis, they nevertheless presented "some puzzles" and "fall short of proving the case" [Graham (1978, p90, 94)].

Although the industrial organization approach outlined in this section has attracted many followers, its basic hypothesis is open to question. For example, if uncompetitive markets really do encourage the migration of capital abroad, why did the bulk of FDI flows between the US and Europe in the 1950s emanate from the US when the degree of concentration was generally much higher in Europe? More recent evidence, on Japanese direct investment [Kojima (1978), Ozawa (1979)], suggests a compatability between FDI and a relatively competitive market structure at home.

The appearance of some of the explanations given in this section under other theoretical groupings identified in this chapter highlights the fact that the study of MNCs is an interdisciplinary undertaking which encompasses a number of branches of economic theory, many of which overlap. In the final section of this chapter, a classificatory scheme is outlined which unifies these various strands of thought under the common concept of market imperfections.

4.8 INVESTMENT THEORY

4.8.1 Introduction

The explanations of FDI which can be derived from investment theory can be separated into two distinct viewpoints. One argues that FDI occurs in response to imperfections in capital markets, while the other suggests that firms expand abroad in order to reduce the riskiness their expected returns [Grosse (1981, p18)]. These two viewpoints are considered separately.

4.8.2 Imperfect Capital Markets Approach

It might be argued that this approach to FDI, primarily associated with Aliber (1970, 1971), falls within the industrial organization tradition since it is oriented towards the search for an advantage which enables foreign-owned firms to outperform their domestic competitors. Aliber's theory, however, suggests that this advantage is not specific to individual firms, but is common to all firms based in a particular 'currency area'.

His whole argument is based upon the assumption that portfolio investors take no account of foreign exchange risk in evaluating their investments; they assume that the foreign subsidiaries of MNC's are all in the same currency area as the parent firm. The foreign exchange risk involved in the repatriation of profits to the parent firm is therefore ignored.

For example, portfolio investors are assumed by Aliber to value the assets of, say, US firms operating in the UK as though they were dollar assets rather than sterling assets. If the currency premium on dollars (ie the market's assessment of the depreciation risk) was lower than the currency premium on sterling, then the market rate of interest on the debt of US-based MNCs would be lower than that on the debt of indigenous UK firms. US multinationals would therefore possess an advantage over their UK competitors since they would be able to borrow more cheaply than UK firms. (Indeed, such firms could realise an immediate profit by financing the takeover of a UK firm).

If this imperfection in the market for debt is compounded by investor short-sightedness in the equity market then the earnings of investing firms will be capitalised at a higher rate than the earnings of host-country firms, thus enhancing the investing firms' competitive positions.

At the time of its inception, Aliber's theory gained considerable academic respectability because its predictions were consistent with the postwar pattern of MNC expansion which had prevailed until that period, particularly the US expansion into Europe in the Fifties and Sixties, at a time when the dollar was strong. In the Seventies and Eighties, however, US investment continued to grow despite periods of dollar weakness; UK investment followed the same pattern in similar circumstances.

Aliber's model may fail to explain such events because it does not acknowledge that firms operating with weak currencies may actually have an incentive to invest abroad since they will realise exchange rate gains when converting healthier foreign currencies back into the host-country denomination. The model's breakdown may also be explained by the rise in institutional investment, which should have eliminated the market's myopia over foreign exchange risk and so deprived the theory of its fundamental premise. The type of myopia postulated by Aliber may well have been true of the transitional phase when MNCs first entered capital markets on a large scale, but it is difficult to believe that contemporary fund managers are so irrational.

Even if this assumption is retained, Aliber's theory still cannot offer an explanation for cross-investment between currency areas; the fact, for example, that US firms invest in Europe at the same time as European firms invest in the US. Nor can it account for FDI into LDCs, where capital markets may be non-existent, and foreign exchanges highly regulated.

4.8.3 Risk Diversification Approach

This approach is basically an extension of Markowitz's (1952, 1959) portfolio theory to the international environment. It views FDI as a process of geographic diversification which has the effect of reducing the riskiness of returns. Because business cycles are not synchronous internationally, it can be argued that firms will enjoy a more stable stream of profits over time if they have investments in different countries. As the valuation of a company's shares is dependent on the stability of earnings, as well as their absolute level, the MNC will be valued higher than comparable firms which rely purely on their home market.

The few empirical studies which have been conducted to test the risk diversification hypothesis have produced ambiguous results. The findings of Rugman's study of US firms (1979) are supportive of the theory. He showed that an increase in the number of countries in which his sample of firms operated had the effect of reducing the variance of their earnings (the proxy used for risk). Rugman's statistical tests have, however, been criticised by several authorities, one of whom [Ingo (1979, p109)] described them as "inconsistent and sloppy".

An investigation by Jacquillat and Solnik (1978) compared the potential gains from an international portfolio of securities with the potential gains from investing in MNCs. They found that the MNCs did not offer the better investment: a portfolio of US-based MNC shares had 90 per cent of the standard deviation of a portfolio of US domestic firms' shares, while a portfolio of securities from foreign and domestic stock markets had only 30-50 per cent of the risk of a portfolio of US domestic firms' shares. Further empirical evidence is therefore required before any definite conclusions about the gains from international diversification can be arrived at.

4.10 GENERALISED THEORIES

So far, only strictly economic theories and strictly subjective theories have been considered. The former assume that subjective factors are constant, while the latter assume that economic factors are constant. In the real business world, however, these types of variables are interdependent. In the opinion of Koutsoyiannis (1982, p 347) "a realistic theory of the decision to invest abroad must first take into account this interdependence between subjective and economic variables and then determine the relationship of these variables to the decision-making criteria of the firm."

Richardson (1971) attempted to develop such a comprehensive theory. He introduced subjective factors by using the concept of 'spatial preference' to account for the tendency of firms to prefer their existing location when considering further investment. According to Richardson the typical firm has a definite aversion to new locations or markets, which stems not only from physical distance but also from differences in language, political system, economic environment and ideology. A firm's spatial preference will therefore reflect its attitude towards, eg political and currency risks.

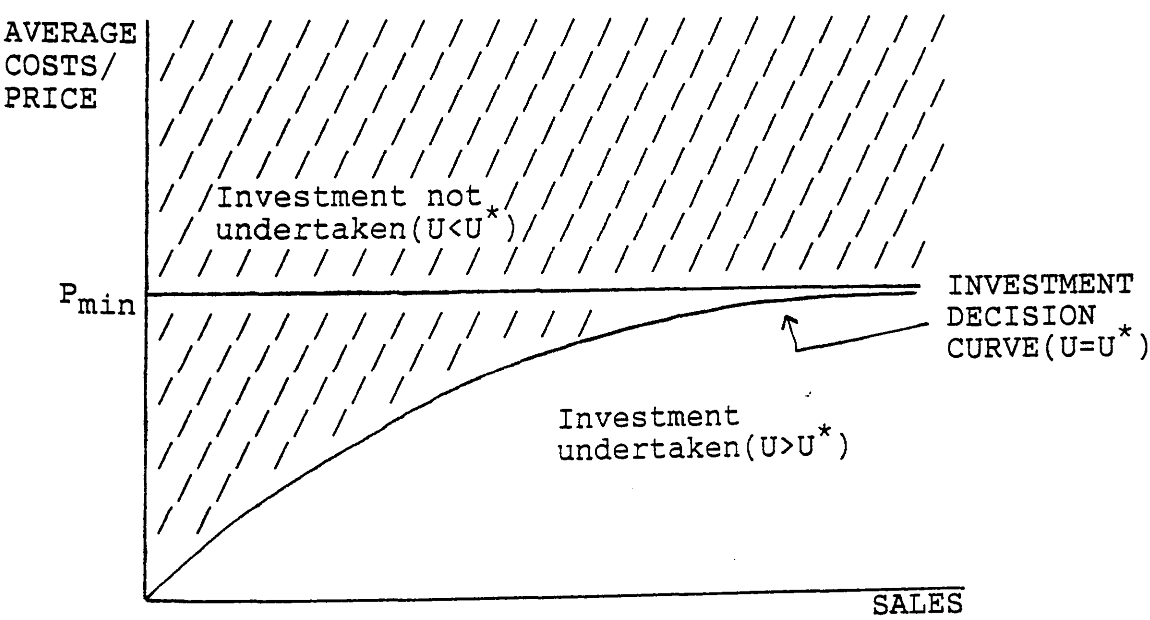
To induce a firm to build a plant in a new location, a premium must accrue to it which is sufficient to overcome its aversion to new locations. Richardson calls the degree of this aversion 'the rate of spatial preference', which grows with 'distance'. Changes in the spatial preferences of firms are brought about by such events as increases in general information about foreign markets, changes in the political or economic climate abroad, and increased insight into foreign markets gained by an increased share of exports.

The economic factors which Richardson regarded as influential are those variables which determine the profitability of investment in a foreign market, ie demand and cost conditions in both the domestic and overseas markets. The first stage in the firm's decision process consists of an analysis of these conditions for each prospective investment project. This gives information on expected profitability, which the firm's management adjusts on the basis of its spatial preferences. If this adjusted rate of return is greater than the firm's target rate of return then the investment will be undertaken.

Richardson derived from this procedure an 'investment opportunity frontier' (or decision curve) representing the locus of all combinations of unit costs and output which make an investment in any given foreign market barely attractive (see Figure 4-2). He also introduced the assumption that MNCs have some control over price, since most operate in oligopolistic markets, and that they will set a minimum price equal to the domestic price plus the costs of exporting. Richardson's investment opportunity frontier is shown below:

FIGURE 4-2

INTERNATIONAL INVESTMENT OPPORTUNITY FRONTIER



(U=Total expected returns, U^*=Total target returns)

[SOURCE: Koutsoyiannis, (1982, p335)]

As the diagram illustrates, the decision curve represents the boundary between investments which will be undertaken and those which will not. FDI projects which appear below the curve, for example, have lower average costs for the given price and any given level of output, and will thus be undertaken. This representation of Richardson's model assumes that target returns, spatial preference, and price in the foreign market are all constant. These factors will, of course, be unstable and their changes will affect the position and/or slope of the decision curve, and hence the level of FDI.

The strength of Richardson's model lies in its ability to incorporate, directly or indirectly, many of the different factors which have been suggested as explanations for the FDI decision. Nonetheless, the testing of a model which incorporates both economic and subjective factors is a formidable task, and one which is beyond the scope of this thesis, which concentrates purely on economic factors.

4.10 A TAXONOMY OF FDI THEORIES: THE MARKET IMPERFECTIONS PARADIGM

4.10.1 Introduction

The variety of the economic theories of FDI presented thus far demonstrates that many of the competing explanations can be listed under more than one category. This highlights the need for a classification scheme which eliminates this overlap by clearly defining each approach within a given category. Recent contributions to the literature [Parry (1980), Calvet (1981)] have suggested the adoption of a 'market imperfections paradigm' as an appropriate taxonomic device.

The market imperfections paradigm stems from Hymer's seminal (1960) thesis, which explained FDI by examining the assumptions underlying the neoclassical model of international trade. In the perfectly competitive international environment postulated by this model, the use of FDI to penetrate foreign markets would constitute an irrational action, since it would not produce returns any greater than those which could be earned by free trade. It follows logically from this that any departures from the model of perfect competition provide a rationale for FDI. Imperfections in markets therefore serve to destroy the basis for free trade, which may then replaced by international production.

Hymer's theoretical conception was taken up by Kindleberger (1969), who proposed a four-fold taxonomy of departures from the model of perfect competition to explain the phenomenon of FDI. These departures consisted of imperfections in product markets, imperfections in factor markets, scale economies and government disruptions (such as taxes and tariffs).

A more recent classification scheme, proposed by Calvet (1981), captures developments in the theory of FDI that have taken place since Kindleberger's contribution. It consists of the following four categories:

(1) Market disequilibrium imperfections
(2) Government induced imperfections
(3) Market structure imperfections
(4) Market failure imperfections

Each of these categories, and the FDI theories which they embrace, will now be considered.

4.10.2 Market Disequilibrium Imperfections

These imperfections occur when prices do not adjust to bring supply and demand into equilibrium because of the segmentation of world markets. Firms will seek to exploit this situation by investing abroad until markets are brought into equilibrium. FDI is therefore seen as an equilibrating capital flow which comes to an end when rates of return are equalised among countries.

This form of market imperfection embraces investment theory and the comparative cost school of international trade theory, since the disequilibrium conditions which provide incentives to invest abroad occur mainly in factor markets and currency markets. A country with an undervalued currency, for example, will attract foreign firms since it offers lower costs compared to other countries. In addition, those firms holding undervalued currencies will realise a capital gain once market equilibrium is re-established. FDI is thus a transient phenomenon which may even be completely reversed if foreign investors decide, once equilibrium is restored, to sell their foreign assets, pocket the capital gain, and return to their domestic operations.

As an example of disequilibrium in factor markets, it is possible that real rates of return on securities may not be equalised internationally by portfolio capital flows due to inefficiencies in international securities markets, such as thinness or lack of disclosure. As a result, real rates of return on assets can only be brought into equilibrium by flows of direct investment across national boundaries.

The market disequilibrium approach also has close similarities with location theory. MNCs, in the pursuit of cost minimization, may be persuaded to invest in low labour-cost countries. The resultant increase in the demand for labour will drive up wages in these countries, while the decline in labour demand in home countries will force wages down. FDI will thus have a finite life-span since the act of investing abroad will set in motion a process which will eventually lead to the re-establishment of equilibrium.

4.10.3 Government Induced Imperfections

These imperfections are the result of government policies which restrict the working of the market mechanism, such as central bank intervention in currency markets. Such actions could conceivably be responsible for some of the disequilibrium hypotheses considered above, but government-induced imperfections merit a category of their own in Calvet's taxonomy because there are no equilibrating forces which will automatically correct them. In order to nullify the incentive for FDI <u>all</u> governments would have to harmonise their policies, or have no policies at all [Calvet (1981, p45)].

By imposing restrictions on trade, governments can make it impossible for firms to reach their market potential through exports alone. Firms may find themselves in the position of having to produce in a foreign country if they are to sell there. Another major government-inspired distortion is the levy of taxes. Since firms aim to maximise rates of return after tax, inter-country taxation differentials and tax laws will significantly influence their choice of production location.

Although FDI may occur as a by-product of government trade and taxation policies, governments may also set out specifically to attract foreign investment by offering financial incentives, such as preferential tax rates and soft loans. These policy instruments have the effect of 'pulling' companies towards certain locations, whereas other policies tend to 'push' firms into FDI.

From the above it is clear that this category of market imperfection, like the previous one, incorporates variables that are an integral part of location theory and international trade theory. The first two categories of Calvet's taxonomy are, in fact, compatible with a relatively competitive market structure. This is not the case in the third category, which explicitly considers imperfect competition, and therefore captures industrial organization theory and Vernon's product life cycle concept.

4.10.4 Market Structure Imperfections

These imperfections correspond to deviations from purely market-determined prices in the product market, brought about by the existence of monopolistic or oligopolistic market characteristics. FDI is therefore undertaken to exploit, as Hymer suggested, the specific advantages which firms operating in these markets must possess.

The two essential attributes which set oligopolistic markets apart from competitive ones (interdependent decision-making and the existence of barriers to entry) feature in the foreign investment models of both Vernon and Knickerbocker. In the former, firms react to the threat of losing markets by expanding overseas, while in the latter FDI is triggered by the decisions of leading firms to invest abroad.

These theories implicitly assume that the market mechanism has the ability to transfer a firm's unique assets abroad. FDI takes place because firms perceive that they will derive a greater benefit by transferring their assets within the firm rather than through the market. However, the final category in Calvet's framework questions the ability of the market mechanism to efficiently transfer the unique rent-securing abilities of firms across national frontiers.

4.10.5 Market Failure Imperfections

These imperfections are defined by Calvet (1981) as "characteristics in production techniques and commodity properties which prevent the market mechanism from allocating resources efficiently" (p47). The main commodity for which markets are deemed to be inefficient resource allocators is knowledge. Arrow (1962) pioneered the development of theory in this area in his work on the market allocation of resources for invention. His ideas were developed by Johnson (1970) who was the first author to apply the market failure literature to the foreign investment decision.

Johnson's argument commenced with the observation that knowledge is a public good with a zero social price. Firm-created knowledge has many of the characteristics of a public good (ie it can be used in another firm without its value being substantially impaired) and the marginal cost of employing it abroad is likely to be much less than its average cost of production and transfer. The creation and development of such knowledge does, of course, require an investment of resources which must be recompensed if there is to be an incentive for private investment in knowledge creation. Hence a classic dilemma arises: from society's point of view efficiency in use demands that knowledge be free, but incentives for the production of knowledge require monopolies to be awarded so that knowledge-creators earn higher than average returns.

Because the market mechanism will fail to set a price which captures the private cost of knowledge creation the firm will have an incentive to transfer its knowledge abroad via FDI, for it can then set the price which it's foreign subsidiary will use to exploit this knowledge. The MNC thus reconciles the requirements of efficient production of knowledge with the requirements of efficient exploitation of knowledge.

4.10.6 Conclusions

Through the use of a common concept, the market imperfections paradigm links together the various strands of economic thought on the determinants of FDI. It enables specific explanations and models developed by individual theorists to be described in terms of the particular imperfection in world product and factor markets which they identified.

As Mark Casson (1981) pointed out, however, taxonomies have an inherent defect if one is interested in theory construction, for they cannot serve as a basis for predicting events. The market imperfections paradigm lists all the factors which could conceivably influence the firm's FDI decision, but it does not suggest which of the categories is more likely to prevail in the real world. It only explains the motivations for FDI in a very limited way, by "pigeon-holing" observed phenomena within the categories defined by the taxonomy. In order to move away from taxonomy to theory it is necessary to impose restrictions on the taxonomy, ie to state that certain cases which the taxonomy identifies will never be observed.

Just such restrictions are imposed on this taxonomy by those theorists who focus their attention on the internal organization properties of the MNC. Their basic postulate is that FDI is a response to the transaction costs which arise in international markets. The act of bringing transactions within the firm, by engaging in FDI, serves to reduce these costs. The next chapter reviews internal organization theory and the insights which it provides for the analysis of the MNC.

CHAPTER FOUR

NOTES

1. Assessments of the influence of Hymer's (1960) thesis can be found in articles by Dunning and Rugman (1985) and Teece (1985), both written in honour of Hymer for the American Economic Review to mark "the first quarter century of the theory of foreign direct investment."

2. In fact, a large proportion of the postwar US FDI into Europe was financed in dollars, but via the 'offshore' Eurodollar market.

3. Galbraith, 1973, p167.

REFERENCES

AHARONI, Y., The Foreign Investment Decision Process, Boston: Harvard University Press, 1966.

ALCHIAN, A.A. & DEMSETZ, H., 'Production, Information Costs and Economic Organization', American Economic Review, Vol 62, No 5, December 1972, pp 777-795.

ALIBER, R.Z., 'A Theory of Direct Foreign Investment', in Kindleberger C.P. (ed.), The International Corporation, Cambridge, Mass.: MIT Press, 1970.

ALIBER, R.Z., 'The MNE in a Multiple-Currency World' in Dunning J.H. (ed), The Multinational Enterprise, London: George Allen & Unwin, 1971.

ARROW, K.J., 'Economic Welfare and the Allocation of Resources for Invention', in National Bureau of Economic Research, The Rate and Direction of Inventive Activity: Economic and Social Factors, Princeton: Princeton University Press, 1962.

BAIN, J.S., Barriers to New Competition, Cambridge, Mass.: Harvard University Press, 1956.

BALASSA, B., 'Trade Creation and Trade Diversion in the European Common Market', Economic Journal, Vol 77, 1967.

BAUMOL, W.J., Business Behaviour, Value and Growth, New York: MacMillan, 1959.

BERLE, A.A. & MEANS, G.C., The Modern Corporation and Private Property, New York: Macmillan, 1932.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

CASSON, M., 'Foreword' to Rugman, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981, pp 15-21.

CAVES, R.E., 'International Corporations: The Industrial Economics of Foreign Investment', Economica, Vol 38, February 1971, pp 1-27.

CAVES, R.E., 'The Causes of Direct Investment: Foreign Firms' Shares in Canadian and UK Manufacturing Industries', Review of Economics and Statistics, Vol 56, August 1974, pp 279-293.

COASE, R.H., 'The Nature of the Firm', Economica, New Series, Vol 4, November 1937, pp 386-405.

CYERT, R.M. & MARCH, J.G., A Behavioural Theory of the Firm, Englewood Cliffs, N.J.: Prentice Hall, 1963.

DUNNING, J.H., American Investment in British Manufacturing Industry, London: Allen & Unwin, 1958.

DUNNING, J.H., 'The Determinants of International Production', Oxford Economic Papers, Vol 25, No 3, November 1973, pp 289-336.

DUNNING, J.H. & RUGMAN, A.M., 'The Influence of Hymer's Dissertation on the Theory of Foreign Direct Investment', American Economic Review, Vol 75, No 2, May 1985, pp 228-232.

FAMA, E.F., 'Agency Problems and the Theory of the Firm', Journal of Political Economy, April 1980, pp 288-307.

GALBRAITH, J.K., Economics and the Public Purpose, London: Andre Deutsch, 1973.

GRAHAM, E.M., Oligopolistic Imitation and European Direct Investment in the United States, Doctoral Thesis, Harvard Business School, 1974.

GROSSE, R., The Theory of Foreign Direct Investment, South Carolina Essays in International Business, No 3, December 1981.

GRUBER, W.D., MEHTA, D. & VERNON, R., 'The R&D Factor In International Trade and International Investment of United States Industries', Journal of Political Economy, Vol 75, February 1967, pp 20-37.

HOOD, N. & YOUNG, S., The Economics of Multinational Enterprise, London: Longman, 1979.

HORST, T., 'The Industrial Composition of US Exports and Subsidiary Sales to the Canadian Market', American Economic Review, Vol 62, March 1972, pp 37-45.

HYMER, S.H., The International Operations of National Firms: A Study of Direct Investment, Cambridge, Mass: MIT Press, 1960 (published 1976).

JACQUILLAT, B., & SOLNIK, B., 'Multinatonals are Poor Tools for Diversification', Journal of Portfolio Management, Winter 1978.

JENSEN, M.C. & MECKLING, W.H., 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure', Journal of Financial Economics, Vol 3, 1976, pp 305-360.

JOHNSON, H.G., 'The Efficiency and Welfare considerations of the International Corporation', in Kindleberger, C.P. (ed.), The International Corporation, Cambridge, Mass: MIT Press, 1970.

KINDLEBERGER, C.P., American Business Abroad: Six Lectures on Direct Investment, New Haven, Conn.: Yale University Press, 1969.

KINDLEBERGER, C.P., Multinational Excursions, Cambridge, Mass.: The MIT Press, 1984.

KLEIN, R.W., 'A Dynamic Theory of Comparative Advantage', American Economic Review, Vol 68, 1973, pp 173-184.

KNICKERBOCKER, F.T., Oligopolistic Reaction and Multinational Enterprise, Boston: Harvard University Press, 1973.

KOUTSOYIANNIS, A., Non-Price Decisions: The Firm in a Modern Context, London: Macmillan, 1982.

KOJIMA, K., Direct Foreign Investment: A Japanese Model of Multinational Business Operations, London: Croom Helm, 1978.

KWACK, S.Y., 'A Model of US Direct Investment Abroad: A Neoclassical Approach', Western Economic Journal, Vol 10, December 1972: 376-383.

LEONTIEF, W.W., 'Domestic Production and Foreign Trade: The American Capital Position Re-examined', Economia Internazionale, Vol 7, 1954.

MARKOWITZ, H.M., 'Portfolio Selection', Journal of Finance, Vol 7, March 1952, pp 77-91.

MARKOWITZ, H.M., Portfolio Selection: Efficient Diversification of Investments, New York: Wiley, 1959.

MARRIS, R.L., The Economic Theory of Managerial Capitalism, London: MacMillan, 1964.

OZAWA, T., 'International Investment and Industrial Structure: New Theoretical Implications From the Japanese Experience', Oxford Economic Papers, Vol 31, No 1, March 1979, pp 72-92.

PARRY, T.G., 'The Product Cycle and International Production: UK Pharmaceuticals', Journal of Industrial Economics, Vol 24, No 1, September 1975, pp 21-28.

PARRY, T.G., The Multinational Enterprise: International Investment and Host-Country Impacts, Greenwich, Conn.: JAI Press, 1980.

RICHARDSON, J.D., 'On "Going Abroad": The Firm's Initial Foreign Investment Decision', Quarterly Review of Economics and Business, Vol 11, Winter 1971, pp 7-22.

RUGMAN, A.M., International Diversification and the Multinational Firm, Lexington, Mass.: Lexington Books, 1979.

SCAPERLANDA, A.E. & MAUER L.G., 'The Determinants of US Direct investment in the EEC', American Economic Review, Vol 59, September 1969, pp 558-568.

SIMON, H.A., Administrative Behaviour: A Study of Decision-Making Processes in Administrative Organization, 2nd edn, New York: Macmillan, 1957.

SMITH, A., An Inquiry into the Nature and Causes of the Wealth of Nations, Books 1-3, Skinner, A. (ed.), Harmondsworth: Penguin Books, 1970. First published, 1776.

STOBAUGH, R.B., 'The Neotechnology Account of International Trade: the case of petrochemicals', Journal of International Business Studies, Fall 1971.

TEECE, D.J., 'Multinational Enterprise, Internal Governance, and Industrial Structure', American Economic Review, Vol 75, No 2, May 1985, pp 233-238.

VERNON, R., 'International Investment and International Trade in the product cycle', Quarterly Journal of Economics, Vol 80, May 1966, pp 190-207.

VERNON, R., Sovereignty at Bay: The Multinational Spread of US Enterprises, New York: Basic Books, 1971.

VERNON, R., 'The location of Economic Activity', in Dunning, J.H. (ed.), Economic Analysis and the Multinational Enterprise, London: George Allen & Unwin, 1974, pp 89-114.

VERNON, R., Storm over the Multinationals: The Real Issues, London: Macmillan, 1977.

VERNON, R., 'The Product Cycle in a New International Environment', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 255-267.

WILLIAMSON, O.E., The Economics of Discretionary Behaviour: Managerial Objectives in a Theory of the Firm, Englewood Cliffs, N.J.: Prentice-Hall, 1964.

CHAPTER FIVE - TRANSACTION COST THEORY AND THE MNC

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5.1 INTRODUCTION

Transaction cost theory[1] seeks to provide an explanation for the division of economic activities between firms, markets and other forms of economic organization. The basic unit under investigation is the transaction. Costs which arise in the course of market-mediated transactions are held to provide the rationale for the existence of the firm, which can reduce such costs by organizing transactions itself.

Several authors have pointed out that transaction cost theory is, in many respects, simply a new name for the economic theory of the firm [eg Spence (1975, p163), Calvet (1981, p49), Spicer & Ballew (1983, p77)]. It is, therefore, worthwhile pointing out an important difference. Whereas the mainstream theory of the firm treats the firm as merely a unit of production which responds in a profit maximising way to supply and demand conditions in the marketplace, transaction cost theory analyses the firm as a substitute for alternative modes for completing exchanges, such as markets.

It can thus be argued that the term 'theory of the firm' is in fact a misnomer, which should be replaced by the term 'theory of markets', in which firms are important actors. This point was made by Jensen and Meckling (1976) and re-iterated by Jensen (1983) as follows:

> "Just as astronomers can usefully abstract from the complexities inside a star or galaxy for certain purposes, the classical economic notion of the firm has usefully abstracted from the internal complexities of organizations. It has yielded a robust theory of markets that is of great value. However, precisely because the definition of the firm abstracts from most of the real problems and complexities of organizations, it provides no insights to the construction of a theory of organizations."[2]

In essence, the traditional theory of the firm regards the firm as a 'black box' to which a production function is routinely assigned. Transaction cost theory is concerned with explaining what goes on inside this black box, so that the efficiency with which firms organize transactions can be compared with the transactional efficiency of alternative methods of resource allocation.

Transaction cost theory has been applied to the multinational as well as to the domestic firm. This development is analysed later in the chapter. The next section surveys the antecedent literature on transaction cost theory.

5.2 TRANSACTION COSTS AND THE THEORY OF THE FIRM

5.2.1 The Roots of Transaction Cost Theory

Orthodox economists in the early part of this century were preoccupied with the perfectly competitive model of market competition, in which the existence of transaction costs is assumed away. The notion that the transaction was an insignificant phenomenon, unworthy of investigation, was first challenged by John R. Commons (1934), who advocated that the study of transactions should form the basis of economic analysis. Commons belonged to the 'institutionalist' school of thought, an American intellectual tradition inspired by the ideas of Thorstein Veblen [see eg Veblen (1899)]. The institutionalists were critical of neoclassical economics for its reliance on theoretical and mathematical models which not only distorted and oversimplified economic phenomena but which, more importantly, also ignored their non-economic, institutional environment.

Commons argued that the focus of orthodox theory on the exchange of goods and services was misplaced, for it failed to recognise the significance of the other transactions which are a necessary pre-requisite for product market exchange. Two such varieties of transaction were identified by Commons: 'managerial' transactions involving, essentially, relations between employers and employees; and 'rationing' transactions, consisting of such events as the declaration of dividends. Commons drew attention to these transactions because they were essential to the functioning of most institutions, and in particular to the firm.

Although he made the transaction the basic unit of his investigations, Commons did not associate costs with any of the particular transactions which he identified. It was Ronald Coase who introduced the concept of transaction costs with his 1937 article The Nature of the Firm, which put forward an explanation for the existence of firms in market economies. Economists at this time, with the exception of Knight (1921), were not interested in justifying the existence of the firm. They were concerned, predominantly, with the way in which markets mediated exchange; the boundary of the firm was taken as a parameter. Coase argued, however, that the boundary of the firm should be regarded as a decision variable for which an economic assessment was needed.

The method of analysis used by Coase has similarities with that employed by the seventeenth century political theorist Thomas Hobbes in his book Leviathan (1651).[3] It involves the use of what may be described as a 'thought experiment' in which a 'state of nature' is proposed which has the institution in question absent from it. In Hobbes's case the institution was government, and its existence was explained by the failings of the state of nature which caused government to arise, namely human nature. Governments were formed, in Hobbes's opinion, as the result of a voluntary contract between citizens and a protective sovereign in which the citizens agree to recognise the authority of the sovereign in return for relief from the anarchy and constant war which would otherwise make "the life of man solitary, poor, nasty, brutish and short" (p186).

In Coase's analysis the 'state of nature' is the free market in which firms are absent and individuals transact with one another. The failings of the market which cause firms to arise are the costs which arise in individual transcations. Two particular transaction costs were identified by Coase. Firstly, costs involved in using the price mechanism. These arise because the relevant prices for the exchange of factor inputs have to be discovered. In a market economy without firms, factor inputs have to search each other out and combine via short-term contracts for the one-off production of particular products. The firm, in contrast, becomes a sole source supplier to itself for those transactions that are shifted out of the market and into the firm; relevant prices are thus known.

Secondly, the firm is able to cut down the number of contracts between factors of production by substituting a single employment contract in their place. Coase explained it as follows:

> "The costs of negotiating and concluding a separate contract for each exchange transaction which takes place on a market ... are not eliminated when there is a firm but they are greatly reduced. A factor of production .... does not have to make a series of contracts with the factors with whom he is co- operating within the firm .... For this series of contracts is substituted one."[4]

Coase was therefore arguing that the emergence of firms may be viewed simply as a process in which product markets are replaced by factor markets, resulting in a saving in transaction costs.

Having provided a rationale for the existence of firms, Coase then needed to provide a reason for the continued existence of markets, given their inherent transaction costs. The answer was, simply, that firms experience distinctive costs of their own, so that a balance will be struck when the firm has expanded to the point where "the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange in the open market or the costs of organizing in another firm."[5]

In an article written some twenty three years later, Coase (1960) elaborated further on the transaction costs that result from using the market mechanism. This involved forsaking the assumption of perfect information embodied in the neoclassical market model. In this model prices are not set by individuals but by a fictional 'market administrator', the Walrasian auctioneer, who ensures that trade only takes place when the equilibrium set of prices has been announced. These co-ordination services are assumed to be costless, so that traders will be provided with costless market information about exchange opportunities as conveyed by prices; they will not, therefore, incur any search costs.

Coase dropped the economic fiction of the Walrasian auctioneer and recognised that direct bargaining does, in fact, take place. Traders have to engage in a process of search to discover who they can deal with. They must subsequently inform the trading partners they identify that they wish to deal with them, and they must then enter into negotiations, which will end with the striking of a bargain and the signing of a contract. Thereafter, they will incur contract enforcement costs as they attempt to make sure that the terms of the contract are being observed.

5.2.2 Recent Contributions

After a long hiatus, the ideas contained in Coase's 1937 article on the nature of the firm began to exert an influence on the thinking of those economists concerned with the theory of the firm.

Alchian and Demsetz (1972) followed the lead of Coase in modelling the firm as the nexus of a set of contracting relationships among factors of production. They argued that the firm owes its existence not only to the excessive costs of organizing contracts through the market, but also to the advantages which accrue from team production (ie individuals working together). These advantages arise from the premise that individuals are unlikely to make specific knowledge about their own capabilities freely available in a market since in so doing they would weaken their bargaining position vis-a-vis other participants. However, when combined under one organizational umbrella, individuals have an incentive to voluntarily disclose their specific knowledge since they are part of a team, upon whose success their own standard of living and prospects for advancement depend.

Alchian and Demsetz recognised, however, that production processes which involve team production make the identification and measurement of individual performance difficult since the marginal product of one input is dependent upon the level of output achieved by all the other inputs employed. If one input were to work below its full potential the repercussions would be dissipated across all the other inputs, thus making the source of any 'shirking' difficult to identify.

Alchian and Demsetz argued that this 'metering problem', caused by interdependency between factor inputs, was overcome by the evolution of hierarchical structures within firms which enabled one or more of the factor inputs to specialise in monitoring the productive activity of all other inputs. These monitors did not themselves shirk because they were endowed with 'property rights' which gave them a residual claim to the income of the firm in excess of payments to all other factor inputs. They therefore had an incentive to work at maximum productivity.

The origin of the firm is therefore explained by Alchian and Demsetz in terms of its greater effectiveness at monitoring the performance of employees engaged in 'team production' compared to non-centralized contractual arrangements. Compared with Coase's explanation of the firm, their arguments can be regarded as the opposite side of the same coin: the lower the cost of managing team production, the greater the comparative advantage of organizing transactions within a firm.

The analysis of Alchian and Demsetz was taken up and extended by Jensen and Meckling (1976). They believed that Alchian and Demsetz placed too much emphasis on team production and therefore failed to recognise that firms have contractual relationships with parties other than employees, eg with customers, suppliers, creditors etc. In the theory of the firm which they developed monitoring expenditures are only part of a more extensive set of costs which arise in contractual relationships. These so-called 'agency costs' arise in relationships which involve a delegation of decision-making authority from the contractor (principal) to the contractee (agent).

Jensen and Meckling developed their agency cost model to explain the form of the classic entrepreneurial firm. Fama (1980) modified agency theory to provide an explanation for the modern publicly-owned firm, whose managers own little or no equity. He did so by arguing that management and risk-bearing should be treated as naturally separable factors of production, each faced with a market for its services: the managerial labour market and the capital market. The former serves to effectively monitor the performance of management, while the latter provides the means for risk-bearers to sanction management by shifting their resources among firms with relatively low transaction costs.

The most significant contribution to the recent transaction cost literature is, arguably, O.E. Williamson's Markets and Hierarchies (1975).[6] This work is much more ambitious than the theories considered so far, for it attempts to account for the human and environmental factors responsible for the existence of transaction costs. In doing so, it integrates other literatures into transaction cost theory, principally the market failure and organization theory literatures. The theoretical synthesis which Williamson developed, known as the Market and Hierarchies (M&H) framework, is described in the following section.

5.2.3 The Market and Hierarchies Framework: The Basic Model

Williamson's analysis of transaction costs relies on two critical behavioural assumptions: bounded rationality and opportunism. Both are derived from organization theory.

The term 'bounded rationality' was coined by Simon (1957a) to reflect the fact that individuals have limited cognitive powers and therefore experience difficulties in formulating and solving complex problems, and in processing information. These cognitive defects stem from neurophysiological limits on the one hand and language limits on the other.

The concept of 'opportunism' stems from the work of organization theorists such as Schelling (1960) and Goffman (1969).

It extends the conventional assumption that individuals are guided by considerations of self-interest, to make allowance for 'strategic' behaviour. This involves self-interest seeking with the extra dimension of 'guile', eg making false threats in the belief that individual advantage will thereby be realised.

The implications of these two aspects of human nature for economic organization are set out by Williamson as follows:

> "As a consequence of these two assumptions, the human agents that populate the firms and markets with which I am concerned differ from economic man (or at least the common caricature thereof) in that they are less competent in calculation and less trustworthy and reliable in action. A condition of bounded rationality is responsible for the computational limits of organization man. A proclivity for (at least some) economic agents to behave opportunistically is responsible for their unreliability ... But for the simultaneous existence of both bounded rationality and opportunism, all economic contracting problems are trivial and the study of economic institutions is unimportant."[7]

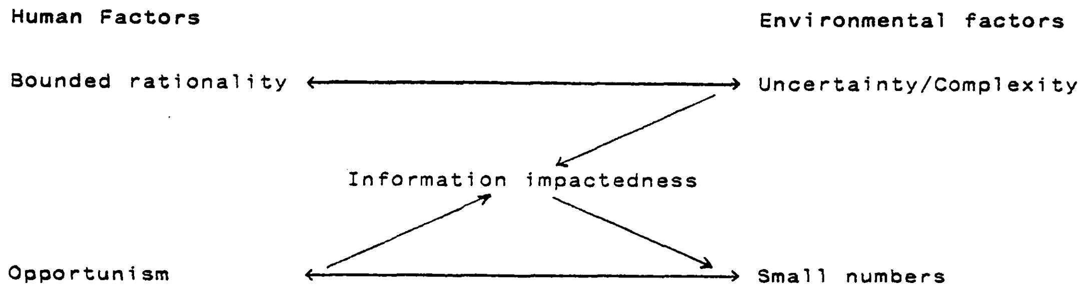
Nevertheless, Williamson stresses that these two human limitations do not in themselves pose transactional problems; it is only when they interact with the appropriate 'environmental' factors that they give rise to significant transaction costs. Bounds on rationality, for example, are only interesting to the extent that the limits of rationality are reached, ie under conditions of uncertainty and/or complexity. Similarly, opportunism will only change the trading situation if there are a small number of traders. Large numbers will render opportunistic inclinations ineffectual because traders who attempt to secure gains by strategic posturing will find, at the contract renewal stage, that such behaviour is non-viable.

Figure 5-1 summarises the conditions which, in Williamson's view, promote organizational failure:

CHAPTER 5

FIGURE 5-1

THE ORGANIZATIONAL FAILURES FRAMEWORK



[SOURCE: Adapted from Williamson (1975, p40)]

The horizontal double-headed arrows represent the main combinations of human and environmental factors which give rise to transaction costs. However, these are not the only interactions which produce organizational failure. Williamson described a third interaction, between uncertainty and opportunism, which gives rise to a condition called "information impactedness". This exists when "true and underlying circumstances relevant to the transaction, or related set of transactions, are known to one or more parties but cannot be costlessly discerned by or displayed for others" (1975, p31).

The concept of information impactedness is derived from a section of the market failure literature which deals with the effects of information asymmetries on market exchange. The seminal contributions were made by Arrow (1969) and Akerlof (1970).

Arrow highlighted the information asymmetry problem in the context of contracting for an item whose final cost and/or performance is subject to uncertainty. If the supplier chooses to bear this risk he will undertake a fixed price contract to deliver a specified result, but only after attaching a risk premium to the price. If the buyer has different information about the nature of the risk and regards this premium as excessive, then he can opt to bear the risk himself by offering a cost-plus contract. This, however, impairs the incentive of the supplier to achieve least cost performance: hence the 'moral hazard' problem arises. Risk-bearing will not, therefore, be optimally allocated where there is inequality of information among economic agents.

Akerlof, in his analysis of the used car market as "The Market for 'Lemons'", demonstrated that this market fails because transactors have unequal information about the product being exchanged. Because the seller knows more about the true condition of the car he has been using than a potential buyer can expect to know about it, the price a customer will be prudently willing to pay will be what it seems to be worth less some discount estimated to represent the deficiencies in quality that may have been missed. Therefore, if a car is really as good as it looks, the owner will gain by not selling it and continuing to use it himself. Because the market must assume used cars to be 'lemons', they mostly are; the market for used cars is sub-optimal, and the market for good used cars may be non-existent.

In deriving his condition of information impactedness, Williamson argued that it was not merely asymmetry alone but asymmetry coupled with the high cost of achieving information parity, and the tendency of agents to behave opportunistically, which is problematic. The agent with superior information will use his knowledge in an opportunistic fashion if he knows that the other party to the exchange is unable to bear the cost of achieving information parity. Williamson also pointed out that information impactedness can arise in the absence of information asymmetry if one party is prepared to act opportunistically. Where buyer and seller have identical information, one agent may make representations that the true state of the world is different from what both parties know it to be. If it is costly for an outside arbiter to determine what the true state of the world is, then an incentive for making opportunistic representations will exist.

A necessary condition for information impactedness to prevail, however, is the existence of a small number of transactors. If there are many potential bidders, opportunistic transactors will find that their contract will not be renewed when it expires because of the existence of a large pool of alternative traders; opportunism would effectively be competed away.

The term "organizational failure" is used by Williamson to highlight the fact that his framework applies to market and non-market institutions alike. Organizational failure is said to occur when the transaction costs associated with one mode of organizing transactions (such as the market) could be reduced by shifting those transactions to an alternative organizational arrangement (such as the firm). A presumption of market failure is warranted where it is observed that transactions are shifted out of a market and into a firm. A presumption of internal organization failure is warranted for transactions that are unshifted (continue to be market-mediated).

The meaning of the word 'organization' in the sense in which it is used by Williamson is clearly different from its meaning in other contexts. Ouchi (1980) has suggested that, in the broader language necessary to encompass both economics and organization theory, it is useful to define an organization as "any stable pattern of transactions" (p132). With this definition, a market may be regarded as an organization just as much as a firm or any other method of mediating transactions.

5.2.4 The Choice of Economic Organization: Market Costs

Having identified a set of human and environmental factors whose interactions give rise to transaction costs, Williamson went on to apply his method of analysis to a particularly common transaction, that between employer and employee. The method which he employed is similar to the Hobbesian method used by Coase in that markets are presumed to constitute the 'state of nature' which initially prevails. Williamson then proceeded with his thought experiment by considering the characteristics of four different types of market-based contracts before concluding that non-market contracting is superior.

Williamson considered, firstly, the 'spot market contract'. This type of contract, which obliges employees to perform specific tasks in the future, is unable to permit adaptation to take place. In the face of uncertainy about the future, Williamson argued that this inflexibility rules it out as a feasible contracting mode.

Most transactions involve long-term obligations, and these are commonly dealt with by the second type of contract considered by Williamson, ie contracts that are drawn up in probabilistic, or contingent, terms to account for uncertainty. These 'contingent claims contracts' specify the obligations of each party to an exchange, contingent upon all possible future states of nature. However, given a future that is either complex or uncertain, the bounded rationality of individuals will make it impossible to specify such a contract completely. Leaving the contract incompletely specified is an alternative, but one that will only succeed if each party can trust the other to interpret the future. Thus, according to Williamson, given the existence of uncertainty, bounded rationality and opportunism, contingent claims contracting will fail.

Instead of trying to anticipate the future in cumbersome, 'once-and-for-all' contracts, traders may employ a series of contracts, each one written for a short period within which future events can be confidently foreseen. However, williamson points out that the problem with this third type of contracting mode, 'sequential spot contracting', is that many exchange relationships involve the transfer of unique goods or services which require specialised knowledge to be provided by the supplier about how to supply the customer best and most efficiently. The supplier will acquire knowledge about his idiosyncratic tasks over time, and in so doing will gain a 'first mover advantage' which enables him to bid more effectively on subsequent contracts than any of his potential competitors. Knowing this, potential competitors will not waste their time bidding, thus producing a situation of 'small numbers bargaining' (bilateral monopoly) in which there is only one seller and one buyer.

Under these conditions competitive pressures are absent, and each party will opportunistically claim higher costs or poor quality, whichever is in its best interests. In order to maintain such an exchange, each party will have to go to considerable expense to audit the costs or performance of the other. Williamson argues that if these transaction costs are too high, the market relationship will fail due to the confluence of opportunism with small numbers bargaining, even though the limitations of uncertainty and bounded rationality may have been overcome.

The fourth type of contractual relationship considered by Williamson was the 'authority relation', defined originally by Simon (1957b) as an agreement in which an employee accepts an employer's authority in exchange for a stated wage. The feature which distinguishes this form of contract from others is that both parties do not agree on all terms ex ante but 'agree to agree later'. This arrangement is therefore more flexible than the simple spot contract, and it does not pose the bounded rationality problems that the contingent claims contracting model is subject to. It also reduces the frequency with which contracts must be negotiated, in comparison with the sequential spot contracting mode. However, all the problems of task idiosyncracy which are present in sequential spot contracting remain; firms will either have to bear the high costs of continuous labour turnover or the high costs of meeting the demands of idiosyncratic workers with monopoly bargaining power.

The fifth type of contracting mode considered by Williamson was the 'internal labour market' (ie the firm). Although not optimal in terms of minimising transaction costs between employees and employers, Williamson considered it to be the closest to optimality. In particular, it overcomes the problems posed by task idiosyncracies by its use of collective bargains rather than individual contracts. Wage rates, under this system, are attached mainly to jobs rather than to workers and so the incentive to behave opportunistically which employees would have in individual contracting (due to their unique experience) is greatly reduced. The collective agreement also overcomes problems of uncertainty by being written in general terms.

The organizational failures framework holds that the mode of economic exchange which prevails at any time is determined not only by the costs of transacting in markets but also by the costs of organizing transactions within firms. Williamson therefore went on to consider the costs associated with the expansion of a firm's hierarchy. These 'hierarchy costs' are considered in the following section.

5.2.5 The Choice of Economic Organization: Hierarchy costs

The expansion of a firm is likely to involve additional hierarchical layers of management, assuming that its organizational structure is held constant. In Williamson's opinion, this will generally result in a lessening of contact with personnel at the lower levels of the hierarchy. Furthermore, if expansion is achieved by means of vertical integration this will tend to create 'goal distortions' within the organization. According to Williamson, four types of distortions are common: an 'internal procurement bias', an 'internal expansion bias', a 'programme persistence bias', and a 'communication distortion bias'.

The first of these distortions stems from the existence of an internal source of supply that tends to distort procurement decisions. Divisional goals tend to be given too much weight in relation to objective profitability considerations, and 'norms of reciprocity' develop (usually of the 'I buy from your division, you support my project' type). In Williamson's view, the opportunities for this type of behaviour are more extensive within the firm than within markets.

The second distortion, the 'internal expansion bias', is driven by the knowledge that the reward system for management is often positively correlated with firm size, inducing management to take decisions which expand the size of the firm, even if this is contrary to the interests of shareholders. The third distortion, the 'programme persistence bias', refers to the propensity of management to adopt cross-subsidisation as a means of maintaining uneconomic divisions in situations where market forces would lead to their elimination.

Supporting all of these three biases are the distortions created by information passed horizontally and vertically within the firm. These 'communication distortion biases' arise when individuals within the firm seek to promote personal goals by distributing false or misleading information through the firm's communication channels.

Much of Williamson's analysis of the control losses associated with vertical integration is derived from the organization theory literature. He does not refer, however, to an important idea from the economics literature which captures many of the notions put forward by organization theorists, namely Harvey Leibenstein's concept of X-inefficiency (1966). This type of inefficiency is said to exist when organizations do not operate in a fashion which minimizes costs because individuals do not work as productively as they are able to. X-inefficiency may therefore be present in situations where allocative efficiency exists, ie although factors of production may be allocated to the right decision units, these units may not necessarily use the inputs as effectively as possible. The difference between the maximum effectiveness of utilization and actual utilization is the degree of X-inefficiency.

The overall conclusion reached by Williamson in his analysis of the expansion of firms' hierarchies is that the distorting behaviour which results can only be relieved by the adoption of appropriate control mechanisms and that a balance must therefore be struck between the costs associated with controlling these distortions and the benefits of hierarchical control.

The general method of analysis proposed by Williamson in his organizational failures framework has been advocated by other economists, notably Demsetz (1969) and Dahlman (1979). The merits, and potential pitfalls, involved in comparing the relative efficiency of alternative institutional arrangements are considered in the following section.

5.2.6 Comparative Institutional Analysis

The comparative analysis of alternative institutional arrangements was originally recommended by Demsetz (1969) as a suitable method for the study of economic problems. He compared his 'comparative systems approach' with what he called the 'nirvana approach', where the choice is between <u>ideal</u> and real institutional arrangements. If discrepancies are found, the real arrangement is deduced to be inefficient. Demsetz argued that the nirvana approach, ie using a zero transaction cost world as a frame of reference, was logically fallacious because it is unattainable in the real world.

The same conclusion was reached by Dahlman (1979), who argued that Pareto optimality was irrelevant as a measure of efficiency. He reached this conclusion from an examination of externalities, ie side-effects of production (or consumption) which confer benefits or costs on other producers (or consumers) for which no payment or compensation is made. Dahlman pointed out that externalities are dependent upon the existence of transaction costs, for without them wealth-maximising economic agents would be able to make the emittor of an externality 'internalize' the cost of his actions. It therefore follows that transaction costs are responsible for deviations from Pareto optimality.

According to Dahlman, all transaction costs can be regarded as resource losses caused by lack of information: search costs, bargaining costs and policing and enforcement costs all owe their existence to imperfect information. Armed with this definition of transaction costs, Dahlman proceeded to analyse the classic textbook example of an externality, ie the smoke pollution case, in which a laundry owner must decide whether to transact with a smoke emmitor to curtail his output. If, on the basis of available information, the laundry owner decides that the costs of transacting with the polluter are too high, then the smoke is endured and internalized in the market. On the other hand, the sufferer may decide on the basis of available information to contract with the polluter so that the externality is internalized in the firm. In both cases the externality is internalized.

In the case where the laundry owner decides to endure the smoke, but his estimate of the costs of transacting are incorrect (to the extent that the benefit gained from transacting would outweigh the cost) then the laundry owner suffers a loss of income. According to Dahlman, however, this case cannot be classified as an externality because the laundry owner's decision is based upon information which he perceives to be correct. It is only later that he may realise that he has made a mistake, in view of additional information that was not available at the time. Given the existence of imperfect information, an optimal allocation of resources is impossible. To be able to claim that a deviation from optimality does represent an externality it is necessary to possess superior information to that available to market transactors. This reasoning led Dahlman to make the following observation:

> "... transaction costs per se have nothing to do with externalities. What is involved is a value judgement: if you believe that markets internalize everything, you will believe that externalities do not exist; on the other hand, if you believe that markets do not internalize side effects, you will believe in the persistence of externalities as deviations from an attainable optimum. This is not science; it is metaphysics."[8]

The implication of Dahlman's critique is that externalities are relevant only in the context of comparisons between existing institutional arrangements and alternative institutional arrangements (rather than a Pareto optimal set of institutional arrangements). Any externality can then be measured by the difference between the costs and benefits of alternative real-world arrangements relative to the costs and benefits of existing arrangements.

Williamson (1979, 1981a, 1981b, 1985, 1986, 1990) has continued to elaborate the Market and Hierarchies theory of organizational change and has had his ideas adopted by economists concerned with the theory of the multinational firm, most notably Calvet (1981) and Teece (1980, 1981a, 1981b, 1981c, 1982a, 1982b, 1983, 1986). These, and other related contributions, are reviewed in the next section.

5.3 TRANSACTION COST THEORIES OF THE MNC

5.3.1 Introduction

Although the transaction cost theories cited so far relate to the theory of the firm at the national level, the most prominent support for the transaction cost approach in recent years has come from theorists concerned with the multinational firm. They have recognised that Coase's idea that a firm grows through its ability to organize transactions at a lower cost than the market is just as applicable to the MNC at the level of world markets as it is to the domestic firm for which the theory was first developed. One economist at the forefront of this development has credited students of the MNC with the title "theoretical innovators" for their "introduction of transaction costs into conventional economic theory" [Casson (1981, p16)].

The Coasian theory of the multinational firm has come to be known as 'internalization theory', so called because MNCs are believed to evolve by internalizing imperfect markets (ie markets with transaction costs). The ideas of Coase were first applied to the study of MNCs by McManus (1972). It was not until 1976, however, with the publication of Peter Buckley and Mark Casson's 'long-run theory of the multinational enterprise' that the term 'internalization theory' was employed. The rudiments of internalization theory as it has evolved since 1976 are outlined below, and its strengths and weaknesses are considered.

5.3.2 Internalization Theory

As initially developed by Buckley and Casson (1976), and subsequently extended by Rugman (1981), internalization theory starts with the simple observation that the modern firm carries out many activities apart from the routine production of goods and services. All of these activities (marketing, R&D, etc) are interdependent and are related through the flow of intermediate products, mostly in the form of knowledge and expertise. Buckley and Casson argued that it is the existence of imperfections in these intermediate product markets which provide the incentive for firms to engage in FDI. Such a course of action leads to the creation of internal markets; that is, activities previously linked by the market are brought under common ownership and control. It is this internalization of markets across national boundaries which gives rise to the MNC.

Like Williamson, Buckley and Casson point out that the process of internalization involves costs: increased accounting and control information is required, communication costs are greater, and there is the possibility of incurring some form of political discrimination. Thus, the firm will only internalize, in their opinion, up to the point where marginal benefits gained are equated with marginal costs incurred.

Buckley and Casson suggest that the incentive to internalize depends on the relationship between four groups of factors: industry-specific factors, which relate to the nature of the product and the structure of the external market; region-specific factors, which relate to the geographical and social characteristics of the regions linked by the market; nation-specific factors, which relate to political and fiscal relationships between the nations concerned; and finally firm-specific factors, which reflect the ability of management to organize an internal market. Their main emphasis is on industry-specific factors, for they believe that these give rise to most of the market imperfections which promote internalization.

Buckley and Casson (1976, pp37-39) outlined five classes of market imperfection which they regarded as important stimulants to internalization:

(1) Absence of futures market;
(2) Inadequate protection for firm-generated knowledge;
(3) Monopolist/monopsonist bargaining (bilateral monopoly);
(4) Buyer uncertainty;
(5) Government intervention.

The existence of futures markets enables firms to eliminate the uncertainty involved in co-ordinating buying and selling plans which involve significant time lags. Where such markets are not present, firms have an incentive to create their own futures market internally by bringing their intermediate activities under common control.

The second imperfection listed by Buckley and Casson is essentially a restatement of Johnson's (1970) view about the inadequate nature of the market for knowledge: since know-how provides the firm with a limited 'natural monopoly', it is most efficiently exploited through discriminatory pricing, which is not feasible in an external market.

These first two imperfections can be listed under Calvet's category of 'market failure imperfections'. The third and fourth of Buckley and Casson's imperfections stem from defects in the structure of markets and can thus be listed under Calvet's category of 'market structure imperfections'. The third imperfection arises when there exists a bilateral concentration of economic power, which gives rise to an unstable bargaining situation. Where prospective purchasers of knowledge are monopsonists, and the proprietor of knowledge is a monopolist, conflict will inevitably result. This is best avoided, argue Buckley and Casson, by the joint ownership of intermediate products, which may be achieved through merger or takeover.

The fourth type of imperfection arises when an information gap exists between buyer and seller with respect to knowledge about the nature or value of a product. If the seller of an intermediate product is better informed than the buyer, but is nevertheless unable to convince the latter that the price requested is reasonable, there will be an incentive for the seller to integrate forwards and undertake the buyer's activities himself.

The four types of imperfection mentioned so far depend mainly on the nature of the products traded and on the structure of markets. The final type of imperfection, however, stems from government intervention in international markets. Taking taxation as an example, its impact on the firm will be reduced if the firm is able to set it's own prices for tax purposes. Since it cannot achieve this in external markets (where prices are usually published and cannot therefore be easily misquoted when the firm reports it's tax liability) it has a strong incentive to create an internal market for transfer-pricing purposes. This last type of imperfection corresponds to Calvet's category of 'government imposed distortions'.

The internalization approach has been widened by Rugman (1980, 1981, 1982). His main contribution lies in his explicit identification of internalization with the market imperfections approach, initiated by Hymer (1960). Since internalization is the process by which a firm overcomes market imperfections, the concept enables the various types of imperfections to be synthesised into a 'general theory' of FDI. Existing theories of FDI are thus really sub-cases of the theory of internalizaton.

Rugman goes so far as to make the following claim about the explanatory capabilities of internalization theory:

> "Milton Friedman has said that inflation is always and everywhere a monetary phenomenon. We can say that internalization is always a response to market imperfections and that both natural market failure and unnatural government regulations are everywhere. While world inflation has a monetarist cause we also now know that multinational enterprises exist due to worldwide market imperfections to which internal markets are the only viable economic response."[9]

The internalization theory is, however, not without its critics. Their arguments are considered later, in section 5.4.

A particular version of the internalization view of the MNC was initiated by Magee (1977a, 1977b, 1981) who focussed on the role of imperfections in the market for knowledge. This version, known as the 'appropriability theory' of the MNC, is considered next.

5.3.3 Appropriability Theory

The theory is based upon work done by Arrow (1962), Demsetz (1969) and Johnson (1970) on the creation and appropriability of returns from private investment in knowledge creation. It was Arrow who first diagnosed the 'appropriability problem', which stems from the observation that knowledge is a public good. As such, its use by the firm which creates it does not preclude its exploitation by other firms, although if this were to occur it would reduce the return on knowledge for the innovating firm. In order to fully appropriate the returns from knowledge creation, the innovating firm must be able to prevent others from using its proprietary knowledge. If it is able to acquire a monopoly, however, society will lose out because the lack of competition will result in higher prices: hence the 'appropriability problem'.

The need to ensure that innovative firms earn a high enough return to provide them with an incentive to create further knowledge led to the creation of the patent system and other legal safeguards. In developing his appropriability theory, Magee argued that normal market and institutional means of protection against free-riding (notably patents) have had limited effectiveness in maintaining proprietary rights to information and technology. The protection of these assets is therefore more effectively carried out, he suggested, by the bundling of information and knowledge activities within the firm.

At the international level this involves entering foreign markets via direct investment, with ownership and control of foreign subsidiaries. Only this method of overseas expansion ensures that the firm is able to fully appropriate the returns to its investment in knowledge creation. For Magee, therefore, the MNC is essentially a device for slowing the rate of diffusion of innovations on an international scale, thus enabling profits to be maximised.

The possession of firm-specific knowledge as a rationale for the existence of MNCs was also proposed by Galbraith and Kay (1986). Their theory is based upon the potential "economies of scope" (ie synergistic benefits) which can be obtained from the sharing of proprietary knowledge between parent and subsidiaries, thus spreading the cost of individual R&D projects.[10] They argued that the gains from technological research can be more easily transferred than other potential sources of synergy (eg marketing expertise, which tends to be country-specific).

According to Galbraith and Kay, the key characteristic of a knowledge advantage which motivates firms to exploit it abroad via FDI is the degree to which it is related to a specific product. This is referred to by the authors as the degree of "product specificity".[11] They argued that the lower is the degree of product specificity, the more difficult it will be for firms to fully appropriate their returns from knowledge creation. This is because the use of the market-place (ie licensing) to exploit knowledge with a low product-specific content may result in the knowledge being applied by the licensee to other products without appropriate compensation. The potential for such opportunistic behaviour increases the costs of policing licensing agreements and thus makes the use of FDI more appealing.

Whether it is the possession of firm-specific knowledge that leads to internalization (as argued by Magee and by Galbraith and Kay) or a range of functions which are potentially carried out by markets but, because of market imperfections, are internalized within the MNC (as argued by Buckley and Casson) both approaches are united in agreeing that it is not the possession of unique assets per se which give firms an advantage. Rather, it is the process of internalizing these assets within the firm which gives the MNC it's unique advantage.

5.3.4 The Market and Hierarchies Explanation of the MNC

The applicability of the M&H framework to the MNC was examined by Williamson (1981b), Teece (1980-1986) and Calvet (1981). The latter argued that the M&H framework is necessary to explain the existence of the MNC, but that it is not in itself sufficient for the purpose. (Calvet's argument is considered in Chapter Seven).

Williamson and Teece, on the other hand, both argued that the M&H framework provides a sufficient explanation for the existence of corporate multinationality. Their ideas are considered in the remainder of this section.

Williamson argued that the difficulties which firms face in using markets to transfer knowledge across national boundaries encourages FDI. He identified (1981b, pp1562-63) three principal impediments to the market transfer of knowledge:

(1) Recognition
(2) Disclosure
(3) Team organization.

The first of these follows from Coase's insight that firms are obliged to enter into a search process to discover potential trading partners. Since the protection of technological know-how often requires the suppression of information on exchange possibilities, transfer may fail by reason of non-recognition. This situation may also arise if potential recipient firms (especially if they are located in LDCs) do not possess the requisite capabilities for absorbing foreign know-how. In such circumstances internalization would be the only option available to the firm.

Assuming that recognition problems are overcome, markets may still break down if the firm has difficulty in disclosing information to buyers in a way that is convincing yet does not destroy the basis for exchange. This is the familiar problem of 'information impactedness', which can be characterised as follows: if a company has a piece of knowledge which it knows will be valuable to other firms, it will try to convince them of this value by describing its general nature and character, but it will not reveal the details because then the cat would be out of the bag and the potential customer would be free to use the knowledge without paying for it. Thus, if there is sufficient disclosure to assure the buyer that the information possesses value, Arrow's "fundamental paradox" of information arises: "its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost" (1971, p152).

Since firms which wish to sell their know-how need to limit disclosure in order to keep it proprietary, firms wanting to purchase this know-how will decline to pay as much as it is worth to the seller because they will suspect the seller of behaving opportunistically. With these conditions present, a company cannot collect in an arm's-length transfer the full net-revenue product of its knowledge. In order to earn the most it can it would have to put this knowledge to work itself, thereby engaging in direct investment when dealing with overseas markets.

Assuming, nevertheless, that the disclosure problem is overcome, ie that buyers do recognise value with only limited disclosure and are prepared to pay for the sellers' information, the use of contracts may still pose problems. Since knowledge frequently has a high tacit content it may not be easily codified: individuals often know more than they are able to articulate. The transfer of knowledge may thus be impossible without also transferring people, who may require team support. In circumstances where such transfers occur infrequently the contractual method may be appropriate. Repeated contracting, however, provides the firm with an incentive to undertake transactions itself and thus eliminate market transaction costs. The natural characteristics of knowledge, concluded Williamson, favour its transfer within a single firm.

David Teece also explored the explanatory capabilities of the M&H framework with respect to FDI. He analysed the three different categories of international markets which MNCs typically span: intermediate product markets, markets for know-how, and international capital markets. The first category involves vertical FDI, the second horizontal FDI, and the latter either vertical, horizontal or conglomerate FDI.

Vertical FDI is likely to occur in situations where firms find that their intermediate product markets (eg for raw materials) are not well developed. Contracts with suppliers are necessarily incomplete because uncertainty implies the existence of a large number of possible contingencies. Opportunistic suppliers have the incentive, and often the ability, to renege on transactions, or change the conditions of sale. Where judicial redress is weak, and alternative suppliers are unavailable, the buyer may be obliged to honour any new terms. Backward vertical integration can eliminate this risk, for if supplier and purchaser are one and the same, the incentive for so-called 'postcontractual recontracting' is weakened. Wholly-owned subsidiaries thus afford greater security of supply than reliance on market contracts with independent firms.

Horizontal FDI can also be explained by market failure considerations. Firms which seek to extract further economic rents from their proprietary knowledge by licensing overseas firms may encounter transactional difficulties (of the type elaborated by Williamson) which encourage the transfer of such knowledge to be completed within the firm rather than through the market.

The internalization of international capital markets as a reason for FDI is not given much credence by Teece because the available evidence indicates that capital transfers are not a significant feature of FDI. It is local sources of capital (eg the retained earnings and depreciation allowances of established subsidiaries) which account for the bulk of the capital component of FDI. Nevertheless, Teece pointed out that there may be a number of efficiency gains associated with the internalization of international capital markets. Where capital markets are poorly developed (as in many LDCs, for example) the MNC can act as an effective substitute for these markets by allocating funds to high yield uses, irrespective of national boundaries.

The essence of the organizational failures viewpoint, as applied to MNC's, was summed up by Teece (1981a) as follows:

> "... intrafirm transfer to a foreign subsidiary (which avoids the need for repeated negotiations and attenuates the hazards of opportunism) has advantages over autonomous trading. Better disclosure, easier agreement, better governance, and more effective team organization ... Here lies an incentive for foreign direct investment."[12]

5.4 LIMITATIONS OF TRANSACTION COST THEORY

The extent to which transaction cost theory has been adopted by MNC theorists in recent years does not obviate the fact that it contains a number of deficiencies. Indeed, the way in which the approach has been elaborated by some scholars, in particular claims that it represents a 'general theory' of FDI, has not met with the approval of those who originally explored its applicability to the MNC.[13]

For example, Buckley (1983), one of the original proponents of the internalization approach, has been active in pinpointing a number of its weaknesses. He does not regard internalization as a general theory of FDI, but rather has characterised it as "a concept in search of a theory" (1983, p42). He points out that the concept is, at its most general, tautological: firms internalize imperfect markets until the cost of further internalization outweighs the benefits. To have any empirical content, transaction costs arising from imperfections in internal and external markets must be defined and operationalised.

Veljanovski (1982) has drawn attention to the existence of a variety of definitions of transaction costs, the most basic of which is also a tautology: transaction costs are any frictions that impede an efficient outcome. He quotes the complaint made about transaction costs by Stanley Fischer (1977):

> "Transaction costs have a well-deserved bad name as a theoretical device ..... because there is a suspicion that almost anything can be rationalised by invoking suitably specified transaction costs."[14]

The tautological nature of internalization theory was also criticised by Kay (1983) who stated that "internalization does not satisfy the conditions of refutability that is required of a theory" (p305). In addition, Casson (1982, 1984) also criticised the tendency of internalization theory to be tautological. He argued that it is no more than a general theory of why firms exist, and that to make it operational requires the specification of assumptions about the relative transaction costs of internal and external markets. (This task is undertaken in the Chapter Seven).

Buckley's (1983) criticisms of internalization theory also focussed on its inability to provide an adequate explanation of the transition process from the internal mode to the external mode. Because it adopts a static approach it tends to produce a bias towards the status quo as the ideal solution.[15]

The assertion by Rugman (1981, p30) that "the theory of internalization is also a theory of centralization in decision-making" has been criticised by Kay (1983) and Casson (1984). Both of them pointed out that the creation of an internal market does not necessarily imply centralization, since control can still be exercised within a decentralized organization through the use of transfer pricing, or some other means of budgetary control.[16]

Parry (1985) also pointed out that internalization theory ignores the possibility that the firm's internal market may not necessarily be any better at controlling its proprietary rights than the arm's-length market. As he put it, "there is no a priori reason for quasi-contractual control via an internal hierarchy to be easier (or less costly) than via contractual arrangements with unrelated parties in market transactions" (1985, p568). Parry argued that know-how is just as likely to leak from within firms because the "quasi-contractual" control which they have over their employees may be less easy to enforce than the formal control exercised over a licensee. He also questioned the assumption made by internalization theorists that the organization and control structures possessed by MNCs are consistent with centralized decision-making. Foreign subsidiaries of MNCs often have a degree of autonomy over a range of functions. The possibility of such "subsidiary-independent" behaviour, a term coined by Stopford and Wells (1972), is generally greater for those MNCs with a longer history and with indigenous personnel occupying senior positions.

Another major weakness of the internalization approach lies in its assumption that market imperfections are exogenous to the (internalizing) firm. This defect has been highlighted by a number of authors: Hood and Young (1979), Calvet (1981), Kogut (1983) and Buckley (1983). Although the assumption of exogenous imperfections gives determinacy to the theory, it also unduly restricts it. As Buckley (1983) stated, "firms play a role in creating, sustaining, dominating and suppressing markets as well as merely reacting to them" (p35). Thus the fact that MNCs have the power to endogenise market imperfections (eg by creating barriers to entry) must be recognised if the theory is to have credibility. In Buckley's view, the forces which move economic transactions to be internalized or externalized need to be understood before the role of the MNC in creating market imperfections and/or responding to them can be ascertained.

In the opinion of Kogut (1983) the internalization literature fails to come to terms with the advantages which are associated with being a multinational. He argued that this fault arises from its tendency to view FDI as a decision made at a discrete point in time. He pointed out that there is "an important distinction between the original motivations to establish plants in foreign countries and the subsequent investment decisions. There is, in short, a fallacy of explanation of genesis in failing to distinguish between the initial investment decision and the subsequent incremental investment flows" (1983, p38).

Kogut argued that internalization theory's failure to consider alternative projects as incremental at a global level results in a misplaced emphasis on the <u>structural</u> elements of plant location and the elimination of transaction costs, rather than a consideration of the <u>operational</u> value of a multinational system. He identified three characteristics associated with multinationality which provide this operational value: firstly, the ability to arbitrage institutional restrictions; secondly, the ability to capture externalities in information; and thirdly, the ability to obtain joint production economies.

The first of these features, the ability to arbitrage institutional restrictions, refers to the potential which MNCs have for circumventing high tax rates, anti-trust provisions, etc. In the words of Kogut (1983) "the operation of an international system has provided the multinational with a string of options written on contingent outcomes ... The MNC can, in effect, exercise an option upon the occurence of an event, eg its option to choose in which country to declare its profits. Boundaries do not represent only the costs of tariffs and transport; they also represent profit opportunities which can only be exploited by a multinational corporation" (p43).

The second feature identified by Kogut arises from the need of firms involved in international production to obtain information about different host-country environments. He pointed out that there are important learning costs involved in such information-gathering activities, which are captured by MNCs. Thus, the wider a firm's multinational network, the greater will be its advantage over less internationally-diversified firms.

The third of Kogut's characteristics refers to cost savings in manufacturing and marketing which arise from the creation of a multinational network. These joint production economies serve to reduce the costs of production and marketing of incremental investments. For example, otherwise non-exportable goods may be exported since the fixed costs of establishing sales offices, hiring personnel and locating plant sites have already been sunk.

The essential thrust of Kogut's critique of internalization theory, then, is that it is pre-occupied with market failure and does not pay sufficient attention to the market power which arises from the inherent benefits of multinationality.

In a further contribution to the debate on the merits of the transaction cost paradigm, Buckley (1988) argued that internalization, as a general theory, cannot be tested directly. Although this viewpoint is not at odds with Kay's earlier (1983) comment that "internalization does not satisfy the conditions of refutability that is required of a theory" (op cit), Buckley has nevertheless labelled this statemement as "rather nihilistic" (1988, p184).[17] He adopts a more positive outlook, arguing that it is possible to generate a number of "special theories" by introducing "plausible real world assumptions" which limit the generality of internalization theory (1988, p182).

These special theories can be obtained, in Buckley's opinion, by building a bridge between internalization theory and Williamson's M&H approach. This involves specifying different types of transaction costs which arise in external and internal markets. Although he recognised that the measurement of these costs is a difficult task, he stated that it is necessary to make some estimates "if we are to move beyond heuristic models to concrete predictions about market configurations" (1988 p184).

Another assumption of transaction cost theory that has come under challenge is the view that firms and markets yield the same equlilibrium allocation of resources, but at different costs. This assertion is present in Coase's seminal 1937 paper (p395) and is repeated by Williamson (1975), who stated that "markets and firms are alternative instruments for completing a related set of transactions" (p8).

McManus (1975) argued that firms do not duplicate the allocative results of a price system, but rather create different resource allocations. According to McManus:

> "Both the firm and the price system are attempts to approximate, as closely as is economical, a perfectly efficient allocation of resources; but in an imperfect world, they are not attempts to approximate each other."[18]

Thus, although the firm may reduce the cost of completing transactions previously carried out in the market, it may also distort the allocation of resources produced by the market, eg by the use of transfer pricing. Increased <u>transactional</u> efficiency may therefore be offset by <u>allocational</u> inefficiency.

The internal organizational viewpoint has also been criticised for its tendency to assume a dichotomous classification between firms (hierarchies) and markets [Nicholas (1982, pp6-7)]. Such a classification is inappropriate because there are intermediate methods of co-ordinating activities. Apart from the more obvious intermediate modes such as licensing and franchising, MacMillan and Farmer (1979), Nicholas (1982) and Mariti and Smiley (1983) have all highlighted another important intermediate mode, namely "co-operative behaviour". This is defined by Mariti and Smiley (1983, p437) as "any long term, explicit agreement amongst two or more firms."

Thus, the one-off purchase of goods and services would not constitute a co-operative agreement, but an agreement to purchase all inputs from one supplier over a fixed number of years would. The relationships between the UK retailing MNC Marks and Spencer and its suppliers are examples of co-operative agreements. Bargaining and negotiation between the parties leads to long-term contracts and co-operative behaviour. This can be contrasted with markets (where there is no bargaining and prices clear the market) and firms (where prices are determined by administrative fiat).

Despite the criticism that transaction cost theory ignores intermediate forms of organization, Williamson did recognise that his organizational failures framework can be applied to institutions other than firms and markets (1975, p102). The widespread use of the term 'Markets and Hierarchies' by writers citing his ideas has, nevertheless, tended to create the impression that he did not consider intermediate organizational forms. In a later contribution, Williamson (1981b) explicitly advocated a "comparative institutional assessment of alternative organizational forms" consisting of markets, firms and "mixed modes - eg franchising" (p1544).

In his most recent contribution, Williamson (1990) has advocated that the term which is commonly used by transaction cost theorists to describe the firm, 'nexus of contracts', be replaced by a new term, 'nexus of treaties'. The dropping of the word 'contract' is justified by Williamson on the grounds that it often carries unwanted legal meanings which serve to inhibit understanding (1990, pp3-4). The broader term 'treaties' is recommended on the basis that it accomodates organizational forms such as coalitions and alliances, thus making it easier for other disciplines such as sociology and political science to "join the dialogue" and foster the integration of theories of bureaucracy and power into the organizational failures framework.

5.5 CONCLUSIONS

Transaction cost theory is concerned with the transaction cost-economizing properties of alternative forms of economic organization (markets and hierarchies being the two extremes). The concept of efficiency it employs is not therefore Pareto optimality because alternative institutional arrangements are compared with one another, not with the abstraction of a perfectly competitive market. The theory predicts that firms will substitute for markets, or any other mode of economic organization, if in so doing they are able to reduce the cost of completing transactions.

This comparative institutional approach is readily applicable to the arena of international business. It predicts that the form of international involvement chosen by a firm is dependent upon two variables: the efficiency of its own organization and imperfections in international markets. If the costs which arise from transacting in imperfect international product markets are greater, net of internal organization costs, than the costs of transacting in imperfect international factor markets, then FDI will occur in preference to exporting. The same analysis holds for international knowledge markets; where net transaction costs in these markets are greater than the costs of transacting in international product and factor markets, knowledge will be exploited within the firm rather than licensed to an independent producer.

The application of transaction cost analysis to the MNC has produced three distinctive, but complementary theories: internalization theory, appropriability theory and the Markets and Hierarchies approach. Appropriability theory is really only a special case of internalization theory (focusing exclusively on imperfections in the knowledge market) while the only real difference between the M&H framework and internalization theory is that the former traces market imperfections (both internal and external) to human and environmental factors. All three approaches are united in their belief that it is the existence of transaction costs which determine the choice between different forms of economic organization.

Transaction cost theory derives much of its appeal from its use of a non-Paretian concept of efficiency. A measure of the popularity of the approach can be guaged from the impact it has made in related disciplines. In the field of business history, for example, Nicholas (1983, 1986a, 1986b) has used Williamson's model to derive an explanation for the transition from agency selling to FDI by British manufacturing multinationals before 1939. Accountants have begun to apply the organizational failures framework to explain the development and design of managerial accounting systems [Spicer and Ballew (1983), Johnson (1983)]. The emerging literature on the phenomenon of management buy-outs has utilised concepts found within transaction cost theory [eg Wright (1986), Wright and Thompson (1985)]. And, in the field of development economics, the usefuleness of Williamson's ideas have been highlighted by Cruise O'Brien and Helleiner (1980).

Last, but not least, the insights provided by the transaction cost approach have been applied by scholars working in the field of business strategy. For example, Jones and Hill (1988) analysed the relationship between strategy, structure and performance in terms of transaction costs, which they used as a framework to integrate a number of ideas in the business strategy literature. Despite the fact that the transaction cost approach and business strategy theories share several commonalities, they differ fundamentally in terms of the objectives which they ascribe to the firm. This nature of this difference is discussed in Chapter Seven, which outlines a framework of analysis for the research issues tackled in the thesis. Before this framework can be described, however, it is necessary to review the literature pertaining to the international licensing decision. This task is undertaken in the following chapter.

CHAPTER FIVE

NOTES

1. Transaction cost theory is sometimes referred to as "internal organization theory" or the "new institutional economics", after Williamson (1975). It is also occasionally called the "institutional theory of the firm" [eg Casson (1983)].

2. Jensen, 1983, p326.

3. The similarity between Coase's method of analysis and that used by Hobbes was highlighted by Shepherd et al (1985, pp37-38).

4. Coase, 1937, p391.

5. Quoted in Williamson, 1981b, p1541.

6. The transaction cost approach outlined in Williamson's 1975 book has been further elaborated in a follow-up book [Williamson (1985)]. This is based largely upon the work done by Williamson and others in the intervening period. Many of the original articles published by Williamson since 1975 are reproduced in a subsequent publication [Williamson (1986)] which contains a selection of his essays dating from 1963.

7. Williamson, 1981b, p1545.

8. Dahlman, 1979, p156.

9. Rugman, 1981, p156.

10. The term "economies of scope" is used to define a situation in which "joint production of two goods by one enterprise is less costly than the combined costs of production of two specialty firms" [Willig (1979, p346)].

11. The idea that firm-specific knowledge may have varying degrees of product specificity is similar to the notion of "fungible knowledge" proposed by Teece (1982a). This refers to knowledge in which "the human capital inputs employed by the firm are not always entirely specialised to the particular products and services which the enterprise is currently producing" (p45).

12. Teece, 1981a, pp9-10.

13. The claim that the transaction cost approach, in the form of internalization theory, represents a 'general theory' of FDI has been advanced by Rugman (1980, 1981, 1982).

14. Veljanovski, 1982, p57.

15. Buckley and Casson (1981) have attempted to inject a dynamic element into the theory of the MNC by developing a model of the optimal timing of FDI, based upon a number of heroic assumptions about the costs of FDI and of alternative modes of market servicing over time. This, and other similar models are considered in Chapter Seven.

16. This point was also made by Buckley (1983) in a different context.

17. It is interesting to note that Buckley, in his 1988 paper, was somewhat apologetic about his 1983 comment that internalisation represented "a concept in search of a theory". He stated that this comment has been "much quoted, but not always in the spirit intended by the author" (p191).

18. McManus, 1975, p343.

REFERENCES

AKERLOF, G.A., 'The Market For "Lemons": Qualitative Uncertainty and the Market Mechanism", Quarterly Journal of Economics, Vol 84, August 1970, pp 488-500.

ALCHIAN, A.A. & DEMSETZ, H., 'Production, Information Costs and Economic Organization', American Economic Review, Vol 62, No 5, December 1972, pp 777-795.

ARROW, K.J., 'Economic Welfare and the Allocation of Resources for Invention', in National Bureau of Economic Research, The Rate and Direction of Inventive Activity: Economic and Social Factors, Princeton: Princeton University Press, 1962.

ARROW, K.J., 'The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation', in The Analysis and Evaluation of Public Expenditure: The PPB System, US Joint Economic Committee, 91st Congress, 1st Session, US Government Printing Office, 1969, pp 59-73.

ARROW, K.J., Essays in the Theory of Risk-Bearing, Chicago: Markham, 1971.

BUCKLEY, P.J., 'New Theories of International Business: Some Unresolved Issues', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 34-50.

BUCKLEY, P.J., 'The Limits of Explanation: Testing The Internalization Theory of Multinational Enterprise', Journal of International Business Studies, Vol 19, No. 2, Summer 1988, pp 181-193. (Originally presented at the annual conference of the Academy of International Business, London, November 1986).

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

CHAPTER 5

BUCKLEY, P.J. & CASSON, M., 'The Optimal Timing of a Foreign Direct Investment', The Economic Journal, Vol 91, March 1981, pp 75-87.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

CASSON, M., 'Foreword' to Rugman, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981, pp 15-21.

CASSON, M., 'Transaction Costs and the Theory of the Multinational Enterprise', in Rugman, A.M. (ed.), New Theories of The Multinational Enterprise, London: Croom Helm, 1982, pp 24-43.

CASSON, M., 'Introduction: the Conceptual Framework', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 1-33.

CASSON, M., 'General Theories of the Multinational Enterprise: A Critical Evaluation', University of Reading Discussion Paper in International Investment and Business Studies, No. 77, January 1984.

COASE, R.H., 'The Nature of the Firm', Economica, New Series, Vol 4, November 1937, pp 386-405.

COASE, R.H., 'The Problem of Social Cost', Journal of Law and Economics, 3, October 1960, pp 1-44.

COMMONS, J.R., Institutional Economics: Its Place in Political Economy, New York: Macmillan, 1934.

CRUISE O'BRIEN, R. & HELLEINER, G.K., 'The Political Economy of Information in a Changing International Economic Order', International Organization, Vol 34, No 4, Autumn 1980, pp 445-470.

DAHLMAN, C.J., 'The Problem of Externality', Journal of Law and Economics, Vol 22, April 1979, pp 141-162.

DEMSETZ, H., 'Information and Efficiency: Another Viewpoint', Journal of Law and Economics, Vol 12, No 1, April 1969, pp 1-22.

FAMA, E.F., 'Agency Problems and the Theory of the Firm', Journal of Political Economy, April 1980, pp 288-307.

FISCHER, S., 'Long-Term Contracting, Sticky Prices and Monetary Policy: Comment', Journal of Monetary Economics, Vol 3, 1977, pp 312-314.

GALBRAITH, C.S. & KAY, N., 'Towards a Theory of Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 3-19.

GOFFMAN, I., Strategic Interaction, Philadelphia: University of Pennsylvania Press, 1969.

HOBBES, T., Leviathan, London: Penguin Books, 1968. (First published in 1651).

HOOD, N. & YOUNG, S., The Economics of Multinational Enterprise, London: Longman, 1979.

HYMER, S.H., The International Operations of National Firms: A Study of Direct Investment, Cambridge, Mass: MIT Press, 1960 (published 1976).

JENSEN, M.C., 'Organization Theory and Methodology', The Accounting Review, Vol 58, No 2, April 1983, pp 319-339.

JENSEN, M.C. & MECKLING, W.H., 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure', Journal of Financial Economics, Vol 3, 1976, pp 305-360.

JOHNSON, H.G., 'The Efficiency and Welfare considerations of the International Corporation', in Kindleberger, C.P. (ed.), The International Corporation, Cambridge, Mass.: MIT Press, 1970.

JOHNSON, H.T., 'The Search For Gain In Markets and Firms: A Review of the Historical Emergence of Management Accounting Systems', Accounting, Organizations and Society, Vol 8, No 2/3, 1983, pp 139-146.

JONES, G.R. & HILL, C.W., 'Transaction Cost Analysis of Strategy-Structure Choice', Strategic Management Journal, Vol 9, 1988, pp 159-172.

KAY, N.M., 'Multinational Enterprise: A Review Article', Scottish Journal of Political Economy, Vol 30, No 3, November 1983, pp 304-312.

KNIGHT, F.H., Risk, Uncertainty and Profit, New York: Houghton Mifflin, 1921.

KOGUT, B., 'Foreign Direct Investment as a Sequential Process', Ch 2 in Kindleberger, C.P. & AUDRETSCH, D. (eds.), The Multinational Corporation in the 1980's, Cambridge, Mass.: the MIT Press, 1983.

LEIBENSTEIN, H., 'Allocative Efficiency Vs. "X-Efficiency"', American Economic Review, Vol 56, June 1966, pp 392-415.

MACMILLAN, K. & FARMER, D., ' Redefining the Boundaries of the Firm', The Journal of Industrial Economics, Vol 27, No 3, March 1979, pp 277-285.

MAGEE, S.P., 'Multinational Corporations, the Industry Technology Cycle and Development', Journal of World Trade Law, July/August, 1977a, pp 297-321.

MAGEE, S.P., 'Information and the Multinational Corporation: An Appropriability Theory of Direct Foreign Investment', in Bhagwati, J. (ed.), The New International Economic Order: The North-South Debate, Cambridge, Mass.: The MIT Press, 1977b, pp 317-340.

MAGEE, S.P., 'The Appropriability Theory of the Multinational Corporation', The Annals of the American Academy of Political and Social Science, Vol 458, November 1981, pp 123-135.

MARITI, P. & SMILEY, R.H., 'Co-Operative Agreements and the Organization of Industry', The Journal of Industrial Economics, Vol 31, No 4, June 1983, pp 437-451.

McMANUS, J.C., 'The Theory of the Multinational Firm', in Paquet, C. (ed.), The Multinational Firm and the Nation State, Toronto: Collier-Macmillan, 1972.

McMANUS, J.C., 'The Costs of Alternative Economic Organizations', Canadian Journal of Economics, Vol 8, No 3, 1975, pp 334-350.

NICHOLAS, S.J., Transactional Cost Approach To Institutional Change, Business History Unit Discussion Paper, London School of Economics, 1982. (Mimeographed).

NICHOLAS, S.J., 'Agency Contracts, Institutional Modes, and the Transition to Foreign Direct Investment by British Manufacturing Multinationals Before 939', Journal of Economic History, Vol 43, No 3, September 1983, pp 675-686.

NICHOLAS, S.J., The Choice Between Sales and Production Branches as Forms of Transacting Internationally: British Manufacturing Multinationals, 1870-1939', Paper presented at the annual conference of the Academy of International Business, London, November 1986a.

NICHOLAS, S.J., 'The Theory of Multinational Enterprise as a Transactional Mode', Ch 4 in Hertner, P. & Jones, G. (eds.), Multinationals: Theory and History, Aldershot: Gower, 1986b, pp 64-79.

OUCHI, W.G., 'Markets, Bureaucracies and Clans', Administrative Science Quarterly, Vol 25, March 1980, pp 129-142.

PARRY, T.G., 'Internalization as a General Theory of Foreign Direct Investment: A Critique', Weltwirtschaftliches Archiv, Vol 121, No 3, 1985, pp 565-569.

RUGMAN, A.M., 'Internalization as a General Theory of Foreign Direct Investment: A Re-Appraisal of the Literature', Weltwirtschaftliches Archiv, Vol 116, 1980, pp 365-379.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

RUGMAN, A.M., 'Internalization and Non-Equity Forms of International Invovement', Ch1 in Rugman, A.M. (ed.), New Theories of the Multinational Enterprise, London: Croom-Helm, 1982.

SCHELLING, T.C., The Strategy of Conflict, Cambridge, Mass.: Harvard University Press, 1960.

SHEPHERD, D., SILBERSTON, A. & STRANGE, R., British Manufacturing Investment Overseas, London: Methuen & Co, 1985.

SIMON, H.A., Administrative Behaviour: A Study of Decision-Making Processes in Administrative Organization, 2nd edn, New York: Macmillan, 1957a.

SIMON, H.A., Models of Man: Social and Rational Mathematical Essays on Rational Human Behaviour in a Social Setting, New York: Wiley, 1957b.

SPENCE, A.M., 'The Economics of Internal Organization: An Introduction', The Bell Journal of Economics and Management Science, Vol 6, No 1, Spring 1975, pp 163-172.

SPICER, B.H. & BALLEW, V., 'Management Accounting Systems and the Economics of Internal Organization', Accounting, Organizations and Society, Vol 8, No 1, 1983, pp 73-96.

STOPFORD, J.M. & WELLS, L.T., Managing the Multinational Enterprise: Organization of the Firm and Ownership of Subsidiaries, London: Longman, 1972.

TEECE, D.J., 'Economies of Scope and the Scope of the Enterprise', Journal of Economic Behaviour and Organization, Vol 1, September 1980, pp 223-248.

TEECE, D.J., 'The Multinational Enterprise: Market Failure and Market Power Considerations', Sloan Management Review, Vol 22, Spring 1981a, pp 3-17.

TEECE, D.J., 'The Market For Know-How and the Efficient International Transfer of Technology', The Annals of the American Academy of Political and Social Sciences, Vol 458, November 1981b, pp 81-96.

TEECE, D.J., 'Technology Transfer And R&D Activities of Multinational Firms: Some Theory and Evidence', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981c, pp 39-74.

TEECE, D.J., 'Towards An Economic Theory of the Multiproduct Firm', Journal of Economic Behaviour and Organization, Vol 3, 1982a, pp 39-63.

TEECE, D.J., 'A Transactions Cost Theory of the Multinational Enterprise', University of Reading Discussion Paper in International Investment and Business Studies, No. 66, September 1982b.

TEECE, D.J. 'Technological and Organizational Factors in the Theory of the Multinational Enterprise', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 51-62.

TEECE, D.J., 'Transactions Cost Economics and the Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 21-45.

THOMPSON, R.S. & WRIGHT, M., Markets to Hierarchies and Back Again: The Implications of Management Buy-outs for Factor Supply, October 1985. (Mimeographed).

VEBLEN, T., The Theory of the Leisure Class: An Economic Study of Institutions, London: George Allen & Unwin, 1925. (First published in 1899).

VELJANOVSKI, C.G., 'The Coase Theorems and the Economic Theory of Markets', KYKLOS, Vol 35, 1982, pp 53-73.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: The Free Press, 1975.

WILLIAMSON, O.E., 'Transaction-cost Economics: The Governance of Contractual Relations', Journal of Law and Economics, Vol 22, October 1979, pp 233-261.

WILLIAMSON, O.E., 'The Economics of Organization: The Transaction Cost Approach', American Journal of Sociology, Vol 87, No 3, 1981a, pp 548-577.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981b, pp 1537-1568.

WILLIAMSON, O.E., The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, New York: The Free Press, 1985.

WILLIAMSON, O.E., Economic Organization: Firms, Markets and Policy Control, Brighton: Harvester Press, 1986.

WILLIAMSON, O.E., 'The Firm as a Nexus of Treaties: an Introduction', in Aoki, M., Gustafsson, B. & Williamson, O.E. (eds), The Firm as a Nexus of Treaties, London: Sage Publications, 1990.

WILLIG, R., 'Multiproduct Technology and Market structure', American Economic Review, Papers and Proceedings, May 1979, pp 346-350.

WRIGHT, M., 'The Make-Buy Decision and Managing Markets: The Case of Management Buy-outs', Journal of Management Studies, July 1986.

CHAPTER SIX - THE THEORY OF LICENSING IN INTERNATIONAL BUSINESS

CHAPTER SIX - THE THEORY OF LICENSING IN INTERNATIONAL BUSINESS

6.1 INTRODUCTION

6.1.1 The Literature on International Licensing

There exist four main bodies of literature where explanations can be found for the use of licensing as a means of earning income overseas.

Firstly, there is a body of literature concerned with international licensing itself. Much of this is concerned with the legal aspects of licensing, a reflection of the contractual nature of this form of business. There is also a section of this literature which is concerned with the practicalities of licensing: how to negotiate a licence, the pricing of technology, etc. The section of the international licensing literature which is of most concern in this chapter is that which identifies the determinants of international licensing.

The pioneering research on the determinants of international licensing took place in the US in the late 1950's. Lovell (1958) identified a variety of reasons for foreign licensing by US firms.[1] Another study of the same phenomenon, undertaken by Behrman (1957-1960), generated a sizeable amount of data on the nature and extent of foreign licensing activity among US firms, its contribution to economic growth, the factors promoting it, and the costs and benefits involved.[2]

Other useful contributions, both theoretical and empirical, have been made by Lovell (1969), Baranson (1970), Zennof (1970), Wilson (1975, 1977), Business International (1977), Telesio (1979), Buckley and Davies (1979, 1981), Contractor (1981a, 1985) and Lowe and Crawford (1984). These, and other studies of a less significant nature, will be referred to in the ensuing analysis.

In addition to the literature concerned with international licensing per se, reference to international licensing can also be found in the technology transfer literature. In this literature licensing is analysed as one means of transferring technology between firms and between nations, the other principal mode being equity investment. Reference to factors which influence the international licensing decision can also be found in the literatures concerned with the theory of FDI and the theory of the MNC, covered in Chapters Four and Five respectively.

These four literatures are by no means discrete entities; there is a considerable degree of overlap in the explanations to be found in each of them. The theories of international licensing described in this chapter are derived from all four literatures.

6.1.2 Factors Affecting the Licensing Decision

The licensing literature identifies a large number of factors which potentially influence the licensing decision. These factors will be discussed under the following broad headings: (1) technology and product-specific factors; (2) industry-specific factors; (3) country-specific factors and (4) firm-specific factors.

The first category groups together certain characteristics of products, and the technology used to manufacture them, which are held to influence the licensing decision. The factors which comprise the second category are related to the structure of the industry in which firms operate; included among these are the use of licensing as a strategy to enhance a firm's competitive position within its industry. The third category contains factors that are associated primarily with the host (ie licensee's) country, but also the source (ie licensor's) country. The factors which make up the final category are specific to the firms involved in licensing, and relate mainly to licensors.[3]

6.2 TECHNOLOGY AND PRODUCT-SPECIFIC FACTORS

6.2.1 Imperfections in the International Technology Market

Because arms-length licensing is a market-mediated transaction (unlike FDI or exporting, which are governed by the firm's internal market) a key determinant of the viability of the licensing option will be the nature of the arm's-length market for technology licences. If the market is characterised by imperfections which make it costly to transact in it, then licensing may prove to be a less attractive option compared to the alternatives of FDI or exporting.

The literature on transaction cost theory therefore provides useful insights for the evaluation of the licensing option. Indeed, Caves et al (1983) stated that "the concepts needed to analyse licensing agreements lie in the literature of institutional economics, with its emphasis on the costs and uncertainties of contractual agreements between opportunistic parties" (p249). These concepts have been described at length in the previous chapter. Their relevance to the arm's-length technology market will be outlined here, in brief, under the following three headings: small-numbers bargaining, information asymmetry, and transfer costs. Available empirical evidence on the degree of imperfection associated with the international technology market is then outlined.

Small-numbers Bargaining

As Buckley and Casson (1976) pointed out, knowledge is a "natural monopoly", at least for a limited period of time. Thus, when technology is embodied in the form of patents and know-how there are likely to be few, if any, alternative suppliers. When there are also a limited number of competent licensees, there exists a situation which has been described by Williamson (1975) as "small-numbers bargaining" and by Buckley and Casson (1976) as a "bilateral concentration of market power". When this situation is combined with opportunistic behaviour by the contracting parties the costs of transacting will increase, in relation to those incurred in internal markets, and will therefore act as a disincentive to the use of the arm's-length market.

Information Asymmetry

When technology takes the form of what is commonly described as an intangible asset (eg know-how) there is inevitably an asymmetrical distribution of information amongst potential parties to any transaction about the value of that asset. The effect of such information asymmetry on market exchange has been highlighted by Arrow (1969) and Akerlof (1970). These contributions have formed the basis for Williamson's (1975) concept of "information impactedness". According to Williamson, information becomes impacted when the uncertainty which arises from information asymmetry cannot be overcome by the use of guarantees because of the existence of "opportunism". As a result of information impactedness, the arms-length market for intangible assets is prone to failure, and is therefore likely to be replaced by internal markets.

The condition of information impactedness has been described elsewhere by Williamson (1981) as the "disclosure" problem. It also provided the basis for Buckley and Casson's (1976) concept of "buyer uncertainty". They argued that buyer uncertainty is almost inevitable whenever unpatented knowledge is marketed, since there are limits to the extent to which information can be divulged about this type of knowledge without actually disclosing the knowledge itself. If inadvertant disclosure were to occur, then the value of the knowledge to the seller would be eliminated. This led Buckley and Casson (1976) to conclude that it is "essential that some buyer uncertainty is preserved, which means that inevitably the buyer is willing to pay less than the seller could afford to give were he in the same position. There is thus a strong incentive for the seller to assume the buyer's risk by internalising the knowledge and integrating forward into the buyer's industry" (p40).

An additional problem which arises because of information asymmetry is that of "recognition" [Williamson (1981)]. This problem occurs prior to the disclosure problem, and refers to the inability of potential licensees to recognise the opportunities for licensing because of their lack of awareness of the benefits which could be provided by intangible knowledge.

It is important to point out that the problems of recognition and disclosure do not arise for patents and that it is therefore easier to license patents than it is to license know-how. These problems do not apply to patents because the act of patenting itself places knowledge in the public domain. In patenting their discoveries companies make a conscious decision to forego secrecy in favour of public disclosure. Potential licensees are therefore able to "recognise" the potential benefits which patents may provide by searching through patent filings. There may still, of course, exist a degree of information asymmetry between the patent holder and potential licensees concerning the value of the patented knowledge, but this will not be as severe as that surrounding know-how.

In addition, because patented knowledge is publicly available it does not matter if it is passed on to another company by the licensee. As long as the patent is in force other companies cannot (legally) use this knowledge without obtaining a licence from the patent holder. However, the leakage of know-how from the licensee does represent a problem as it destroys the confidentiality which is necessary for know-how to retain its value. In the opinion of Rugman (1981, pp156-157) it is this "risk of dissipation of the firm-specific advantage" which is the key drawback of licensing.

In addition to the risk of the licensee, or an employee of the licensee, passing on the licensor's know-how to a third party, there is also the risk that the know-how will be dissipated by the licensee using it for purposes other than those originally intended. It must be noted, however, that this form of dissipation may also affect patented knowledge. The extent to which it is present will depend upon what Galbraith and Kay (1986, p14) referred to as the degree of "product-specificity" inherent in the knowledge that is being licensed.[4] The higher is the product-specificity of knowledge (ie the more specific it is to a particular product) the more difficult it is to use it in the development of other products. Given that patented knowledge is generally less tacit in nature than know-how it is likely to exhibit a higher degree of product-specificity and therefore be less susceptible to dissipation and more susceptible to licensing.

Transfer Costs

Apart form the transaction costs incurred as a result of information asymmetry and small numbers of traders, there are additional costs involved in using the market mechanism. These are of the type identified by Coase (1960), ie search costs, policing costs, etc. If these transaction costs are smaller when internal markets are used to effect transfer, rather than external markets, then there will be less likelihood of the licensing option being adopted.

Evidence to support the contention that internal technology transfers are less costly than external technology transfers has been provided by Teece (1976). He obtained data on the "resource costs" associated with 26 international technology transfer projects involving US MNCs, where these costs were defined as the costs of "transmitting and absorbing" all of the relevant unembodied knowledge (1976, p36).[5]

Teece found that the costs associated with market or "semimarket" (ie joint venture) transfers were greater than those associated with non-market (ie intra-firm) transfers. His data indicated that, on average, transfers to joint ventures cost 5 per cent more than transfers to wholly-owned subsidiaries, while transfers to independent firms cost 9 per cent more. Transfers to government enterprises involved the greatest resource cost, 17 per cent higher than those incurred for intra-firm transfers (1976, pp81-83).

In aggregate, transfer costs were found to represent 19.16 per cent of total project costs, although there was considerable variation in the data (the range extended from 2.25 per cent to 59 per cent). Teece's results therefore refute the notion that technological knowledge is in any sense a public good, ie that it can be sold at zero marginal cost. In addition, Teece found that transfer costs were lower for technology that had previously been commercialised (ie transferred). They were also lower the greater was the amount of related manufacturing experience possessed by the transferee.

Empirical Evidence

Evidence to support the contention that the international market for technology licences is an imperfect one was provided by Caves et al (1983). They argued that imperfections in this market would lead licensors to include "restrictive terms" in their licensing agreements, as a protective measure. As they put it, licensors have "an incentive to trade some licence revenue for auxiliary terms that avert negative external effects of the licensee's strengthened competitive position on the licensor's expected future profits. Thus the terms of technology licences should reflect the imperfections of the licence market" (1983, p251).

In their survey of the licensing agreements of 22 US, Canadian and UK MNCs, Caves et al found a "high incidence" of protective terms.[6] In 34 per cent of the agreements covered in their survey the licensee was prohibited from either selling or producing the licensed product outside certain specified markets. In 43 per cent of the agreements the licensee was required to share with the licensor any advances or improvements in the licensed technology, thus curtailing the licensee's incentive to invest in further development of the technology.

It was predicted by the authors that the risk to licensors of setting up a potential competitor would be associated with the incidence of restrictive clauses. This risk was measured by the licensor's level of product diversification, on the assumption that "dominant-product" licensors should be more averse to a licensee's emergence as a strong competitor than "diversified" licensors. A statistically significant degree of association was found to exist between the incidence of licensing and these two categories of licensor, thus confirming the predicted relationship.[7]

The incidence of restrictive clauses in licensing agreements was also investigated by Contractor (1981a) who found that, "as a matter of policy, licensors desire to place restraints on nonaffiliated licensees wherever it is legal or feasible to do so" (p61).[8] Clauses which restricted the export sales of licensees were found to be less prevalent than those which restricted production location, or those which provided for technology flowback. This was attributed to the fact that the former often contravene host country anti-trust legislation, whereas the latter two generally do not.

The studies by Contractor (1981a) and by Caves et al (1983) were both concerned with the incidence of restrictive clauses in arms-length licensing agreements. They did not measure the incidence of arms-length restrictions relative to those occuring in intra-firm licensing agreements, ie agreements between MNC parents and their subsidiaries. This omission was remedied by Parry (1986, 1988) who measured the incidence of restricitve clauses in the know-how licensing agreements of 137 domestic and foreign-owned Australian firms.[9] The foreign-owned firms in Parry's sample obtained their know-how "primarily from their foreign affiliates" while the domestically-owned firms obtained theirs "primarily from unaffiliated foreign enterprises" (1988, pp359-400). As a result, these two categories of licensing agreements can be viewed as proxies for arm's-length and intra-firm agreements.

Parry's study concerned itself with three principal categories of restrictions: export restrictions, restrictions on the re-licensing of technology embodying the overseas-sourced know-how, and requirements to purchase designated raw materials, capital equipment or other inputs from the licensor. What he found was that, with the exception of restrictions on re-licensing technology, there was no significant difference between foreign and domestically-owned firms in the incidence of restrictions.[10]

This finding was at odds with the two main schools of thought about the incidence of restrictive conditions in licensing agreements. One of these schools of thought, labelled by Parry (1986) as the "popular view", holds that arm's-length licensing agreements will be associated with fewer restrictive conditions than intra-firm agreements. According to this view, agreements between independent parties are seen as being more likely to reflect whatever competitive conditions prevail in the international technology market. Parry notes that this popular view is held predominantly by policy-makers in host countries, who have used it as a rationale for policies aimed at unbundling the technology component of the FDI package by encouraging domestic firms to enter into arm's-length licensing agreements with MNCs.

The other school of thought, labelled by Parry (1986) as the "internalization approach", holds that MNCs will be more likely to impose conditions on licensing agreements with independent parties than on agreements with their own subsidiaries.[11] This follows from the need that MNCs have to protect their "proprietary interests", ie to avoid technology leaking out to competitors. It is taken for granted that the subsidiaries of MNCs will not act against the best (global) interests of the MNC parent, and will therefore not be subject to the same restrictive conditions in their licensing agreements as are independent firms.

To account for his results, which suggested that there was, in fact, no significant difference between the incidence of restrictive clauses in arm's-length and intra-firm licensing agreements, Parry (1986) proposed an alternative school of thought, called the "imperfect/constrained hierarchy" approach, which draws on his earlier work, Parry (1985), referred to in Chapter Five. His approach called into question one of the main assumptions of the internalization approach, namely that the MNC can itself more easily monitor activities and enforce proprietary rights via its internal hierarchy than it can via arm's-length contracts. Parry pointed out that there exists evidence of a relationship between the leakage of technology within host countries and the movement of personnel from MNC subsidiaries [see eg Reuber (1973)]. He also suggested that formal, contractual agreements with independent third parties may be easier to enforce than the "quasi-contractual" obligations of employees in subsidiary companies (1986, p13).[12]

In addition, Parry questioned whether MNCs in general have organizational structures which exhibit the hierarchical co-ordination, control and enforcement that is assumed by the internalization approach. He pointed out that there are many MNCs where subsidiaries have a significant degree of independence over a range of functions, including activities associated with technology acquisition. This "subsidiary-independent" behaviour is reinforced by the fact that local managers often have career objectives and perceptions different from those of parent-company managers (Op cit, p15).

So, according to Parry's "imperfect/constrained hierarchy" approach, many of the elements associated with market failure are to be found in the internal markets of MNCs as well as in external markets. As a result, there should be no significant difference in the incidence of restrictive clauses found in intra-firm and arms-length licensing agreements.

Parry (1986) also suggested that the incidence of licensing restrictions overall is likely to have decreased in the 1980s. Two reasons were proposed to account for this trend. Firstly, he argued that the international technology market had become more competitive in the 1980s as a result of an increase in the number of firms able to supply technology, and also in the number of countries in which these firms are located. Secondly, he pointed out that governments in many countries had sought individually to limit the use of restrictive conditions in licensing agreements. There have also been negotiations at an inter-governmental level (conducted under the auspices of UNCTAD) to formulate an international code of conduct on technology transfer. Although these negotiations have been going on since 1975, a code has not yet been agreed upon, largely as a result of differences over the regulation of restrictive practices [see Roffe (1987)].[13]

The licensing agreements which were surveyed in the studies by Caves et al (1983) and Contractor (1981a) both revealed a lower incidence of those restrictive clauses which fall within the domain of governmental regulations, thus backing up Parry's contention that the actions of governments have had an impact in reducing the prevalence of restrictive provisions.

6.2.2 Degree of Codification and Diffusion of Technology

In his 1976 study of the resource costs involved in technology transfer, Teece was concerned only with the transfer costs associated with "unembodied", rather than "embodied", technology. According to Teece, the latter "embraces physical items such as tooling, equipment and blueprints", while the former "is the information that must be acquired if the physical equipment, or 'hardware', is to be utilised effectively" (1976, p34). The reason given by Teece for focusing his study on the transfer of unembodied technology is that it represented "a much more complex process ... the crux of the process of technology transfer" (op cit, p34). The transfer of embodied technology, on the other hand, involved "nothing more than the physical relocation of objects" (op cit, p34).

The distinction between these two different categories of technology was emphasised in later contributions by Teece (1981a, 1981b, 1981c, 1983) when he highlighted the greater ease with which technology can be transferred via the arm's-length market if it is in codified (ie embodied) form rather than in uncodified (ie unembodied) form.[14] He also observed that the transfer of uncodified technology is often impossible without the transfer of people, giving rise to the problem of "team organization" identified by Williamson (1981).[15] The extent to which this problem will inhibit a company from licensing its technology depends upon whether that technology consists of patents or know-how. The former must by definition be codifiable in order to be publicly disclosed and so the problem of team organization does not exist to the same extent as it does in know-how transfers.

The difficulties involved in transferring uncodified knowledge were also examined by Boisot (1982, 1983). He proposed a conceptual framework for analysing the communication of knowledge called the "C-D framework", so-named because it is based upon the extent to which knowledge is both codified and diffused. By dichotomising each of these two dimensions, Boisot derived a four-fold classification of knowledge, which is illustrated in Figure 6-1.

FIGURE 6-1

TYPES OF KNOWLEDGE AND ASSOCIATED TRANSACTION MODES

Uncodified Knowledge	Personal knowledge (Carry out internally)	Public tacit knowledge (Create joint venture)
Codified Knowledge	Proprietary knowledge (License)	Common knowledge (Buy and sell)
	Undiffused Knowledge	Diffused Knowledge

[SOURCE: Boisot (1983, p's 165 & 171)]

Also illustrated are the transactional modes which Boisot associated with each category of knowledge. The bottom two quadrants represent external (ie market) transactions. In the left-hand quadrant knowledge is proprietary in nature (eg patents) and is therefore licensed in order to control the rate of diffusion. In the right-hand quadrant, knowledge has become diffused, and because it is in codified form it can be readily bought and sold (eg in book form).

The upper two quadrants represent internal (ie hierarchical) transactions. In the left-hand quadrant, knowledge which is both uncodified and undiffused (eg know-how) presents the most difficulties for market-transacting and will therefore be internalised within the firm. In the right-hand quadrant, knowledge will still be internalised, but as it is no longer firm-specific it is more likely to be utilised within a joint venture arrangement.

The dichotomies represented in Figure 6-1 are, of course, somewhat artificial; in reality both dimensions are continuous. The C-D framework is, nevertheless, a useful device for demonstrating the point that the nature of knowledge will itself play a part in determining the method used to exploit it. Boisot himself acknowledged that the final choice of transaction mode will often depend on a much broader set of considerations, but pointed out that his diagram was meant to describe "the transaction decisions that confront a firm at the margin in different quadrants" (1983, p171).

6.2.3 Product Cycle Standardisation

The product life cycle theory developed by Vernon (discussed earlier in Chapter Four) relates a number of stages in the life of a product to the choice between exporting and foreign production.

According to the theory, 'new' products become 'mature' over a period of time as competitors develop substitutes which serve to weaken the innovating firm's initial competitive advantage. This advantage will eventually be lost as competition intensifies and the product becomes 'standardised'. It is in this final stage of the product life cycle that firms are likely to locate production abroad, as the over-riding priority by this time is to site production at the least-cost location.

Although most studies of the product cycle hypothesis have been concerned with the choice between exporting and FDI, Stobaugh's (1968) study of US petrochemical products found that the likelihood of these products being licensed to overseas firms increased as they became more mature. Subsequent studies by Telesio (1979) and Contractor (1981a) have provided evidence to support the view that the product life cycle has an impact upon the licensing decision.[16] The results of their surveys of executive opinion indicate that the more mature products within a firm are often singled out as being suitable for licensing. According to Contractor, some companies have formalised this in their planning procedures: "a product list is drawn up and given to the licensing department with a mandate to go all out and maximise licensing receipts."[17]

It should be noted that the existence of a product life cycle necessarily implies the existence of a parallel technology life cycle. A new product will only become mature and standardised if competitors are able to produce substitutes from the same, or very similar, technology. It is not products which firms license, but the technology used to manufacture them.

Magee (1977), and Ford and Ryan (1981), attempted to define this parallel technology life cycle for industries. Both of their cycles hypothesise essentially the same pattern of evolution over time. Ford and Ryan's cycle is, however, the more detailed one, containing six stages of evolution (compared to Magee's three).[18]

The viewpoint that older technology is more susceptible to licensing is supported by the findings of Mansfield et al (1979) and Mansfield and Romeo (1980).[19] Their studies of the technology transfer policies of US firms found that newer technology tended to be transferred overseas through established overseas subsidiaries, but that licensing to independent overseas firms became more predominant as the age of the technology increased. Other studies of the international technology transfer transactions of US firms, conducted by Davidson and McFetridge (1984, 1985), also found that newer technologies were more likely to be transferred internally rather than by an arm's-length licensing agreement.[20]

6.2.4 Rate of Technological Turnover

As well as the age of technology affecting the propensity to adopt licensing, the pace of technological change may also have an impact. If the rate of technological turnover is rapid, then firms may be willing to license their technology in order to generate a quick return before it becomes superceded. Michalet and Delapierre (1976, pp16-17, 24) provided evidence of French firms adopting licensing when technological turnover was rapid.

Contractor (1981b, p78) noted that high technological turnover is a characteristic feature of certain industries, eg electronics and computing. Firms in such industries, he argued, are willing to license their competitors in the knowledge that these competitors are technologically equal, so that licensing will not in itself significantly improve their competitiveness.

6.2.5 Length of Patent Life

Licensing may sometimes be adopted when a patent is due to expire [Contractor (1981a, p71)].[21] The reason for doing so is to give the firm chosen by the licensor a head start over its local rivals. The licensor is therefore able to "choose" the competitor that it will face, at least initially, when the patent eventually runs out.

Although this tactic may be illegal in some countries, firms can still perpetuate the benefits of a patent beyond its legal life by entering into a licensing agreement covering related know-how or trademarks. As noted earlier, in Chapter Three, these two forms of intellectual property have, in theory, an infinite life (although the life of know-how is, in practice, dependent upon it being kept confidential).

6.2.6 Spin-off Technology

Not all of the technology which arises from a firm's R&D effort is necessarily suited to its existing product range. Where this is the case, licensing may be adopted to exploit what is termed 'spin-off' technology. For example, the US multinational General Electric handles 'spin-off' technology through a separate licensing unit [Millman (1983, p29)]. One such spin-off which this company has licensed is a micro-organism that destroys spilled oil by digesting it [Ford & Ryan (1981, p118)].

Contractor (1981a, p70) reported that licensing opportunities often exist for process technologies which are peripheral to the basic production process. For example, a US aluminium producer was found by Contractor to be wary of licensing its basic aluminium smelting and rolling process, but was eager to license its peripheral process technology, such as anodizing.

In a survey of technology licensing by Canadian firms, it was found that two distinct types of technology were being licensed: core technology and peripheral technology [Crookell (1982, pp4-6)].[22] The former was deemed by the firms surveyed to be of strategic importance, while the latter consisted of either unneeded or unproven technology. Core technology was only licensed by these firms in circumstances where they could not afford direct investment abroad, or where the host market was closed to direct investment. Peripheral technology, on the other hand, was willingly licensed for profit.

Further evidence that licensing is sometimes undertaken to exploit spin-off technology is provided by a study of Australian companies [Carstairs and Welch (1982, p35), Welch and Carstairs (1983, p178)].[23]

6.3 INDUSTRY-SPECIFIC FACTORS

6.3.1 Level of Industry Concentration

The competitive structure of an industry, in both the host and source countries, may influence the licensing decision. If the host market is oligopolised, the entry of a foreign firm may induce a competitive reaction from local firms, such as price cutting, in order to prevent the new entrant from securing a strong position. The likely effect of new entry, therefore, is to reduce the profits made by local firms and effectively "spoil the market" for all firms, including the entrant [Buckley and Davies (1981, p85)].[24]

In this situation, licensing becomes a more attractive market servicing strategy as it avoids disturbance of the competitive status quo. In addition, it is likely that local firms will be willing to offer a higher bid for a licensing agreement, and that foreign firms will be more willing to accept a lower offer, in order to maintain the status quo.

Evidence in support of what Buckley and Davies (1981) have called the "oligopoly model of licensing" was provided by Parry (1976) in his study of the foreign market servicing strategies of UK pharmaceutical firms.[25] Parry found that the licensing commitment of these firms increased with the size of the foreign market, a finding which seemed to contradict existing arguments which suggested that licensing was more likely to occur in smaller markets. Parry explained this apparent contradiction by pointing out that the larger markets had well-developed indigenous pharmaceutical industries; licensing was thus a strategy adopted to overcome the barriers to entry which faced UK firms in these markets.

It has been suggested that the industrial structure which exists in the source country, as well as that which prevails in the host country, may have an impact upon the licensing decision. Buckley and Davies (1979, p27) argued that licensing may be the result of monopsony power in the source country. They cited evidence of UK firms which entered into licensing agreements with Indian firms because they came under pressure to do so from their major UK buyers. These buyers had originally come under pressure from the Indian Government to buy equipment from indigenous Indian firms, so they requested their UK suppliers to license these Indian firms so that they would maintain the same standard of equipment worldwide.

So far, licensing has been presented as a response to an imperfectly competitive market structure. Wilson (1975) has suggested that licensing is one means whereby an imperfectly competitive environment is actually created at an international level. He argued that licensing is a strategic decision in oligopolistic rivalry, in which one of the objectives is to segment markets on a geographical basis. This is achieved by the incorporation of restrictive clauses into international licensing agreements, limiting the territories in which licensees can compete against the licensor.

6.3.2 Reciprocal Access to Technology

In industries characterised by high R&D expenditure, licensing may be entered into in order to obtain access to the licensee's technology. In so-called 'reciprocal' licensing agreements there is an understanding that any future innovations produced by the licensee will be made available under licence to the licensor.

This type of agreement is important for the technological development of industries such as pharmaceuticals, electronics and chemicals, where innovations often build upon one another. In the absence of reciprocal licensing agreements, any one firm in an industry could block further progress in a particular area by refusing to license key patents. The existence of reciprocal licensing deals removes the incentive for such behaviour, as licensors know that they will have access to any future innovations produced by their licensees.

CHAPTER 6

The development of the electronics industry was largely influenced by the existence of reciprocal licensing agreements in semiconductor technology. Tilton (1971) provided an analysis of the growth of reciprocal licensing in this area. Most of the key patents in semiconductors were originally held by the US multinational AT&T, as a result of research carried out at Bell Laboratories. The transistor was invented by three AT&T scientists in 1947, an event which heralded the start of the electronics industry. Because AT&T's patents were vital to the future development of this industry it soon became apparent that other firms were going to make use of them whether or not they had obtained a licence. Some firms were also developing their own technologies and would eventually have 'innovated around' the AT&T patents. As a result, AT&T entered into reciprocal licensing agreements with its competitors.

Licensing agreements which provide for reciprocal access to technology are sometimes referred to as 'cross-licences'. Although cross-licensing is rarely defined in precise terms, it may be considered as a special case of reciprocal licensing in which the exchange of licences takes place concurrently and the reciprocal payments are netted out [Telesio (1979, p24)]. Any residual payments from one party to another would occur if different values were attached to the technologies being exchanged.

Sometimes a large number of cross-licensing agreements, often involving a number of different parties, build up around a particular technology so that a 'patent pool' is created. The members of the pool have access to each others patents and can therefore market their products unhindered by each others patent rights. An example of a technology around which a patent pool was created is laser-optics. Four multinationals had been working independently for a number of years on the use of laser-optical technology to record sound and vision on discs and sheets of reflective and transparent material, ie the Dutch firm Phillips, Sony of Japan, and two US firms, MCA and IBM [Fox (1981, p653)]. Realising the patent infringement problems which would have arisen at the product launch stage these firms decided to cross-license their patents in order to avoid such difficulties.

In the UK, patent pools played a role in the development of radio, television, radar and computer technologies, although they are no longer of any significance [Taylor and Silberston (1973, pp291-292)]. These pools were 'formal' in nature, allowing for patents to be licensed 'en bloc' to any firm for payment of a standard royalty, with the receipts being divided among the patentees in proportion to their contributions to the pool. The first pool, in radio, was started by Marconi in 1923 and lasted until 1964. The disappearance of this, and the other patent pools, in the UK can be attributed mainly to the expiry of basic patents and the loss of technological leadership to the US. Although formal patent pools no longer exist in the UK, informal arrangements for the pooling of patents may still occur through the use of cross-licensing agreements.

In addition to ensuring technological development in an industry, reciprocal licensing agreements also provide cost savings by avoiding duplication of research. They may also be used by firms which need technologies from competitors to fill gaps in their product range, or when they want to enter a new business, but cannot obtain them unless they offer technology in return.

According to Telesio (1979), however, the main role of reciprocal licensing is as an anti-competitive strategy which ensures that no single firm in an industry gains a substantial advantage over any other. It also provides a barrier to entry for firms outside the industry. In the words of Telesio, reciprocal licensing "serves to preserve stability in technology-based oligopolies" (p24).

Because of its role in reducing competition, reciprocal licensing arrangements may violate the anti-trust regulations of certain countries, particularly if it is thought that the motive for this type of licensing is the formation of a cartel.

6.3.3 Pre-emption of Competition

It is a commonly held belief that one of the disadvatages of licensing is that it involves the setting up of a potential competitor. However, one suggested motivation for licensing is that, it actually deters competition. The argument here is that, by allowing other firms to share technology, licensing makes the development of competing technologies a less attractive proposition [Frame (1982, p113), Twiss (1986, p57)]. Both of these authors cited the licensing of the float-glass process by the UK firm Pilkington Brothers in support of this argument.

This new process, developed in 1958, produced sheet glass far more cheaply than the old process, which required the mechanical grinding of sheet glass to rid it of surface imperfections. Pilkington had little difficulty in licensing the process to other glass makers around the world. So long as these competitors could use the new process on reasonable terms it was not cost effective for them to explore alternative means of producing sheet glass.

Although the motive of pre-empting the development of competing technologies is reputed to have played a part in Pilkington's decision to license its float glass process, it does not provide a complete explanation. Both Lowe and Crawford (1984, p112) and Shepherd et al (1985, p143) have argued that Pilkington was forced to rule out FDI as the means of exploiting the new process because it lacked the resources required to set up production facilities in all potential foreign markets.[26] In addition, Lowe and Crawford also pointed out that Pilkington could not easily service foreign markets by exports because the physical characteristics of glass make it unsuitable for transporting over long distances. Thus licensing emerged, to some extent, as a 'second-best' strategy.

The use of licensing as a means of pre-empting competition has also been explored by Wilson (1975, 1977). He argued that licensing can be usefully employed where firms are engaged in product rivalry based upon the physical characteristics of their products. This type of rivalry involves the search for new or physically changed products to gain advantage against actual or potential competitors. It often takes the form of imitating existing products through 'reverse engineering' or 'inventing around' a patent.

Wilson (1977) argued that licensing is particularly appealing in situations where imitation of major breakthroughs is likely since "the cost of rivals duplicating the technology can be very high. Transferring the technology to them through a licence can thus save considerable imitative research expense" (p172). Licensing also benefits the innovator by deterring the production of rival technology, and is therefore attractive "from a joint profit maximizing standpoint" (Op cit, p172).

Theoretical support for the idea that licensing may be used as a pre-emptive strategy to deter the production of substitute technology has been provided by Gallini (1984). Utilising concepts from game theory, she produced a mathematical model which demonstrated that such 'pre-emptive' licensing is more likely to occur in a small numbers situation, in which the costs incurred by an entrant (ie rival) in producing substitute technology are much less than the costs incurred by the incumbent (ie innovator).[27] According to Gallini (1984, p936) "from the incumbent's viewpoint, licensing protects against the risk of discovery of a lower-cost technology by reducing the entrant's incentive for further research. From the firms' collective viewpoint, the expenditure that would be incurred without licensing would be excessive. The rents from the licensing contract reflect the savings of this excessive expenditure."

Even if a substitute technology could be developed by an entrant at the same, or a higher, cost there would still be a strategic incentive for licensing if the incumbent were to value the technology more highly than the entrant. The possibility of such asymmetric valuation was raised by Harris and Vickers (1985) in their game theory model of the strategic factors affecting the patenting decision. In their model, it is the patenting of related technologies by the incumbent firm (rather than the licensing of existing technology) which prevents potential rivals from entering the market.[28]

It should be noted, however, that the value of patenting as a pre-emptive strategy was thrown into question by Mansfield et al (1981).[29] Their empirical study of the costs of legally imitating new products revealed that patent protection does not make market entry impossible; sixty per cent of the successful, patented products in their sample were imitated within four years of their introduction. The findings of this study also cast doubts upon the use of licensing as a strategy for pre-empting competition, since the general feeling of the firms surveyed was that patent licensing would encourage potential rivals (p909).

A slightly different, but related, motivation for licensing is where it is used in order to pre-empt the adoption of technologies which have been developed at the same time as the licensor's technology. An example of licensing being adopted in these circumstances was the decision by the West German firm Telefunken to license its PAL colour television technology to other television manufacturers. Both Telesio (1979, p17) and Business International (1977, p51) contended that Telefunken's aim was to prevent the adoption of the competing SECAM system by television networks in Europe.

6.3.4 Creation of Auxiliary Business

The value of licensing may be derived as much from the auxiliary business which it creates, as from the income derived from the licensing agreement itself. The importance of auxiliary business created by licensing was first identified by Lovell (1958), who stressed the role of licensing in developing outlets for components or other products made by the licensor, and also in developing sources of raw materials or components for the licensor's operations.

Ardisson and Bidault (1986) proposed that licensing motives could be described by three generic strategies, one of which, the "market" strategy, was the generation of auxiliary business.[30] Their research with French licensors revealed that this type of strategy was important in terms of both the number of contracts and the amount of money involved, and that it led to the creation of an international network of purchasing and supply relationships centred around the licensor.

A list of the main categories of auxiliary business, compiled by Contractor (1981b), is given in Table 6-1.

TABLE 6-1

CATEGORIES OF AUXILIARY BUSINESS FOUND IN LICENSING AGREEMENTS

a. Materials and components sold to licensee
b. Products "bought-back" from licensee
c. Fees for future technical improvements
d. Joint bidding and construction with licensee
e. Ad hoc technical assistance
f. Quality Control and Testing for licensee
g. Training of Personnel

[SOURCE: Contractor (1981b, p79)]

In Contractor's opinion this extra business "often tilts the entry method decision in favour of licensing" and in several cases "it is so predominant that the licensing agreement is tantamount to being a cover" (1981b, p79). In countries which lack local sources of supply for the product which is licensed, the supply of components to the licensee can in effect amount to "disguised imports". It should be noted, however, that so-called "tied" licensing agreements are deemed to be anti-competitive in some countries, and may therefore violate anti-trust laws. Nevertheless, when the licensor is the sole possessor of needed supplies, the licensee has little choice but to deal with it.

Another benificial spin-off from licensing activity, identified by Lovell (1958), is the creation of goodwill for other company products or services. The manufacture of one or two products under license may create popular acceptance in the host country for other products exported from the home country. Lovell found that increases in the exports of other products is often sparked by the fact that more local customers become familiar with the licensor's name and the quality of its products (1958, p18).

6.4 COUNTRY-SPECIFIC FACTORS

6.4.1 Legal Considerations

Licensing may sometimes be entered into for a number of legal reasons. These concern, firstly, the possibility of a company being forced by the host country authorities to license its intellectual property; secondly, the possibility of licensing occurring to pre-empt expected infringement of intellectual property rights by firms in the host country; and thirdly, licensing being used as a means of circumventing host-country anti-trust regulations.

In many countries, patent laws allow licences to be granted if certain conditions have not been fulfilled by the patent owner within a certain period of time after the granting of the patent. The main ground for the granting of a so-called "compulsory licence" is that the patent is either not being "worked" at all (ie no products are being produced from the patent) or not as fully as it should be. The latter condition may arise if the patent owner is producing most of the goods from the working of a patent outside a country and satisfying local demand by exports.

A compulsory licence may also be granted if it can be shown that the patent owner will not grant a licence on reasonable terms. Additionally, if a patent owner refuses to grant a licence for a patent that is essential to the exploitation of another patented item, then a compulsory licence may be awarded. In the UK the Patents Act 1977 allows compulsory licences to be applied for once three years have elapsed from the date of the patent grant. In most other European countries the time period is four years.

One motive for licensing patents, therefore, is to avoid compulsory licensing. Although royalties are still paid to the patent owner when a compulsory licence is granted, the returns generated from a freely-negotiated licence are likely to be much greater.

In some circumstances failure to exploit a patent may not be the result of deliberate inaction on the part of the owner. The owner may simply not have the resources to work it, or may have failed to find anyone else interested in doing so. In these circumstances the owner can have the patent registered as one for which a "licence of right" will be made available. This means that the owner is willing to negotiate a licence with any interested party. In return, reduced annual renewal fees are usually payable by the owner.

Maddison (1981, p48) observed that this reduction in annual renewal fees is, in practice, the only practical value of a licence of right. Patents which are registered as being available for licences of right are very seldom taken up. This is because any parties interested in working the patent would, in all probability, have already approached the owner and negotiated an ordinary licence.

Apart from seeking to avoid compulsory licensing, a firm may decide to license its intellectual property if it believes that it is likely to be infringed because of weak legal protection. In such a situation, the firm may believe that it is better to license its property and therefore exercise some degree of control over the activities of the licensee.

This view that weak intellectual property protection will increase the likelihood of firms opting for licensing is not shared by Teece (1986). He argued that if the "regime of appropriability" within which companies operate "permits only weak legal enforcement of rights over intellectual property, transactional problems will abound, and alternative governance modes [to licensing] are likely to be preferred" (op cit, p29). Teece arrived at this conclusion because his analysis focused upon a single category of intellectual property, namely know-how. Unlike patents, the value of know-how is dependent the maintenance of confidentiality; once this is lost, know-how is not capable of being licensed, unless it is protected by trade secret laws. Patents, on the other hand, can still be licensed after after they are infringed because they represent a legal monopoly to the holder and therefore still possess value. The essence of Teece's argument, therefore, is that the high risk of know-how being dissipated if it is licensed favours its exploitation within the company via FDI or exports.

The extent of infringement of intellectual property is generally a function of two factors: the adequacy of intellectual property protection and the cost of policing that protection. Although the degree of protection offered to intellectual property in different countries may not be very different, the 'de facto' protection may differ markedly due to differences in the attitudes of courts of law. In the field of patent protection, in particular, it is often argued that there exists a judicial bias against patents. For example, Kingston (1983, p11) stated that "the bias of the courts against patentees has been growing throughout this century, probably because patents represent 'visible' monopoly."

If the level of legal protection afforded to patents is weak, it can be argued that companies would be better off accepting the risk of keeping their patentable knowledge secret and exploiting it internally [see eg Casson (1979, pp95-96), Prasad (1981, p194)]. However, where a decision has been made to file a patent, companies become reliant upon the courts for protection. There is evidence to suggest that courts in the US have become more favourably disposed towards patents. Indeed Alster (1988, p71) argued that there has been "a genuine revolution in [US] governmental enforcement and judicial interpretation." This, in turn, has strengthened the position of US firms in licensing negotiations.

It would appear, however, that this "revolution" has been confined to the US. According to Alster (1988, p71) patents elsewhere "are often about as effective a defence as the Maginot line." In support of this viewpoint he cited an estimate by the US International Trade Commission that at least $40 billion a year are lost by US firms from technology theft and product counterfeiting abroad.

In those situations where a firm feels that it is unlikely to obtain favourable treatment from the courts in upholding the protection of its industrial property it may decide to enter into licensing agreements with local firms in order to pre-empt the 'pirating' of its property.

Apart from the possibility of judicial bias, the high cost of policing intellectual property rights may also provide a motivation for licensing. The initiative for enforcing intellectual property rights rests with the owner, who is responsible for detecting infringements and proving them in the courts. This can be an expensive and time-consuming business, often running into many years.

In their study of the economic impact of the UK patent system, Taylor and Silberston (1973) found that "the virtually unanimous view of everyone in industry to whom we talked was that patent litigation was to be avoided 'like the plague', although some firms are driven to it when licensing conflicts cannot be resolved in any other way" (p102). The reasons underlying this attitude, apart from the cost of litigation and the time involved, were the large scope for compromise, the unlikelihood of acheiving outright victory, and the adverse publicity that tends to attach to large companies involved in court actions, especially where their opponents are smaller firms.

The cost of policing intellectual property rights (ie of detecting infringement and enforcing the law through the courts) may thus provide an incentive for licensing. Although the licensing of a single firm in a foreign market may not prevent other local firms from 'pirating' the licensor's intellectual property, the possibility of judicial bias is likely to be lower if a local licensing arrangement exists. In addition, local licensees may sometimes be used to monitor unauthorised use of the licensor's intellectual property by other local firms [Daniels and Radebaugh (1986, p510)].

Another motivation for licensing which falls under the 'legal' category is avoidance of anti-trust action. If a company has a large share of a foreign market it may be less vulnerable to charges of monopolistic activity if it licenses its intellectual property to local competitors. The terms of such an agreement would, of course, need to be phrased in such a manner that they themselves did not violate anti-trust regulations (eg by the inclusion of cross-licensing arrangements or 'tied' sales provisions). To the extent that countries differ in their anti-trust policies the attractiveness of licensing will also differ, ceteris paribus. Licensing is more likely to occur in countries with weaker policies since licensors will have greater freedom to define the scope of the licensor's activities in these countries and will therefore find licensing a more attractive proposition.

6.4.2 Market size, Volatility and Growth Potential

The limited size of the host market is often identified as an explanation for licensing [eg Baranson (1970), Business International (1977), Telesio (1979), Contractor (1981a, 1985)].

Small markets are less suitable for direct investment since they offer less opportunity for recovering the initial start-up costs involved. These costs are not likely to be very much lower in small markets because of minimum scale requirements and indivisibilities. Small markets also represent a lower opportunity cost to the licensor, in abdicating the market to the licensee [Contractor (1985, p46)]. Thus, where hosts markets are small and exporting is not a viable proposition, licensing is more likely to be the favoured option.

In addition to its size, the growth potential of the host market may also influence the market servicing decision. If a market is in a phase of rapid expansion, the speed with which a licensing agreement can be set up might be of crucial importance, either as a means of gaining a foothold in the market, or as a pilot venture [Buckley and Davies (1981, p87)].

The perceived volatility of demand in a market may also affect the market servicing decision. Where volatility is deemed to be high, the probability of recovering any fixed investment outlay will be smaller, and so licensing will appear as a more attractive option, ceteris paribus.

6.4.3 Risk Considerations

Because licensing does not usually involve the commitment of any fixed (capital) assets to a foreign market, the risk of expropriation is avoided. Thus, where the political conditions in a country are such that expropriation risk is deemed to be high, licensing may be undertaken instead of FDI.

Firms may also be subjected to governmental interference in their operations which falls short of outright expropriation. They may, for example, face exchange control regulations which make it difficult for them to repatriate income. In such a situation, royalty receipts from licensing agreements are less likely to remain frozen than dividends since they represent a contractual commitment [Contractor (1985, p5)].

Not only are royalties better insulated against so-called 'political' risk, they also offer better protection against ordinary commercial risk. This is because royalties are usually pegged to the licensee's turnover and are therefore more stable than dividends, which may fall to zero if no profits are earned.

If a firm is considering investing in a country that will not permit 100 per cent equity investment, but will allow joint ventures, then licensing may become a more attractive proposition. This is because it is generally much easier to verify the turnover upon which royalties usually depend than it is to verify profits, which may be subject to manipulation by the local partner.

Another area in which governments impinge upon corporate activities is taxation. Licensing may become more attractive than FDI if royalties are subjected to lower rates of tax than dividends.[31] The tax treatment of royalties varies from country to country and may be subject to change over time, so it is difficult to generalise about the impact of taxation upon the licensing decision. It is worth noting, however, that in most countries royalties do attract a more favourable tax treatment than dividends [Eiteman and Stonehill (1986, p555), Shapiro (1986, p363)].

In addition to facing political risk, firms also have to cope with foreign exchange risk if they own operations overseas.[32] If there is believed to be a lower level of foreign exchange risk associated with licensing than with FDI, then the market-servicing decision may be tipped in favour of licensing. Contractor (1981b, p80) has argued that licensing does have a lower level of foreign exchange risk because it involves a lower capital commitment than FDI.[33] In addition, anticipated returns are much more immediate compared with the longer time horizon of a capital investment, particularly if lump sum fees are paid at the outset of the licensing agreement.

One other motivation for adopting licensing is that it may help to reduce the company's overall risk profile through a 'portfolio diversification' effect. By diversifying the forms of income which it receives, the firm reduces its reliance upon any single source of income and hence lowers the variance of its expected returns. This motive was originally identified by Lovell (1958).

6.4.4 Host Country Restrictions on FDI

In many developing countries government regulations restrict FDI to selected industrial sectors. For some MNCs, therefore, market entry via direct investment may not be possible.

Data from developing countries indicate that the introduction of restrictive policies towards FDI is accompanied by subsequent increases in licensing activity [UN (1983, p169)]. In the 1970s, for example, both Korea and Malaysia introduced policies to restrict inward FDI, and in both cases this resulted in an increase in the number of licensing agreements between MNCs and local firms.

6.4.5 Host Country Restrictions on Exports

As well as inhibiting the direct investment option, government interference can also serve to constrain the exporting option. The imposition of barriers to trade, such as tariffs and quotas, may rule out exporting and force MNCs into consideration of licensing. Contractor (1981b, p77) reported that government policy in Japan, Brazil, India, Mexico and Argentina had been directed towards restricting imports in order to encourage licensing, in the belief that this would reduce both the balance of payments and foreign dependency.

In addition to government-created imperfections, a naturally-occuring market imperfection, transport costs, may serve to make exporting impractical or too costly, thus making licensing more likely.

6.4.6 Absorptive Capacity in the Host Country

The ability of host-country firms to absorb foreign technology will play a part in determining whether or not licensing is feasible. Where potential recipient firms are lacking in technical absorptive capacity, the cost of licensing technology to them will be greater [Teece (1976)]. As a result, direct investment (internal transfer) is likely to become more appealing.

This preference for internal transfer in the absence of adequate absorptive capacity has been confirmed by a number of studies of firms involved in transfering technology to India [Baranson (1967), Balasabramanyam (1973), Davies (1977)]. There is also evidence at the aggregate, country-level to support the link between absorptive capacity and the use of licensing. Contractor (1981a) found a statistically significant relationship between the relative adoption of licensing by US firms and the indigenous technical capabilities of 33 host countries.[34] A further study [Contractor (1985)] using two different surrogate measures of absorptive capacity in thirty host countries also found a statistically significant relationship between this variable and the adoption of licensing by US firms.[35]

Anderson and Gatignon (1986, p19) have argued that a host country's absorptive capacity increases in accordance with the size of its foreign business community. This is because foreign firms impart management skills to their local employees, in addition to increasing awareness among other host-country nationals of the benefits of obtaining a business education. The gradual diffusion of management skills among the general population which results from the presence of foreign firms therefore serves to remove one of the major barriers to licensing, ie the lack of competent candidate licensees.

A contrasting viewpoint concerning the effect of absorptive capacity was proposed by Galbraith and Kay (1986, pp15-16) who argued that absorptive capacity may actually have a negative impact upon the propensity to license. Although accepting that the possession of certain technical skills by potential licensees is a necessary pre-requisite for licensing to occur, they pointed out that the ability of licensees to behave opportunistically increases in line with their level of technical sophistication. For example, where licensed technology is not product-specific, licensees may be able to utilise it in production processes not governed by the licence agreement. The higher costs associated with monitoring licensing agreements with technically sophisticated licensees may therefore serve to make direct investment a preferable strategy.

6.5 FIRM-SPECIFIC FACTORS

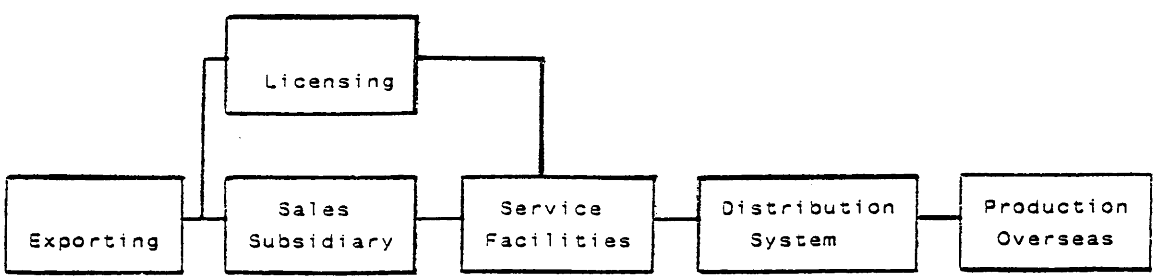
6.5.1 Level of Experience of Overseas Operations

Experience of operating in foreign markets is an important corporate resource. Telesio (1979) referred to the experience of operating abroad becoming "internalized as a 'technology' of multinational operations" (p20). MNCs that possess little of this 'technology' will be more likely to opt for licensing rather than extend their own overseas operations, for in doing so they will be able to benefit from the manufacturing and marketing expertise of local licensees; they will be able to supplement their own resources with those of indigenous firms. A study by Baranson (1970) found that firms with relatively little experience of foreign operations are more likely to license than undertake FDI, and this was backed up by Telesio's own findings (1979, pp83-87).[36]

The idea that licensing may be undertaken because a firm has inadequate experience of operating abroad can be found in the literature concerned with the internationalization process. In this literature, licensing is viewed as one stage in a sequential process of international expansion culminating in FDI. There are varying opinions as to the position occupied by licensing in this sequence. The more common viewpoint is that it follows on from exporting. A typical foreign expansion sequence is illustrated in Figure 6-2.

FIGURE 6-2

TYPICAL FOREIGN EXPANSION SEQUENCE



[SOURCE: Shapiro, (1986, p6)]

The position of licensing in the above sequence indicates that it is an optional stage in the internationalization process. The reason put forward to explain this evolutionary approach is that firms associate a high degree of risk with operating in foreign markets. In order to reduce this risk, they expand in stages, gradually building up information about foreign markets and thus increasing the chances of success at succeeding stages. Some examples of the evidence which exists in support of this gradualistic 'learning approach' to foreign expansion are Johanson and Vahlne's (1977) study of internationalization among Swedish firms, and Davidson's (1980) study of the foreign expansion behaviour of US firms.[37]

In addition to empirical studies of the internationalization process, a number of theoretical models have been formulated which attempt to predict the sequence of the three principal modes of market servicing, ie exporting, licensing and FDI [Giddy and Rugman (1979), Buckley and Casson (1981), Rugman (1981), Rugman et al (1985), Grosse (1985)]. These models place licensing at different points on the evolutionary sequence, according to the differing assumptions which they adopt. They are considered further in Chapter Seven.

6.5.2 Size

Experience of operating abroad is closely related to firm size, so it is not surprising that smaller firms seem to be more likely to utilise the licensing option rather than adopt FDI. Telesio (1979, pp77-83) found that the smaller a MNC (relative to the particular industry in which it operated) the more it would tend to license.

Some firms, however, may grow in such a way that licensing actually becomes more appealing. This may occur if a firm grows via product diversification, which is considered next.

6.5.3 Level of Product Diversification

The argument here is that firms which become highly diversified have to allocate their resources over a number of different product lines, and that this allocation will be uneven because of the lumpiness of these resources. Since a minimum commitment of resources is necessary for investment abroad, highly diversified firms may be unable to make the required investments for all of their product lines in all the foreign markets where they wish to operate. If each product line, for example, needed a distinct marketing formula for each country, then adopting FDI as the method of market penetration would be a costly option. By using licensing, MNCs can utilise the marketing expertise of local firms, which have already sunk costs into acquiring knowledge of their own market.

So, the propensity to license is likely to decrease as firms grow in size and gain more experience of operating abroad, but is likely to increase if growth takes place as a result of product diversification. Another factor which makes licensing more attractive to highly diversified companies is that the loss of control which licensing entails will be of less importance because each product line will only account for a small proportion of total sales. The hypothesis that MNCs with higher than average product diversification are more likely to choose licensing is supported by the findings of Telesio (1979, pp72-77).

An alternative explanation of the relationship between product diversification and the propensity to license was provided by Contractor (1981b, p79). His argument is that highly diversified firms have stronger centralised departments; a systematic analysis of market entry methods will usually be undertaken by the headquarters-based licensing or corporate planning departments of such firms. Licensing is more likely to be favoured, in these circumstances, for two reasons. Firstly, centralised departments are more likely to have full information about a country and to be aware of all the possible entry methods than a product manager. And secondly, the personnel in centralised departments lack the bias which product division managers naturally have for internal expansion rather than business methods which involve external parties.

6.5.4 Level of Geographical Diversification

It can be argued that the extent to which a firm is geographically diversified will also affect its propensity to adopt licensing. This argument is based upon the assumption that a firm with a high degree of geographical diversification will have gained a great deal of experience about operating in different foreign environments. This valuable asset will enable the firm to more easily expand its operations into other markets. Firms with only a few overseas operations will not have the same level of experience as more geographically diversified firms and may therefore be more likely to consider the licensing option because it utilises the licensee's first-hand experience of the foreign market.

In addition, firms with a high degree of geographical diversification are more likely to rely upon internal transfer because of the sunk costs already incurred in establishing foreign subsidiaries in numerous countries.

6.5.5 Access to External Resources

In addition to requiring access to sufficient internal resources to undertake FDI, firms may also need to obtain resources from external sources. For example, where a firm has insufficient retained earnings to finance foreign expansion, it may look to capital markets to provide it with the necessary funds. If these funds are not forthcoming, licensing may be adopted as an alternative means of market penetration.

Firms investing overseas may also wish to hire local managers, because of their familiarity with the local market. If this resource is not available, licensing may be chosen since it enables local managerial expertise to be utilised indirectly via the licensee firm.

6.5.6 Organizational Structure

The argument that a firm's organizational structure will affect its propensity to license was proposed by Davidson (1983).[38] It is based upon the observation made by Teece (1976) that technology transfer costs decline as a function of the number of transfers already executed. Organizational structures which are able to centralize this cumulative experience will realise greater efficency in transferring technology internally. Structures which divisionalise or fragment experience will perform at lesser efficiency. Since transfer inefficiencies will result in reduced returns from foreign investment projects, a greater use of licensing can be expected in exploiting foreign markets.

In his 1983 study, Davidson related the extent to which a number of US firms transferred new products abroad by licensing with their organizational structure, using four of the categories of organizational structure proposed by Stopford and Wells (1972), namely: domestic, international division, global product and global matrix.

Although Davidson did not propose any specific hypothesis about the extent of licensing activity expected under the 'domestic' structure, it is reasonable to presume that it would be associated with a relativley high incidence of licensing compared to the other structures. Firms organised on a domestic basis break down their activities on either functional lines (eg production, marketing, finance) or product lines. Overseas subsidiaries within such a structure tend to be autonomous and report directly to the firm's managing director. This reflects the fact that firms organised on a domestic basis either have very few overseas subsidiaries or very little commitment to overseas operations. As a result, they are more likely to opt for licensing.

According to Davidson (1983), the highest incidence of licensing was expected to occur among those firms which were organised by 'global product' divisions. In this structure, responsibility for both domestic and overseas operations is divisionalised according to product groups. Davidson argued that this divisionalisation results in a fragmentation of experience and information, and duplication of overheads and personnel. There is a tendency for each division to operate on its own learning curve, resulting in an increase in the marginal costs of transferring technology.

The fixed costs of technology transfer also increase as a result of fragmentation. Davidson (1983) noted that these increased costs occur at both the headquarters and subsidiary level: "at headquarters, the need to create and support duplicate personnel and administrative systems in individual divisions can raise the costs associated with potential projects. At the subsidiary level, the product division format can result in a reduced ability to share facilities, personnel, information and support systems across divisions. The result is a lower level of efficiency in evaluating and implementing transfer projects. The inability of the firm to fully share resources and costs across divisions will deter many direct investment projects" (p457). As a result of this reduction in transfer efficiency, licensing was expected to be a more probable option if a firm was organised globally by product divisions.

A lower incidence of licensing was expected among those firms whose organization included an 'international division'. Under this structure firms are organised domestically along either functional or product lines but have all their overseas operations managed by the international division. Because of this centralisation of experience, it was expected that internal technology transfers would occur with greater efficiency, and that licensing was therefore less likely to be adopted.

The organizational structure which was expected to be associated with the lowest tendency towards licensing was the 'global matrix' structure. This is because product and functional managers generally share responsibility for a given market under this structure, and so there is a higher degree of communication and co-ordination than in the other structures.

The results of Davidson's (1983) analysis of data on technology transfers by US firms tend to support his a priori hypotheses. Table 6-2 summarises the data.

TABLE 6-2

ORGANIZATIONAL STRUCTURE AND LICENSING RATES (1945-78)

Structure at time of transfer	Percentage of transfers to independent licensees
Domestic	30.2
International Division	26.8
Global Product	30.3
Global Matrix	5.1
Total	25.9

[SOURCE: Davidson (1983, p462)]

As the table shows, firms organised on a global product basis used licensing marginally more than firms organised along purely domestic lines. As predicted, firms with international divisions used licensing slightly less frequently, while firms organised along matrix lines exhibited a very low propensity to use licensing. On the basis of Davidson's evidence, there would appear to be some degree of association between organizational structure and the propensity to adopt licensing.

6.5.7 Differences in Discount Rates

If the opportunity cost of capital employed by a licensee is higher than that employed by a licensor, then the licensee will put a lower value on the stream of cash flows expected from the technology than will the licensor [Caves (1982, p206), Bonin (1987, p87)].[39] As a result, licensing will be less likely to occur, ceteris paribus.

In contrast, the existence of higher interest rates in general will be likely to increase the propensity to license, ceteris paribus. This is because firms, when faced with the choice between FDI and licensing in these circumstances, are more likely to prefer the latter as it offers a relatively quicker, less risky return with a comparatively negligible outlay. The comparative risk of licensing is lower because of the frequent linking of royalties to turnover and the fact that licensing is less prone to political risk [Contractor (1985, pp78-79)].

6.6 CONCLUSIONS

It is apparent from the foregoing analysis that the international licensing decision is a complex one, determined by the interaction of four key sets of factors. It is possible, however, to identify two general sets of circumstances in which licensing may be adopted. The first is where the licensing option is evaluated against the alternatives of FDI and exporting, and chosen because it is 'intrinsically' more profitable. In this situation licensing may be described as a 'first-best' strategy.

The conditions necessary for licensing to evolve as a 'first-best' option are, however, rather restrictive. Indeed, Buckley and Davies (1981) argued that this type of licensing can only be explained in terms of a "perfect market for advantages" model, since licensing will only be the most profitable form of overseas activity "where markets are atomistic, information perfect, advantages identifiable and cheaply transferable, and potential buyers competent" (p85).

It is more likely, therefore, that licensing will be adopted as a 'second-best' strategy.[40] This may be defined as a situation in which licensing occurs as a result of contraints which make the direct investment and exporting options infeasible.[41] Four categories of constraints can be identified from the literature: direct investment constraints, exporting constraints, internal resource constraints and external resource constraints.

Direct investment constraints arise essentially from economic nationalism, reflected in host-governemnt policies aimed at restricting the level of foreign ownership in their economies. Exporting constraints also arise from governmental interference, in the form of trade barriers, although transport costs may also serve to constrain exporting activity. Internal resource constraints are shortages of resources within a firm, primarily managerial experience of foreign operations, while external resource constraints arise outwith a firm, eg a lack of adequate cash flow to finance foreign operations.

The licensing decision can also be interpreted in terms of the 'market imperfections paradigm' as proposed by Calvet (1981), and discussed in Chapter Four in the context of the FDI decision. In the presence of a perfect market for technology licences, licensing would emerge as a 'first-best' strategy. If this market is imperfect, however, firms may withdraw from it and service overseas markets by either FDI or exports, both of which involve the utilisation of technology within the firm.

In conclusion, it should be noted that the available empirical evidence suggests that licensing is generally adopted as a 'second-best' strategy. In her survey of foreign licensing appraisal methods used by US firms, Lovell (1969) found that "the licensing approach is consciously reserved in some companies as a 'last resort' or 'salvage' measure when no other method of serving or developing a market is immediately feasible" (p38).[42] Zennof's (1970) study of foreign licensing by US firms concluded that "licensing is often viewed as a distant third choice between exporting and foreign investment" (p300).[43]

In his study of licensing and joint ventures between UK and Indian firms, Davies (1977) found that licensing was "a second-best form of operation, dictated by the impact of constraints" (p168).[44] Telesio's (1979) survey of North American and European MNCs found that licensing was adopted as a "last resort alternative" (p37).[45] In their survey of British manufacturing investment overseas, Shepherd et al (1985) found that "licensing would only really be considered as a last resort if there were important obstacles to overseas investment or exporting" (p92).[46]

CHAPTER SIX

NOTES

1. Lovell's research consisted of a survey of 240 US firms, and was conducted for the US National Industrial Conference Board.

2. Behrman's research was sponsored by the Patent, Trademark and Copyright Foundation, based at George Washington University. It involved an analysis of the experience of 207 US firms, involved in some 4,000 licensing agreements. About two-thirds of these agreements were with independent firms, the remainder with subsidiaries. The results of the research are contained in a series of ten articles published in the Patent, Trademark and Copyright Journal of Research and Education between the years 1957 and 1960. Details of five of these articles, of particular relevance to the topic discussed in this chapter, are given in the references.

3. A variety of different classifications of the factors influencing the international licensing decision can be constructed, depending upon the level of aggregation that is adopted. For example, Lowe and Crawford (1984) broke down the various factors into eleven categories, whereas Daniels and Radebaugh (1986) employed only three categories. The four-fold classification scheme adopted here is based largely upon the five categories adopted by Buckley and Davies (1981), which in turn is similar to the four categories adopted by Baranson (1970).

4. This concept of product-specificity is similar in nature to the concept of asset specificity employed by Williamson (1981): "as assets become more fully specialized to a single use or user, hence are less transferable to other uses and users, economies of scale can be as fully realized when a firm operates under its own internal direction as when its services are obtained externally by contract" (op cit, p1548).

5. The data for Teece's 1976 study of international technology transfer projects were obtained from questionnaires filled in during interviews with US MNCs. Some of Teece's results are also reported in a subsequent article (1977).

6. The survey of restrictive clauses by Caves et al (1983) was based upon data relating to 257 arm's-length licensing agreements, obtained from interviews with 22 MNCs.

7. This result is also reported in Crookell (1982).

8. Contractor's (1981a) results were based upon an initial mailed questionnaire survey of 37 US companies and more extensive follow-up interviews with 12 of them.

9. Parry's survey (1986, 1988) involved interviews with 393 "innovating" Australian firms, of which 137 were found to have know-how licensing agreements with overseas firms.

10. Re-licensing restrictions were found by Parry (1986, 1988) to be more common in licensing agreements involving foreign-owned firms.

11. Parry (1986) acknowledged that the predictions concerning restrictive clauses derived from the "internalization approach" can also be derived from both appropriability theory and the market and hierarchies model of the MNC.

12. This point was developed further in Parry (1985).

13. Roffe (1987) suggested that one of the reasons underlying the failure to reach any agreement on an international code of conduct on technology transfer is a recent trend in key developed countries towards the liberalization of anti-trust legislation dealing with restrictions on technology licensing. If true, this represents a reversal of the trend identified by Parry (1986).

14. Teece (1981b) defined codification as "the transformation of experience and information into symbolic form ... such as blueprints, formulas, or computer languages" (pp 83-84).

15. The problems of "recognition", "disclosure" and "team organization" were developed jointly by Williamson and Teece. Consequently they are also described by Teece (1981a-1983).

16. Telesio's (1979) results were based upon a questionnaire survey of 66 MNCs, 40 of them based in the US, 26 in Europe and Canada. Data were collected by interview for 55 of the companies, and by mail for the remainder.

17. Contractor, 1981b, p75.

18. The three stages proposed by Magee (1977) were: 'invention', 'innovation' and 'standardisation'. The six stages proposed by Ford and Ryan (1981) were: 'development' and 'application' (these correspond to Magee's 'invention' stage), 'launch' and 'growth' (these are covered by Magee's 'innovation' stage) and 'maturity' and 'degradation' (which correspond to Magee's 'standardisation' stage).

19. The data for both studies were obtained from interviews with company executives and from internal company records. The result reported in Mansfield et al (1979) is based upon the expectations which 23 US firms had about the technology transfer channel which they would be using to exploit new technology arising from their 1974 R&D projects. The result reported by Mansfield and Romeo (1980) is based upon information concerning the age of 65 technologies transferred abroad by 31 US firms during the period 1960 to 1978.

20. The studies by Davidson and McFetridge (1984, 1985) were based upon data on internal and external technology transfer transactions involving 32 US MNCs during the period 1945-1975. The 1984 study was based on a sample of 1,367 such transactions; the 1985 study was carried out on 1,226 transactions.

21. A number of the results published in Contractor's (1981a) book also appeared in an article concerning the role of licensing in international strategy, published by him in the same year (1981b). This article, in turn, formed the basis for Chapter Five of his later book, published in 1985.

22. The findings of Crookell's (1982) study were based upon the same database used by Caves et al (1983).

23. Carstairs and Welch (1982) and Welch and Carstairs (1983) reported the findings of a study of foreign technology licensing by a sample of 43, mainly smaller, Australian companies.

24. The suggested motivations for licensing reported in Buckley and Davies (1981) were based upon interviews with thirty firms which had licensing agreements in India and the Irish Republic. The findings from these interviews were also reported in Buckley and Davies (1979).

25. Parry's (1976) study involved analysis of data on the market-servicing methods of six UK pharmaceutical firms, for each of fifteen overseas markets, over the period 1967-1972. The study was restricted to "ethical" pharmaceutical products (ie pharmacueticals not advertised to the public and generally available only on prescription). Data was obtained from the six firms and from independent sources.

26. Pilkington had already established a number of overseas subsidiaries by the time it invented the float-glass process, but these were mainly restricted to "Old Commonwealth" countries [Shepherd et al (1985, p142)].

27. The model developed by Gallini (1984) originally assumed a potential duopoly situation (ie incumbent and entrant). This assumption was relaxed later to allow for the possibility of additional entrants.

28. In the model developed by Harris and Vickers (1985) firms are involved in a "patent race". If the incumbent wins the race, the entry of potential rivals is blocked. If the incumbent loses, its monopoly position is eroded.

29. The study by Mansfield, Schwartz and Wagner (1981) was based upon interview data derived from the senior officials of firms located in the northeast of the US. These firms provided information on the estimated costs of legally imitating 48 new products.

30. The other two strategies identified by Ardisson and Bidault (1986) were 'technology' and 'production' strategies. In the former the objective is to maximise the returns from licensing in order to promote more R&D; in the latter licensing is undertaken as a substitute for foreign production because the licensor possesses inadequate resources or is prevented from setting up in the host market by government regulations. In their empirical study the authors analysed interview data from 33 French licensors and 24 licensees based in Portugal and Morocco.

31. In addition, royalty payments by licensees are usually tax-deductible in the host country. MNCs can therefore lower their overall tax bill if their foreign subsidiaries are able to remit royalties to the parent in place of dividends. For an example, see Eiteman and Stonehill (1986, pp555-556).

32. Domestic firms may also face foreign exchange risk if they are subject to competition from imports, or if they export to foreign markets. However, in addition to facing this economic risk, firms which have overseas operations also have to contend with transaction risk and translation risk.

33. Although licensing does not generally involve equity investment in the licensee, the licensor may allow the licensee credit facilities [Business International (1977, p23)]. Future interest repayments would therefore be exposed to foreign exchange risk.

34. Contractor's (1981a) study involved the construction of a multiple regression model to test the relationship between the incidence of licensing among US firms, derived from US Department of Commerce data, and the development status of 33 host countries. One of the independent variables employed was the indigenous technological capacities of the host countries, proxied by the number of scientists and engineers, measured in thousands. The data in this study covered the years 1975 and 1976.

35. The multiple regression model in Contractor's (1985) study used two proxies for the indigenous technological capacity of thirty host countries: R&D expenditure, and research personnel normalised by population. The relationship between absorptive capacity and licensing intensity held for data covering 1977, 1978 and 1980.

36. Baranson's (1970) study was based, in part, upon correspondence and interviews with 30 executives of MNCs.

37. Davidson's (1980) study did not consider the full range of international business methods. It focused on the choice between licensing, joint ventures and FDI.

38. Davidson's (1983) study of the impact of organizational structure upon technology transfer efficiency was based upon data from a sample of 57 US MNCs which had introduced 954 significant new products over the period 1945-1975.

39. Caves (1983, p206) acknowledged Jones (1979, p264) as the originator of this explanation.

40. The rationale for the distinction between licensing as either a 'first-best' or a 'second-best' strategy is the same as that proposed by Davies (1982), although he also defined a third situation when licensing is the preferred strategy, ie in highly concentrated industries. This tri-partite classification is also contained in Buckley and Davies (1981), although the term 'first-best' strategy is not actually used. This paper is, in turn, a refinement of their earlier paper [Buckley and Davies (1979)], in which the term 'second-best' strategy was only used to cover those situations in which licensing is adopted to "buy time" or "test the market" prior to the eventual establishment of a joint venture or wholly-owned subsidiary (pp26-27).

41. A dichotomy similar to the distinction between 'first-best' and 'second-best' licensing was proposed by Lowe and Crawford (1984, p's 105 & 171). They distinguished between 'reactive' licensing, which occurs in response to external or internal contraints on alternative business methods, and 'proactive' licensing, which results from a conscious decision to utilise licensing in preference to other forms of market exploitation.

42. Lovell's (1969) report was based upon mailed questionnaire returns from 191 US firms.

43. Zennof's (1970) study was based upon interview and questionnaire data obtained from 47 US companies involved in foreign licensing in 1967.

44. The study by Davies (1977) involved a postal survey of 119 UK companies involved in joint ventures and licensing agreements with Indian firms over the period 1963-69, and subsequent interviews with 27 of them.

45. Telesio's analysis only considered licensing as a substitute for FDI. It did not address the possibility of licensing substituting for exports.

46. The study by Shepherd et al (1985) followed a 'case study' approach which involved interviews with the senior management of 23 large UK companies, who also filled out a general questionnaire.

REFERENCES

AKERLOF, G.A., 'The Market For "Lemons": Qualitative Uncertainty and the Market Mechanism", Quarterly Journal of Economics, Vol 84, August 1970, pp 488-500.

ALSTER, N., 'New Profits From Patents', Fortune, April 25, 1988, pp 69-72.

ANDERSON, E & GATIGNON, H., 'Modes of Foreign Entry: A Transaction Cost Analysis and Propositions', Journal of International Business Studies, Vol 27, No 3, Fall 1986, pp 1-26.

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ARDISSON, J.M. & BIDAULT, F, 'Technology Transfer Strategies as a Means to Build International Networks', Industrial Marketing and Purchasing, Vol 1, No 1, 1986, pp 59-71.

ARROW, K.J., 'The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation', in The Analysis and Evaluation of Public Expenditure: The PPB System, US Joint Economic Committee, 91st Congress, 1st Session, US Government Printing Office, 1969, pp 59-73.

BALASUBRAMANYAM, V.N., International Transfer of Technology to India, New York: Praeger, 1973.

BARANSON, J., Manufacturing Problems in India: The Cummins Diesel Engine Experience, Syracuse, New York: Syracuse University Press, 1967.

BARANSON, J., 'Technology Transfer through the International Firm', American Economic Review, Vol 40, May 1970, pp 435-40.

BEHRMAN, J., 'Licensing Abroad of American-held Patents, Trademarks and Techniques', The Patent, Trademark and Copyright Journal of Research and Education, Vol 1, No 1, June 1957a, pp 145-158.

BEHRMAN, J., 'Foreign Licensing', The Patent, Trademark and Copyright Journal of Research and Education, Vol 1, No 2, December 1957b, pp 220-243.

BEHRMAN, J., 'Advantages and Disadvantages of Foreign Licensing', The Patent, Trademark and Copyright Journal of Research and Education, Vol 2, No 1, March 1958a, pp 137-156.

BEHRMAN, J., 'Licensing Abroad under Patents, Trademarks, and Know-how by US Companies', The Patent, Trademark and Copyright Journal of Research and Education, Vol 2, No 2, June 1958b, pp 181-277.

BEHRMAN, J., 'Foreign Licensing and Investment in US Economic Policy', The Patent, Trademark and Copyright Journal of Research and Education, Vol 4, No 2, Summer 1960, pp 150-172.

BOISOT, M., An Analysis of Technology Transfer in the South East Asian Chemical Industry, Unpublished PhD thesis, Imperial College of Science and Technology, Universty of London, 1982.

BOISOT, M., 'Convergence Revisited: The Codification and Diffusion of Knowledge in a British and a Japanese Firm', Journal of Management Studies, Vol 20, No 2, 1983, pp 159-190.

BONIN, B., 'Contractual Agreements and International Technology Transfers: The Empirical Studies', Ch 5 in Safarian, A.E. & Bertin, G.Y. (eds), Multinationals, Governments and International Technology Transfer, London: Croom Helm, 1987.

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

BUCKLEY, P.J. & CASSON, M., 'The Optimal Timing of a Foreign Direct Investment', The Economic Journal, Vol 91, March 1981, pp 75-87.

BUCKLEY, P.J. & DAVIES, H., 'The Place of Licensing in the Theory and Practice of Foreign Operations', University of Reading Discussion Paper in International Investment and Business Studies, No. 47, November 1979.

BUCKLEY, P.J. & DAVIES, H., 'Foreign Licensing In Overseas Operations: Theory and Evidence From The UK', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer And Economic Development, London: JAI Press Inc., 1981, pp 75-89.

BUSINESS INTERNATIONAL, International Licensing: Opportunities and Challenges in Worldwide Technology Management, New York: Business International Corporation, 1977.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer 1981, pp 43-59.

CARSTAIRS, R.T. & WELCH, L.S., 'Licensing and the Internationalization of Smaller Companies: Some Australian Evidence', Management International Review, Vol 22, No 3, 1982, pp 33-44.

CASSON, M., Alternatives To The Multinational Enterprise, London: Macmillan, 1979.

CAVES, R.E., Multinational Enterprise and Economic Analysis, Cambridge: Cambridge University Press, 1982.

CAVES, R.E., CROOKELL, H. & KILLING, J.P., 'The Imperfect Market for Technology Licences', Oxford Bulletin of Economics and Statistics, Vol 45, No 3, August 1983, pp 249-267.

CONTRACTOR, F.J., International Technology Licensing: Compensation, Costs and Negotiation, Lexington, Mass.: Lexington Books, 1981a.

CONTRACTOR, F.J., 'The Role of Licensing in International Strategy', Columbia Journal of World Business, Vol 16, Part 4, 1981b, pp 73-83.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.: Quorum Books, 1985.

CROOKELL, H., 'Getting Along Without Multinational Firms', Academy Of International Business Annual Conference Proceedings, Hawaii, December 1982.

DANIELS, J.D. & RADEBAUGH, L., International Business: Environment and Operations, 4th ed, Reading, Mass.:Addison-Wesley, 1986.

DAVIDSON, W.H., Experience Effects in International Investment and Technology Transfer, Ann Arbor, Mi.: UMI Research Press, 1980.

DAVIDSON, W.H., 'Structure and Performance in International Technology Transfer', Journal of Management Studies, Vol 20, No 4, 1983, pp 453-465.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'International Technology Transactions and the Theory of the Firm', The Journal of Industrial Economics, Vol 32, No 3, March 1984, pp 253-264.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'Key Characteristics in the Choice of International Technology Transfer Mode', Journal of International Business Studies, Vol 16, No 2, Summer 1985, pp 5-21.

DAVIES, H., 'Technology Transfer Through Commercial Transactions', The Journal of Industrial Economics, Vol 26, No 2, December 1977, pp 161-175.

DAVIES, H., 'Marketing the Sale of Knowledge Abroad', Chap 3.3 in Brooke, M.Z. & Buckley, P.J. (eds), Handbook of International Trade, Brentford:Kluwer, 1982.

DUNNING, J.H., 'Explaining Changing Patterns of International Production: In Defence of Eclectic Theory', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 269-295.

EITEMAN, D.K. & STONEHILL, A.I., Multinational Business Finance, 4th ed, Reading, Mass.: Addison-Wesley, 1986.

FORD, D. & RYAN, C., 'Taking Technology to Market', Harvard Business Review, March/April, 1981, pp 117-126.

FOX, B., 'Is The Day of the Patent Over?', New Scientist, 10 September 1981, pp 653-655.

FRAME, J.D., International Business and Global Technology, Lexington, Mass.: Lexington Books, 1982.

GALBRAITH, C.S. & KAY, N.M., 'Towards a Theory of Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 3-19.

GALLINI, N.T., 'Deterrence by Market Sharing: A Strategic Incentive for Licensing', American Economic Review, Vol 74, No 5, December 1984, pp 931-941.

GIDDY, I.H. & RUGMAN, A.M., A Model of Trade, Foreign Direct Investment and Licensing, Research Working Paper No 274A, Graduate School of Business, Columbia University, December 1979.

GROSSE, R., 'An Imperfect Competition Theory of the MNE', Journal of International Business Studies, Vol 16, No 1, Spring 1985, pp 57-80.

HARRIS, C. & VICKERS, J., 'Patent Races and the Persistence of Monopoly', The Journal of Industrial Economics, Vol 33, no 4, June 1985, pp 461-481.

JOHANSON, J. & VAHLNE, J.E., 'The Internationalization Process of the Firm - a Model of Knowledge Development and Increasing Foreign Market Commitments', Journal of International Business Studies, Vol 8, No 1, Spring/Summer, 1977, pp 23-32.

JONES, R.W., International Trade: Essays in Theory, Amsterdam: North-Holland, 1979.

KINGSTON, W., 'Patents and Market Power', The Inventor, Vol 23, No 4, Oct/Nov, 1983, pp 9-13.

LOVELL, E.B. Foreign Licensing Arrangements: Evaluation and Planning, Studies in Business Policy, No 86, New York: National Industrial Conference Board, 1958.

LOVELL, E.B., Appraising Foreign Licensing Performance, Studies in Business Policy, No 128, New York: National Industrial Conference Board, 1969.

LOWE, J. & CRAWFORD, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon Press, 1984.

MADDISON, R., Patent and Patent Licensing Law in Europe: Recent Trends and Current Developments, Economist Intelligence Unit Special Report No 97, London: Economist Publications, 1981.

MAGEE, S.P., 'Multinational Corporations, the Industry Technology Cycle and Development', Journal of World Trade Law, July/August 1977, pp 297-321.

MANSFIELD, E., ROMEO, A. & WAGNER, S., 'Foreign Trade and US Research and Development', The Review of Economics and Statistics, Vol 61, No 1, February 1979, pp 49-57.

MANSFIELD, E. & ROMEO, A., 'Technology Transfer to Overseas Subsidiaries by US-Based Firms', Quarterly Journal of Economics, Vol 95, December 1980, pp 737-750.

MANSFIELD, E., SCHWARTZ, M. & WAGNER, S., 'Imitation Costs and Patents: An Empirical Study', The Economic Journal, Vol 91, December 1981, pp 907-918.

MILLMAN, A.F., 'Technology Transfer in the International Market', European Journal of Marketing, Vol 17, No 1, 1983, pp 26-47.

MICHALET, C.A. & DELAPIERRE, M., The Multinationalization of French Firms, Chicago: Academy of International Business, 1976.

PARRY, T.G., 'Methods of Servicing Overseas Markets: The UK-Owned Pharmaceutical Industry', University of Reading Discussion Paper in International Investment and Business Studies, No 27, May 1976.

PARRY, T.G., 'Internalization as a General Theory of Foreign Direct Investment: A Critique', Weltwirtschaftliches Archiv, Vol 121, No 3, 1985, pp 565-569.

PARRY, T.G., The Multinational Enterprise and Restrictive Conditions in International Technology Transfer, Paper presented at the annual conference of the Academy of International Business, London, November 1986.

PARRY, T.G., 'The Multinational Enterprise and Restrictive Conditions in International Technology Transfer: Some New Australian Evidence', The Journal of Industrial Economics, Vol 36, No 3, March 1988, pp 359-365.

PRASAD, A.J., 'Technology Transfer to Developing Countries Through Multinational Corporations', in Hawkins, R.G. & Prasad, A.J. (eds), Research In International Business and Finance: Technology Transfer And Economic Development, London: JAI Press Inc., 1981, pp 151-173.

REUBER, G.L., Private Foreign Investment in Development, London: Clarendon Press, 1973.

ROFFE, P., 'Code of Conduct on the Transfer of Technology', The CTC Reporter, No 24, Autumn 1987, pp 39-40 & p 43.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

RUGMAN, A., LECRAW, D.J. & BOOTH, L.D., International Business: Firm and Environment, New York: McGraw-Hill, 1985.

SHAPIRO, A.C., Multinational Financial Management, 2nd ed, Newton, Mass.: Allyn & Bacon, 1986.

SHEPHERD, D., SILBERSTON, A. & STRANGE, R., British Manufacturing Investment Overseas, London: Methuen & Co, 1985.

STOBAUGH, R.B., The Product Life Cycle, US Exports and International Investment, Unpublished DBA Thesis, Harvard Business School, 1968.

STOPFORD, J.M. & WELLS, L.T., Managing the Multinational Enterprise: Organization of the Firm and Ownership of Subsidiaries, London: Longman, 1972.

TAYLOR, C.T. & SILBERSTON, A., The Economic Impact of the Patent System: A Study of the British Experience, Cambridge: The University Press, 1973.

TEECE, D.J., Technology Transfer by Multinational Firms, Cambridge, Mass.: Ballinger, 1976.

TEECE, D.J., 'Technology Transfer by Multinational Firms', Economic Journal, Vol 87, June 1977, pp 242-261.

TEECE, D.J., 'The Multinational Enterprise: Market Failure and Market Power Considerations', Sloan Management Review, Vol 22, Spring 1981a, pp 3-17.

TEECE, D.J., 'The Market For Know-How and the Efficient International Transfer of Technology', The Annals of the American Academy of Political and Social Sciences, Vol 458, November 1981b, pp 81-96.

TEECE, D.J., 'Technology Transfer And R&D Activities of Multinational Firms: Some Theory and Evidence', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981c, pp 39-74.

TEECE, D.J., 'Towards An Economic Theory of the Multiproduct Firm', Journal of Economic Behaviour and Organization, Vol 3, 1982a, pp 39-63.

TEECE, D.J., 'A Transactions Cost Theory of the Multinational Enterprise', University of Reading Discussion Paper in International Investment and Business Studies, No. 66, September 1982b.

TEECE, D.J. 'Technological and Organizational Factors in the Theory of the Multinational Enterprise', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 51-62.

TEECE, D.J., 'Transactions Cost Economics and the Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 21-45.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York:Praeger, 1979.

TILTON, J.E., International Diffusion of Technology: The case of Semiconductors, Washington, DC: Brookings Institution, 1971.

TWISS, B., Managing Technological Innovation, 3rd ed, London: Longman, 1986.

UNITED NATIONS, Transnational Corporations In World Development: Third Survey, New York: United Nations Centre on Transnational Corporations, 1983.

WELCH, L.S. & CARSTAIRS, R.T., 'Some International Marketing Implications of Outward Foreign Licensing', Journal of International Marketing, Vol 1, No 3, 1983, pp 177-185.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: The Free Press, 1975.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

WILSON, R.W., The Sale of Technology Through Licensing, Unpublished PhD thesis, Yale University, May 1975.

WILSON, R.W., 'The Effect of Technological Environment and Product Rivalry on R&D Effort and Licensing of Inventions', The Review of Economics and Statistics, Vol 59, No 2, May 1977, pp 171-178.

ZENNOF, D.B., 'Licensing as a Means of Penetrating Foreign Markets', The Patent, Trademark and Copyright Journal of Research and Education, Vol 14, No 2, Summer 1970, pp 292-308.

CHAPTER SEVEN - SUMMARY AND CONCLUSIONS

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7.1 INTRODUCTION

The foregoing review of the literature has surveyed not only theories of licensing but also theories of FDI and of the MNC. This coverage reflects the fact that licensing is only one means of servicing foreign markets, and that it will therefore be influenced by the factors which affect the other main alternatives, ie FDI and exporting.[1] For example, licensing may be adopted because transport costs rule out exporting and high political risk makes FDI unattractive. A comprehensive analytical framework for the licensing decision must therefore incorporate those factors affecting alternative means of market-servicing as well as those which directly impinge upon licensing.

This chapter identifies the theories reviewed in the last three chapters which can provide such a framework, and it describes a number of eclectic approaches which have been proposed as a means of integrating these separate theories into a general theory. Attention is then focussed on two of the variables which feature in these eclectic approaches: transaction costs and production costs. The use of these variables to model the market-servicing decision is considered, along with the problems associated with the measurement of transaction costs. The chapter concludes with a brief consideration of the impact of business strategy considerations on the market-servicing decision and how these considerations fit into the analytical framework previously outlined.

7.2 AN ANALYTICAL FRAMEWORK FOR THE LICENSING DECISION

7.2.1 Relevant Theory

Industrial organization theory is clearly of relevance in explaining the market-servicing decision, for it specifies that a firm must have a proprietary advantage in order for FDI or licensing to take place. The theory, it should be noted, cannot explain vertical FDI, for which the possession of a proprietary advantage is unnecessary.

This defect is of no consequence, however, for the research is only concerned with horizontal FDI as an alternative to licensing. Nevertheless, the theory is still insufficient because it only explains how firms are able to operate internationally; it cannot explain why they might prefer to license their proprietary advantages rather than opt for FDI or exporting. The usefuleness of the theory lies in its ability to identify the type of firm which is able to engage in FDI and, therefore, able to adopt licensing as an alternative.

To incorporate the licensing option it is necessary to bring in transaction cost theory, for it specifies a general condition under which the exploitation of a proprietary advantage by the firm will be preferred to the arm's-length market, ie when market transaction costs exceed firm transaction costs. The circumstances which foster excessive market transaction costs have been defined by various theorists. Williamson (1975, 1981) stressed the interaction of bounded rationality with uncertainty, the effect of opportunism combined with small numbers bargaining, and the derivative condition of information impactedness. These conditions are especially likely to prevail in knowledge markets, where problems of recognition, disclosure and team organization abound. The lack of legal protection for proprietary knowledge was stressed by Magee (1977a, 1977b) in his appropriability theory of the MNC. This imperfection was also noted by Buckley and Casson (1976), who placed more emphasis upon the problems caused by information asymmetry and bilateral monopoly.[2]

Transaction cost theory is also applicable to product markets, and to factor markets other than the knowledge market. It therefore serves to identify the circumstances under which overseas markets are more likely to be served by licensing rather than by foreign production or exporting. For example, imperfections in the product market arising from, say, the imposition of tariffs impose costs on firms which export and therefore encourage production to be located abroad. Imperfections which arise in factor markets, such as government aid schemes to attract foreign investors, will also affect the market-servicing decision.

Since these types of market imperfection determine where production will be located (home or abroad) they can plausibly be considered as part of location theory. Transaction cost theory does not, however, fully embrace location theory, for it fails to consider the impact of home and host country factors which cannot be characterised in terms of market imperfections. For example, if a foreign firm is prevented from exporting by tariff barriers it may still decide against setting up a subsidiary inside the protected market if this market is not large enough to allow it to recover the costs of its foreign investment. It may therefore decide to exploit its advantage by licensing even if it incurs greater transaction costs in doing so. Market size is thus a variable which is not captured by transaction cost theory.

Thus, although the possession of a proprietary advantage, and the existence of an imperfect arm's-length market for its exploitation, are <u>necessary</u> pre-requisites for FDI, they are not always <u>sufficient</u> conditions. To fully explain the preference for FDI over exporting and licensing it is necessary to take location theory into consideration. The attractiveness of specific locations will, of course, be subject to change over time. It is necessary, therefore, to take account of the dynamic aspects of the market-servicing decision. Product life-cycle theory is relevant in this respect, for it predicts that the mode of business is likely to alter as products move through a series of stages; ie new, mature, and standardized.

To summarise, three categories of theory reviewed in the previous chapters are relevant to the research issues tackled in the thesis: industrial organization theory, transaction cost theory and location theory. The first of these explains the ability of a firm to compete in overseas markets in terms of the possession of a proprietary ownership advantage. The second explains why this advantage is likely to be exploited by the firm itself rather than by other firms, while the third identifies country-specific characteristics which may favour FDI over exporting and licensing.

Some authors have attempted to synthesize these three classes of theory into a general, 'eclectic' theory. These efforts are now considered.

7.2.2 Eclectic Approaches

The three strands of theory which are relevant to the problem have been integrated by Dunning (1977, 1979) into what he calls the 'eclectic theory of international production'. He derived from these theories three conditions which a firm must satisfy if it is to engage in FDI:

(1) It must possess a net 'ownership-specific advantage' vis-a-vis firms of other nationalities in serving a particular market.

(2) It must be more profitable for the firm to use its advantage itself rather than sell or lease it to foreign firms, ie it must possess an 'internalization advantage'.

(3) It must be more beneficial for the firm to utilize its advantage in conjunction with at least some factor inputs located outside its home country, ie the overseas market must exhibit a 'location-specific advantage' in order to make FDI more attractive than exporting.

Table 7-1 summarises the advantages which are required for each of the three main categories of international business.

Because Dunning's eclectic theory is based around ownership, locational and internalization advantages it is sometimes referred to in acronymic form as the OLI theory of international production. The theory makes no a priori predictions about which countries, industries or firms are most likely to engage in FDI, but it does hypothesize that at least some of these advantages will be unevenly spread across countries, industries and firms and that they are prone to change over time.

TABLE 7-1

ALTERNATIVE ROUTES OF SERVICING MARKETS

		ADVANTAGES		
		Ownership	Internalization	(foreign) Location
ROUTE OF SERVICING MARKET	Foreign Direct Investment	yes	yes	yes
	Exports	yes	yes	no
	Contractual Resource Transfers	yes	no	no

[SOURCE: Dunning (1981, p32)]

CHAPTER 7

The eclectic theory of international production is appealing because it draws on each of the three main lines of explanation which have emerged following Hymer's seminal (1960) thesis. It is acknowledged by many scholars as the conventional theory of the MNC. For example, Casson (1983) stated that "it is now widely recognised that the behaviour of multinational enterprises can be analysed in terms of three groups of factors: ownership advantages, location advantages, and internalization" (p1).

There is not, however, widespread agreement that the eclectic approach represents a general theory. Rugman (1981, 1982) claimed that internalization theory is the true paradigm. He argued that the locational aspect of eclectic theory can be incorporated into internalization theory by regarding the ability to economize on transport costs as another example of a firm-specific advantage internalized by the MNC. He therefore treated location-specific variables as exogenous parameters; in his opinion they explain trade patterns between nations rather than intra-firm trade. The only difference which then remains between Dunning's eclectic theory and internalization theory is that the former accepts that the MNC has the power to generate its own firm-specific advantages over time (ie to endogenise them) whereas the latter treats market imperfections as exogenous. Rugman (1982), however, dismissed this difference as "not a substantive difference, merely the choice of a suitable method to model the MNC" (p13).

The claim by Rugman that internalization theory is the true 'general theory' is based upon somewhat semantic arguments; location theory is included in his approach, but given a different name, ie "spatial cost saving". In this thesis internalization theory is regarded as a subset of transaction cost theory, which in turn is distinguishable from industrial organization theory and location theory.

The adoption of an eclectic framework to explain the MNC was also advocated by Calvet (1981). He suggested that the international involvement of firms can be explained by industrial organization theory, location theory and property rights theory (the latter being the term he used to describe appropriability theory). To these he added the Markets and Hierarchies framework in order to account for the particular mode of transacting chosen. Calvet's eclectic framework is thus very similar to that proposed by Dunning. Both are in agreement that the choice of mode of transacting obeys different rules from those which justify foreign involvement [Calvet (1981, p54), Dunning (1981, pp32-33)]. The latter can be explained by firm-specific and location-specific factors, while the former are determined by organizational considerations.

In a recent re-evaluation of his eclectic paradigm, Dunning (1988) argued that it remains, despite the criticisms of it, a "useful and robust general framework" (p24). He has, nevertheless, re-organised the paradigm into what he terms the "mark 2" version (p22). This new version emphasises the importance of two inter-related strands of economic analysis: firstly, the neoclassical theory of factor endowments, extended to embrace intermediate products; and, secondly, the theory of market failure. It is therefore formally referred to by Dunning as the "factor endowments/market failure paradigm" (pp12-13).

Within this new version of the paradigm, Dunning classified market failures into one of two categories: structural or transactional. The former arise from the likes of government intervention and barriers to entry, while the latter arise mainly from the inherent characteristics of intangible assets which make them difficult to trade at arm's-length. In addition to classifying market failure into two categories, Dunning also distinguished between two types of ownership advantages: asset advantages (O_a) and transaction advantages (O_t).[3] The former arise from the proprietary ownership of specific assets and are dependent upon the existence of structural market imperfections. The latter stem from the ability of MNC hierarchies to capture the benefits, or lower the costs, of co-ordinating transactions across countries.

The transaction advantages possessed by MNCs are a function of their size and the geographical spread of their foreign subsidiaries. As MNCs evolve they gradually develop a network of foreign subsidiaries, which become part of a global system of activities. As this system develops the relative importance of factor endowments in explaining changes in international production is likely to decrease, while that of market failure is likely to increase [Dunning (1988, p11)].

The adoption of what may be described as an eclectic approach has also been advocated by Teece (1982, 1983). He proposed a synthesis of neoclassical trade and location theory with the transaction cost theory of the MNC. To facilitate this synthesis, Teece made a distinction between production costs and governance (ie transaction) costs. He argued that, in accordance with this distinction, the explanation of international production can be divided into two parts: firstly, an explanation of the locational forces which justify spreading production around the globe; and, secondly, an explanation of the transaction costs associated with placing these production activities under "common administrative control" (ie the firm) rather than letting markets mediate transactions between independent firms [(1982, p3), (1983, p53)]. Teece's proposed synthesis is thus very similar to the "mark 2" version of the eclectic paradigm outlined by Dunning (1988).

Teece noted, however, that it is not always possible to separate analysis of the locational factors which affect production costs from analysis of the transaction costs which determine the form of production. The two may interact to some extent; for example, the transaction costs associated with transferring know-how will determine, at least in part, the level of production costs prevailing at various locations. Nevertheless, this does not detract from the key point Teece was seeking to make, namely that the efficient (ie least-cost) boundary of a MNC is determined by how it responds to the sum of transaction costs <u>and</u> production costs.

Teece (1982, 1983, 1986) also outlined a framework for modelling the relationship between these two sets of costs and the choice of market-servicing mode. This framework is now considered, along with alternative models of the market-servicing decision.

7.2.3 Models of the Market-Servicing Decision

The framework outlined by Teece integrated the analysis of transaction costs and production costs for two particular categories of FDI: horizontal integration and vertical integration. The latter is concerned with the most efficient means of transferring intermediate products between different stages of a production process. Since the thesis is concerned with the most efficient means of transferring proprietary knowledge to produce the same products in different countries we will focus on the former, ie horizontal FDI.

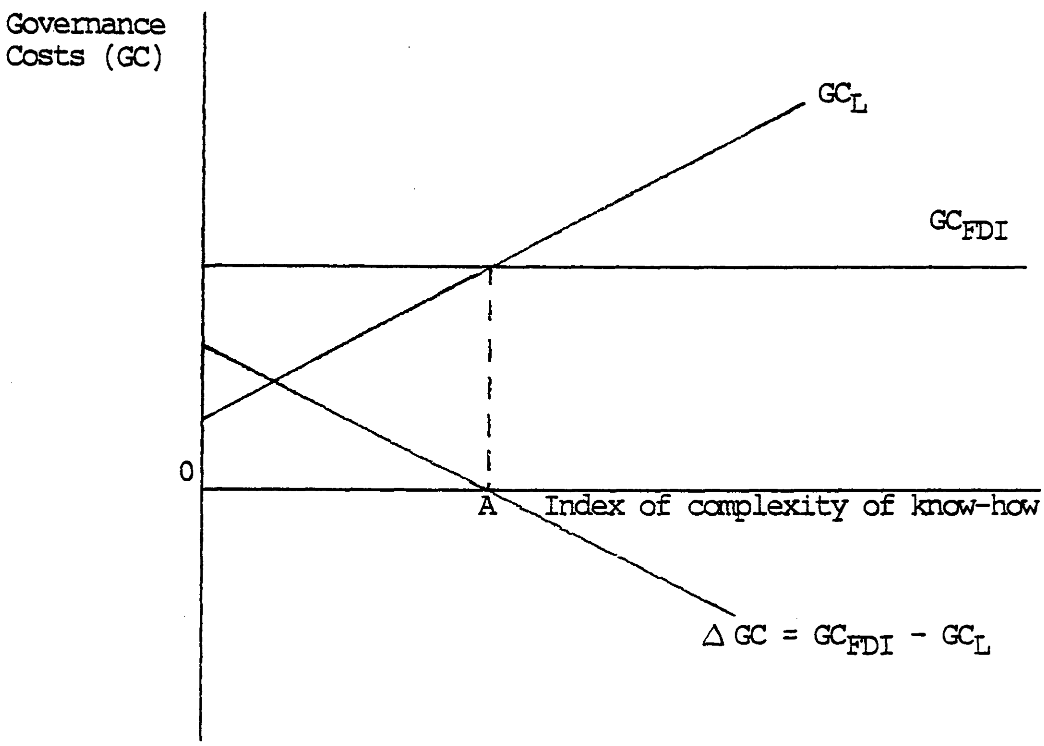
In his analysis of the costs involved in horizontal FDI, Teece concentrated on the choice between licensing and FDI as alternative means of exploiting know-how in foreign markets. He constructed a model which assumed that production costs and governance (ie transaction) costs would each vary to differing degrees in accordance with a particular facet of know-how: its degree of complexity.

Teece assumed that the governance costs associated with licensing (GC_L) would increase in accordance with the degree to which know-how is complex. On the other hand, it was assumed that the governance costs associated with FDI (GC_{FDI}) would be invariant to the degree of complexity of know-how. Governance costs were also assumed, initially, to be higher for FDI than for licensing since FDI was presumed to involve 'de novo' entry rather than the transfer of know-how to an existing overseas subsidiary. (If FDI did involve the latter, then GC_{FDI} would be much lower).[4]

These assumptions are illustrated in Figure 7-1, which also depicts the curve representing the difference in governance costs between the two modes (GC_{FDI} - GC_L) which is accordingly downward sloping. The point at which this curve cuts the X-axis indicates the point at which FDI is favoured over licensing.

FIGURE 7-1

GOVERNANCE COSTS FOR HORIZONTAL INTEGRATION

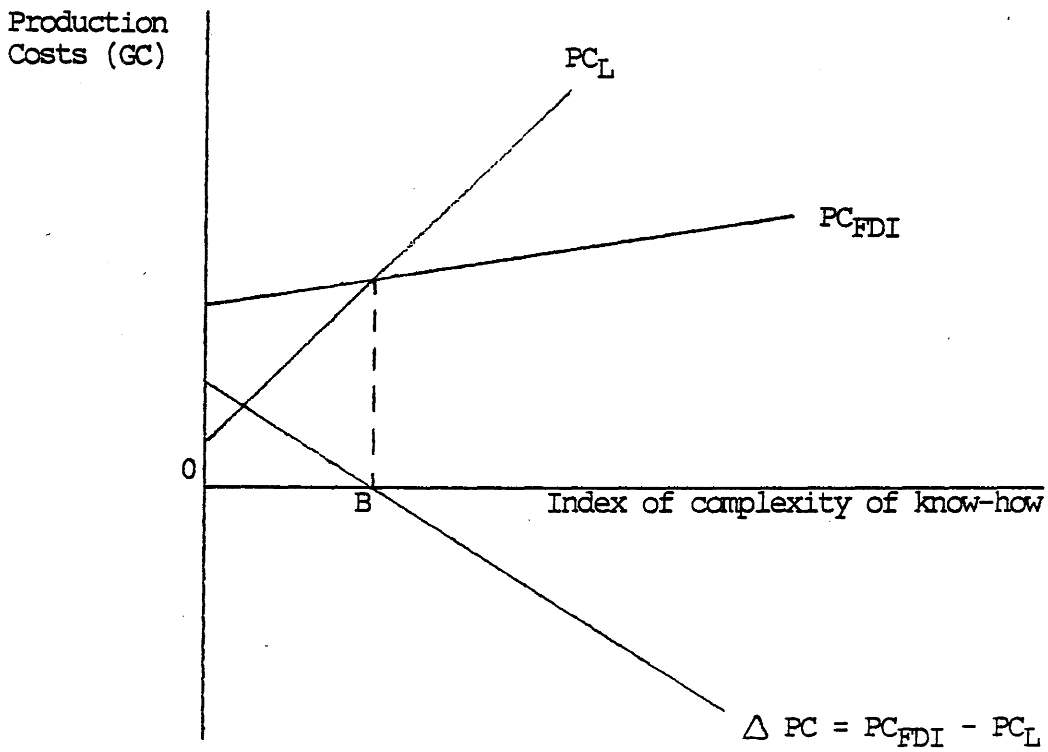


[SOURCE: Teece (1983, p58)]

A similar graph was constructed by Teece to illustrate the differential production costs associated with licensing (PC_L) and with FDI (PC_{FDI}). He assumed that the production costs associated with both modes increase in accordance with the degree of complexity of know-how, but that those associated with licensing start off from a smaller base and increase at a faster rate than those associated with FDI. These features are depicted in Figure 7-2.

FIGURE 7-2

PRODUCTION COSTS FOR HORIZONTAL INTEGRATION

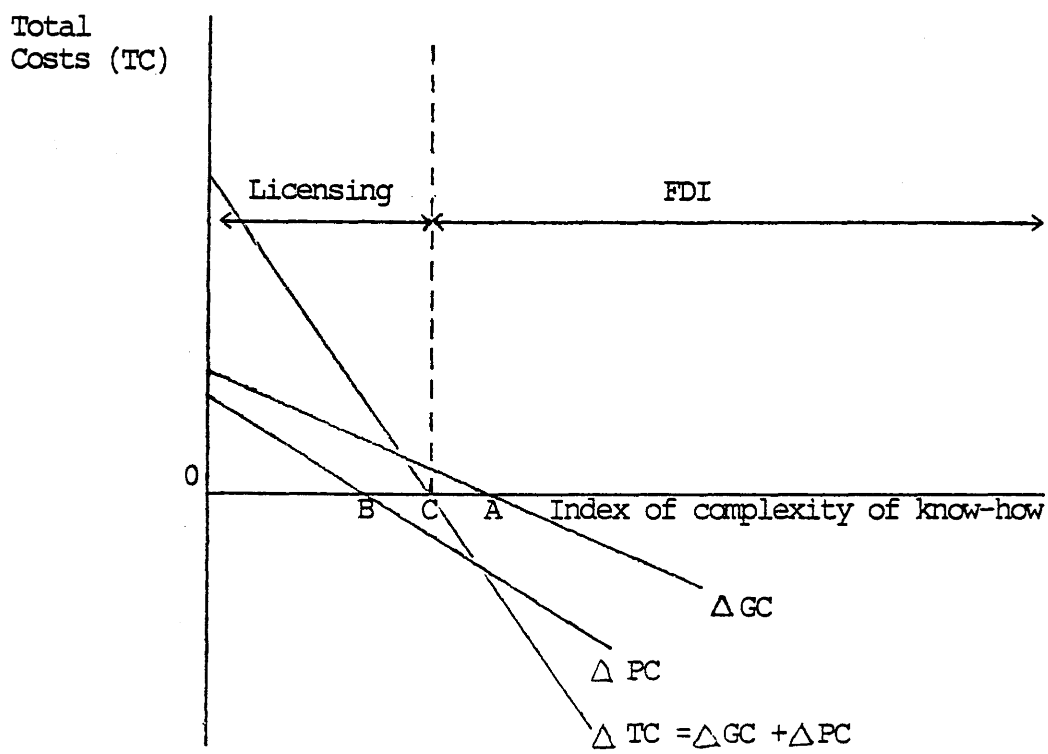


[SOURCE: Teece (1983, p59)]

The schedules depicting the differences in governance and production costs between the two modes are brought together in Figure 7-3, to derive a total difference schedule (ΔTC). It can be seen from this schedule that governance costs and production cost considerations work in the same direction, serving jointly to favour FDI as the complexity of know-how increases.

FIGURE 7-3

TOTAL COSTS FOR HORIZONTAL INTEGRATION



[SOURCE: Teece (1983, p59)]

Figure 7-3 illustrates the importance of analysing the market servicing decision on the basis of total costs rather than on production or transaction costs alone. Over the range A-B of the index of complexity of know-how, production and governance costs jointly may lead to a different choice between licensing or FDI than would production or governance costs considered in isolation.

It should be noted that the diagrammatic treatment of production and governance costs illustrated above represents a gross simplification of reality. Only two market servicing alternatives are considered, and costs are assumed to vary in accordance with only one characteristic of the technology (in this case know-how) being transferred. Further complexity clearly needs to be introduced into Teece's model, a point which Teece himself acknowledged (1982, p17).[5] Nevertheless, the model is a useful starting point for developing a contingency theory of the market-servicing decision.

One of the main defects of Teece's model is that it is static in nature; no account is taken of the way in which governance and production costs change over time. It is therefore appropriate to consider those models which predict the sequence of market-servicing modes over time [ie Giddy and Rugman (1979), Buckley and Casson (1981), Rugman (1981), Rugman et al (1985) and Grosse (1985)]. All of these models are concerned with the timing of the three principal modes of market-servicing, ie exporting, licensing and FDI. Although differing in the assumptions which they adopt, they all incorporate the use of discounting to capture the dynamic elements of the choice of optimal mode, and may thus be referred to generically as the "NPV approach". The model developed by Rugman et al (1985) is outlined below as an illustration of the basic features of this approach.[6]

According to Rugman et al (1985), "the MNC should, in principle, calculate the NPV of each of the three modalities by considering the difference between the discounted revenues and costs [and] then choose the entry mode which has the maximum NPV for the length of time it is anticipated that the foreign market will be serviced" (p125). It is necessary, therefore, to define the revenues and costs which are involved in each particular mode, and how their relative values change over time.

Rugman et al made the simplifying assumption that revenues would be the same for each of the three modes of market servicing, so that the choice among them would depend upon the relative costs associated with each mode.[7] Costs were classified into two categories: the normal costs of production incurred in the home and host countries (location-specific costs) and the special costs of production associated with each of the three modes (firm-specific costs). These variables are defined in Table 7-2.

TABLE 7-2

VARIABLES IN THE CHOICE OF ENTRY MODE

R	Total revenues from sales of the final product which uses a firm-specific knowledge advantage
Location-specific costs	
C	Total cost of labour, capital and other normal inputs in the production function of the home nation
C^*	Total cost of labour, capital and other normal inputs in the production function of the foreign nation
Special costs	
M^*	Export marketing costs (product market)
A^*	Additional costs of FDI (product and factor markets)
D^*	Costs due to risk of dissipation of firm-specific advantage

[SOURCE: Adapted from Rugman et al (1985, p's 123, 126)].

Given the above specification of revenues and costs, the NPV of each mode can be ascertained using the firm's cost of capital. The resulting NPV's for each of the three options are shown in Table 7-3. All of the variables are specified for the same time period (t). The initial date of entry into a foreign market is defined as t_e, which may, or may not, be time zero. The firm's cost of capital is denoted by the letter i.

TABLE 7-3

THE CHOICE OF MODALITY FOR SERVICING FOREIGN MARKETS

Exporting	$NPV_E = \sum_{t=t_e}^{t} \frac{R_t - C_t - M^*_t}{(1+i)^t}$
FDI	$NPV_F = \sum_{t=t_e}^{t} \frac{R_t - C^*_t - A^*_t}{(1+i)^t}$
Licensing	$NPV_L = \sum_{t=t_e}^{t} \frac{R_t - C^*_t - D^*_t}{(1+i)^t}$

[SOURCE: Adapted from Rugman et al (1985, p128)]

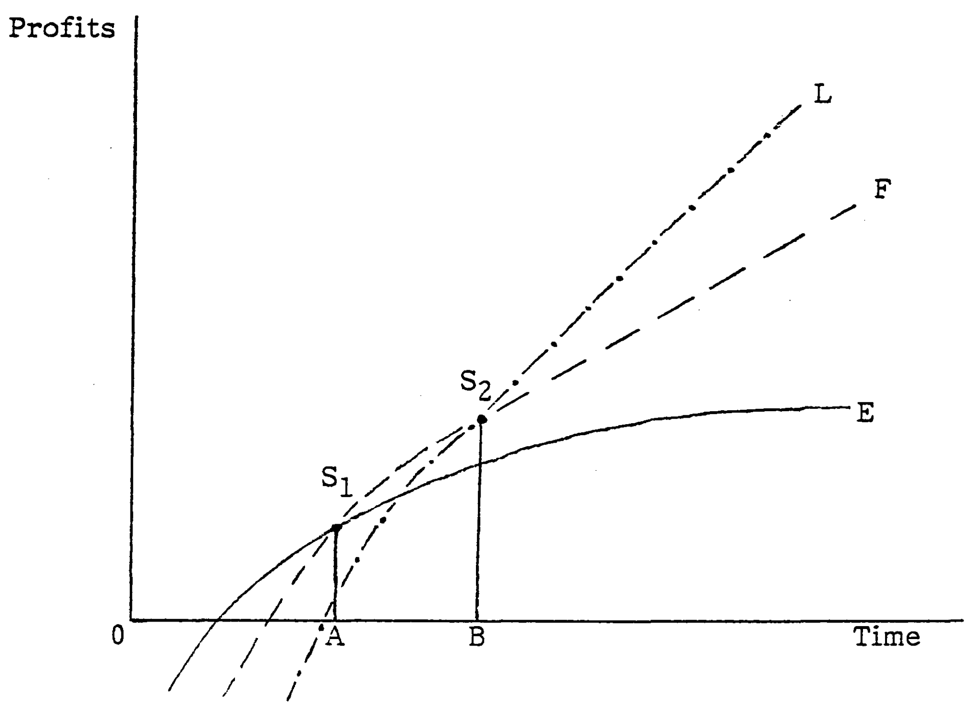
For the NPV of each mode to change it is necessary to have a theory about the relative values of the costs facing the MNC over time. Rugman et al assumed that the normal costs of production (C or C^*) are more or less the same for each alternative. They were also assumed to be exogenous to the MNC. The special costs of production, on the other hand, were deemed to be endogenous to the MNC and therefore to be the primary decision variables in the choice of entry mode.

At the outset, it is assumed that M^* is less than A^*, since M^* involves collecting information about the foreign product market only, while A^* involves gaining information about foreign factor markets (labour and capital) as well as the foreign product market. It is also assumed that the special costs associated with licensing, D^*, are greatest at the outset, due to the high risk of the MNC's firm-specific advantage being dissipated through "premature or inappropriately priced licensing" (1985, p127).

So, at the time of market entry, M^* is less than A^*, which in turn is less than D^*. All of these costs are assumed to decrease over time, but at different rates: D^* falls at the most rapid rate, A^* falls at a slower rate, while M^* falls at the slowest rate. As a result of these special costs falling at differential rates, the optimal mode will change over time. The sequence will involve exporting over time 0A, FDI over time AB, and licensing thereafter, as illustrated in Figure 7-4. The switchover points are identified by S_1 and S_2:

FIGURE 7-4

THE SEQUENCING OF ENTRY MODES OVER TIME



[SOURCE: Rugman et al (1985, p135)]

It should be noted that the predictions of the model proposed by Rugman et al are wholly dependent upon the assumptions made about the level of costs associated with each mode and the changes in these costs over time. Different assumptions may yield a different sequence of entry modes over time. The reason for focusing upon this model is to illustrate the usefuleness of the "NPV approach" in general, namely that it involves a dynamic evaluation of the costs and revenues of each mode. It is therefore a useful supplement to the static model proposed by Teece (1982, 1983) which has the merit of focusing upon transaction costs as well as production costs.

Although transaction costs are a necessary input into any model of the market-servicing decision, empirical testing of transaction cost theories has been hindered by inadequate definitions of what transaction costs actually are. For example, Williamson (1979) stated that "headway with the study of transaction cost issues has been impeded by lack of verbal definitions" (p261). Nicholas (1982) also criticised the imprecision of much transaction cost theorizing, which he blamed for its tendency to degenerate into mere tautology. The next section therefore considers how transaction costs may be more precisley defined.

7.2.4 Transaction Costs in International Markets

Williamson himself attempted to rectify the lack of verbal definitions of transaction costs by identifying three dimensions for describing transactions: uncertainty, frequency of exchange and the degree to which investments are transaction-specific (1979, pp239-247). Nevertheless, the behavioural underpinnings of his organizational failures framework are difficult to operationalise. Phenomena such as bounded rationality and opportunism are not easily observed in the real world, although the recent adoption of psychometric techniques as a means of measuring these phenomena appears to offer some promise [see Anderson (1988)].

The reduction of the imprecision associated with the transaction cost approach is a necessary pre-requisite for its operationalisation. The remainder of this section builds upon the ideas of Casson (1982), who has done much to improve the precision of transaction cost analysis by specifying the transaction costs associated with particular market imperfections.

In the literature, transaction costs are sometimes identified as the cause of market imperfections. According to Casson, this is not strictly correct. He defined market imperfections as "obstacles to trade" (1982, p25). It is only in attempting to overcome these obstacles that transaction costs are incurred. Table 7-4 identifies some obstacles to trade (market imperfections) and indicates the "market-making" activities (transaction costs) required to overcome them.

TABLE 7-4

MARKET IMPERFECTIONS AND ASSOCIATED TRANSACTION COSTS

MARKET IMPERFECTION (obstacle to trade)	TRANSACTION COST (market-making activity)
No contact between buyer and seller	Contact-making via search or advertisement
No Knowledge of reciprocal wants	Specification of the trade and communication of the details to each party
No agreement over price	Negotiation
Need to exchange cusody of goods	Transport
No confidence that goods correspond to specification	Monitoring of quality and/or quantity
Government intervention (taxes, tariffs, etc.)	Payment of taxes, tariffs, etc.; or avoidance/evasion of taxes, tariffs, etc.

[SOURCE: Adapted from Casson (1982, p26)]

The transaction costs detailed in Table 7-4 are prevalent in all types of external market (knowledge, product and factor). In addition to these ubiquitous transaction costs, which may vary greatly from market to market, there are transaction costs which are unique to, or found mostly in, certain markets. Imperfections and associated transaction costs which are characteristic of knowledge markets are listed in Table 7-5.

TABLE 7-5

KNOWLEDGE MARKET IMPERFECTIONS AND ASSOCIATED TRANSACTION COSTS

MARKET IMPERFECTION (obstacle to trade)	TRANSACTION COST (market-making activity)
Inadequate legal protection for patents	Cost of maintaining secrecy
Information impactedness, causing buyer uncertainty	Increase disclosure & risk dissipation of knowledge; or accept lower price for knowledge
Lack of absorptive capacity in recipient firm	Transfer personnel to recipient firm
Small number of buyers (bilateral monopoly)	Bargaining costs; risk of default

[SOURCE: Author]

It should be noted that the final imperfection in the Table 7-5, bilateral monopoly, is not to be found exclusively in knowledge markets; it can also exist in factor markets, especially in markets for raw materials. Hill and Chan Kim (1988, p95) have suggested that the transaction costs associated with the licensing of knowledge can be traced to two main sources: the "ex-ante costs" of composing a licensing agreement (eg bargaining costs) and the "ex-post costs" arising from licensee opportunism (eg earnings lost from knowledge dissipation). The latter of these costs differs from Casson's conception of a transaction cost as a market-making activity in that it arises from events which occur after a market has been made.

If reasonable approximations of transaction costs can be made, these can be integrated with the analysis of production costs to determine the appropriate market-servicing mode. However, an analytical framework which includes transaction and production costs may not in itself be sufficient to explain the business mode chosen for a particular market because it ignores the effect which a firm's business strategy might have on its decision-making. The possible impact of business strategy considerations on the market-servicing decision are considered in the following section.

7.2.5 Business Strategy Considerations

If the market-servicing decision is analysed from a business strategy perspective then the objective which is attributed to the firm differs from that which is attributed to it under the eclectic framework outlined earlier in this chapter. The eclectic viewpoint posits that firms transact by the mode which minimizes the sum of production and transaction costs; the business strategy viewpoint, on the other hand, holds that firms transact by the mode which maximises profits through the improvement of their competitive position vis-a-vis rivals [Kogut (1988, p320)]. The two viewpoints could therefore produce conflicting decisions; it is possible, for example, that licensing may represent a more costly mode of transacting than FDI or exports, but nevertheless one that is more profitable if it pre-empts competition from rival firms.

The field of business strategy has been heavily influenced over the last decade by the ideas of Michael Porter (1980, 1985, 1986). Porter developed a framework for strategic planning, the competitive positioning model, which is based upon concepts derived from the industrial organization tradition, exemplified in the work of Joe Bain (1956) and Edward Mason (1939). They developed what became known as the structure-conduct-performance (S-C-P) paradigm; this held that industry structure determined the conduct (ie strategy) of firms, whose joint conduct then determined the collective performance of the firms in the industry. The problem with this approach was that it assigned a passive role to the firm; it's conduct merely reflected the industry in which it operated and it's performance could therefore be explained by looking directly at the industry structure.

The research conducted under the S-C-P paradigm had been very much public-policy oriented, concentrating on how competition could be increased in order to enhance consumer welfare. What Porter did, essentially, was to turn the S-C-P paradigm on its head by demonstrating how firms could erect entry barriers to restrict competition, thereby enhancing profits. He therefore switched the focus of attention towards the potential for firms to change the industry structure in their favour.[8]

Dunning (1988) recognised the fact that his eclectic paradigm of international production was deficient because it did not take account of business strategy considerations; he acknowledged that "firm-specific behavioural characteristics may be a crucial determinant of the response by MNCs to any particular OLI configuration" (p6). Dunning drew attention to the close similarities between the terminology used by business strategists (eg Porter) and by proponents of the eclectic paradigm, and proposed that more attention should be paid to integrating the modern theory of business strategy with the eclectic paradigm. An indication of the possible future direction of such theory integration is provided by Reve (1990), who suggested a combination of Porter's theory of competitive positioning with Williamson's transaction cost theory.

7.3 CONCLUSIONS

It has been argued in this chapter that the appropriate analytical framework for the licensing decision is an eclectic one which includes industrial organization theory, location theory and transaction cost theory.

The analysis of the licensing decision involves consideration of the costs associated with operating in four classes of international markets:

(1) The arm's-length technology market (ie the market for licences)[9];
(2) The arm's-length capital and labour markets;
(3) The arm's-length product market;
(4) The MNC's internal markets.

In addition to the technology market, product and factor markets are relevant because FDI and exporting are alternatives to licensing. The MNC's internal market must also be considered because the adoption of FDI or exporting will extend its scope. The relationship between these four markets and the strategic (ie market-servicing) choices facing the MNC are illustrated in Figure 7-5.

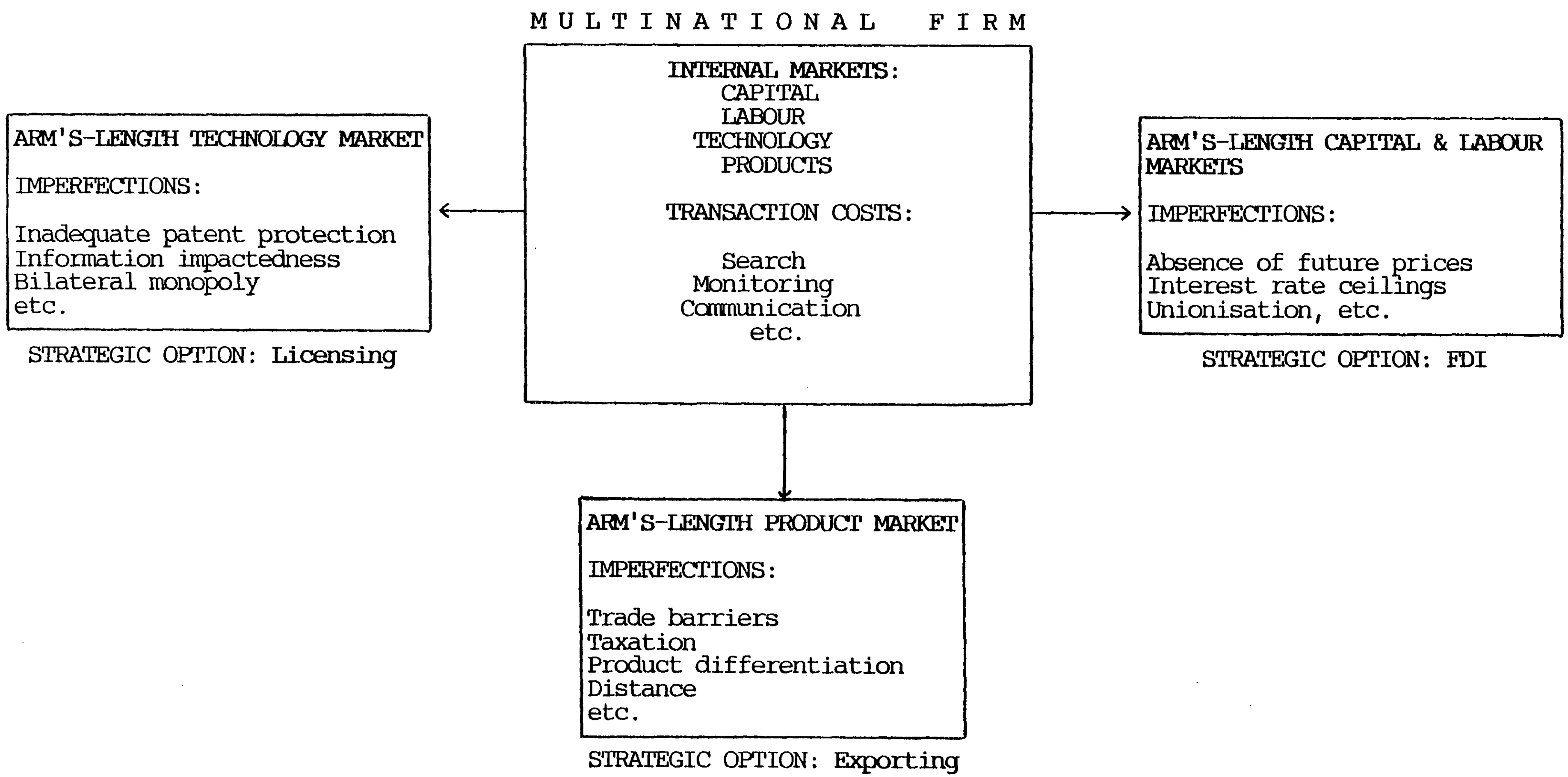
If imperfections in the arm's-length technology market give rise to transaction costs, the MNC will consider utilising its technology internally to generate its own products. If it chooses to produce abroad, this would involve transacting in arm's-length factor markets to obtain local labour, and also local capital if there was an insufficient supply within the MNC. If the MNC chooses to produce at home and export its products, this would necessitate involvement in arm's-length product markets.

As all three of these external markets are likely to exhibit imperfections, the MNC will have to weigh up the relative transaction costs incurred in each of them in deciding how to exploit its technology. In considering the FDI and exporting options it will have to take into account the additional costs which would result from the expansion of its own internal market, such as extra information-gathering costs. Thus, the existence of imperfections in a market do not, per se, rule out the use of that market. It is only when the transaction costs incurred in a particular market, net of firm transaction costs, are greater than those which would be incurred in alternative markets that the use of that particular market may not be optimal.

However, comparative transaction cost analysis is not by itself sufficient to predict the market-servicing mode which will prevail. This will also be influenced by locational factors, such as the host-country infrastructure, which may offset the disadvantages of factor market transaction costs and lead to FDI being chosen. It is necessary, therefore, to take account of the production costs arising in different locations, as well as transaction costs.[10] In addition, account must be taken of changes in production and transaction

FIGURE 7-5

A TRANSACTION COST FRAMEWORK FOR THE STRATEGIC CHOICES FACING THE MULTINATIONAL FIRM



[SOURCE: Author]

costs over time; these are likely to be associated with the life-cycles of products, and the technologies used to produce them.

Finally, it is necessary to consider the strategic behaviour of firms in analysing the market-servicing decision as situations may arise in which the mode of business chosen is more costly in terms of transaction and production costs, but is nevertheless the most profitable option when the competitive position of the firm is taken into consideration.

CHAPTER SEVEN

NOTES

1. A separate chapter has not been devoted to explaining the factors affecting the exporting decision because these are covered in the discussions of FDI theory and the theory of the MNC in chapters 4 and 5.

2. The influence of bilateral monopoly on the choice between FDI and licensing was first identified by Hymer (1960).

3. This distinction between ownership and transaction advantages was originally made by Dunning (1983a, 1983b).

4. Teece (1982, p13) depicted the initial GC_{FDI} as lower than the initial GC_L if FDI did not involve 'de novo' entry.

5. For example, Teece suggested that, for any given level of complexity of know-how, the higher was the frequency of transactions the lower would be the governance costs associated with FDI. This is because, once an overseas subsidiary is established, the marginal governance cost of additional transfers is quite low (1982, p17).

6. Rugman et al's (1985) model is essentially a re-statement of the model which appeared in Rugman (1981) and Giddy and Rugman (1979). They are all, in turn, extensions of the model developed by Hirsch (1976) to explain the choice between exporting and FDI.

7. The assumption of equal revenues from each of the three market servicing modes was based upon the presumption that the market being served by the MNC is it's home market. Such a "global scanner " therefore has to choose between home production, producing abroad for export to the home market, or licensing a foreign firm to produce for export to the home market [Rugman et al (1985, p124)].

8. Porter's competitive positioning model holds that there are five basic competitive forces at work in an industry which determine the potential for firms to earn excess profits: rivalry among existing firms, the threat of new entrants, the threat of substitute products or services, the bargaining power of suppliers, and the bargaining power of buyers.

9. The thesis is concerned, specifically, with that section of the arm's-length technology market which is comprised of patents and know-how. (The technology market itself is part of a wider market in knowledge).

10. Production costs should be taken to include related costs such as marketing and distribution costs, ie the total costs incurred in delivering final products to the consumer.

REFERENCES

ANDERSON, E., 'Transaction Costs as Determinants of Opportunism in Integrated and Independent Sales Forces', Journal of Economic Behaviour and Organization, Vol 9, 1988, pp 247-264.

BAIN, J.S., Barriers to New Competition, Cambridge, Mass.: Harvard University Press, 1956.

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

CASSON, M., 'Transaction Costs and the Theory of the Multinational Enterprise', in Rugman, A.M. (ed.), New Theories of The Multinational Enterprise, London: Croom Helm, 1982, pp 24-43.

CASSON, M., 'Multinationals and Intermediate Product Trade: A Computable Model', University of Reading Discussion Paper in International Investment and Business Studies, No 70, January 1983.

DUNNING, J.H., 'Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach', in Ohlin, B., Hesselborn, P.O. & Wijkman, P.M. (eds.), The International Allocation of Economic Activity, London: Macmillan, 1977, pp 395-418.

DUNNING, J.H., 'Explaining Changing Patterns of International Production: In Defence of Eclectic Theory', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 269-295.

DUNNING, J.H., 'Explaining The International Direct Investment Position of Countries: Towards a Dynamic or a Developmental Approach', Weltwirtschaftliches Archiv, Vol 117, No 1, 1981, pp 30-64.

DUNNING, J.H., 'Changes in the Structure of International Production: The Last 100 Years', in Casson, M.C. (ed), The Growth of International Business, London: Allen & Unwin, 1983a.

DUNNING, J.H., 'Market Power of the Firm and International Transfer of Technology', International Journal of Industrial Organization, Vol 1, 1983b, pp 333-351.

DUNNING, J.H., 'The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions', Journal of International Business Studies, Vol 19, No 1, Spring 1988, pp 1-31.

GIDDY, I.H. & RUGMAN, A.M., A Model of Trade, Foreign Direct Investment and Licensing, Research Working Paper No 274A, Graduate School of Business, Columbia University, December 1979.

GROSSE, R., 'An Imperfect Competition Theory of the MNE', Journal of International Business Studies, Vol 16, No 1, Spring 1985, pp 57-80.

HILL, C.W. & CHAN KIM, W., 'Searching for a Dynamic Theory of the Multinational Enterprise: A Transaction Cost Model', Strategic Management Journal, Vol 9, 1988, pp 93-104.

HIRSCH, S., 'An International Trade and Investment Theory of the Firm', Oxford Economic Papers, July 1976, pp 258-270.

HYMER, S.H., The International Operations of National Firms: A Study of Direct Investment, Cambridge, Mass: MIT Press, 1960 (published 1976).

KOGUT, B., 'Joint Ventures: Theoretical and Empirical Perspectives', Strategic Management Journal, Vol 9, 1988, pp 319-332.

MAGEE, S.P., 'Multinational Corporations, the Industry Technology Cycle and Development', Journal of World Trade Law, July/August, 1977a, pp 297-321.

MAGEE, S.P., 'Information and the Multinational Corporation: An Appropriability Theory of Direct Foreign Investment', in Bhagwati, J. (ed), The New International Economic Order: The North-South Debate, Cambridge, Mass.: The MIT Press, 1977b, pp 317-340.

MASON, E.S., 'Price and Production Policies of Large Scale Enterprises', American Economic Review Supplement, Vol 29, March 1939, pp 61-74.

NICHOLAS, S.J., Transactional Cost Approach To Institutional Change, Business History Unit Discussion Paper, London School of Economics, 1982. (Mimeographed).

PORTER, M.E., Competitive Strategy, New York: The Free Press, 1980.

PORTER, M.E., Competitive Advantage: Creating and Sustaining Superior Performance, New York: The Free Press, 1985.

PORTER, M.E. (ed), Competition In Global Industries, Boston, Mass.: Harvard Business School Press, 1986

REVE, T., 'The Firm as a Nexus of Internal and External Contracts', in Aoki, M., Gustafsson, B. & Williamson, O.E. (eds) The Firm as a Nexus of Treaties, London: Sage Publications, 1990, pp 133-161.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

RUGMAN, A.M., 'Internalization and Non-Equity Forms of International Involvement', in A.M. Rugman (ed), New Theories of The Multinational Enterprise, London: Croom-Helm, 1982, pp 9-23.

RUGMAN, A., LECRAW, D.J. & BOOTH, L.D., International Business: Firm and Environment, New York: McGraw-Hill, 1985.

TEECE, D.J., 'A Transactions Cost Theory of the Multinational Enterprise', University of Reading Discussion Paper in International Investment and Business Studies, No 66, September 1982.

TEECE, D.J. 'Technological and Organizational Factors in the Theory of the Multinational Enterprise', in Casson, M. (ed), The Growth of International Business, London: George Allen & Unwin, 1983, pp 51-62.

TEECE, D.J., 'Transactions Cost Economics and the Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 21-45.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: Free Press, 1975.

WILLIAMSON, O.E., 'Transaction-cost Economics: The Governance of Contractual Relations', Journal of Law and Economics, Vol 22, October 1979, pp 233-261.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

THE ROLE OF TECHNOLOGY LICENSING IN THE INTERNATIONAL BUSINESS OPERATIONS OF UK MULTINATIONALS

VOLUME II

A thesis submitted in fulfillment of
the requirements for the degree of
Doctor of Philosophy

by

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PART III THE EMPIRICAL STUDY

INTRODUCTION

The following chapters describe the empirical study which was undertaken. The study involved two stages: the first was an analysis of official government data to determine the relative significance of licensing vis-a-vis FDI and exporting. This provided a context for the major part of the empirical study, which comprised the analysis of data generated from a mailed questionnaire survey of UK-based MNCs.

Chapter Eight describes the research methodology employed. It details the procedure used to select the population of firms which were surveyed by means of the mailed questionnaire, and the responses obtained. It also discusses the pros and cons of using parametric and nonparametric statistical procedures on the (mainly) ordinal-level data generated from the questionnaire, and outlines the statistical procedures which were used to analyse the data. The chapter concludes with a summary of the advantages and limitations of the research methodology.

Chapter Nine contains the preliminary part of the empirical study, namely the analysis of official government data on the involvement of UK companies in FDI, exporting and licensing over the period 1964-1984. It provides an indication of the relative significance of licensing and the breakdown of all three forms of activity by industry and by geographical area.

Chapter Ten contains a description of the key characteristics of the sample of companies which provided useable questionnaire responses. It profiles the relative size of the companies, the nature of their industrial activities, and their level of involvement in R&D. It also analyses the companies' own rankings of their involvement in different forms of international business, and of how these were forecast to change in the future. Finally, the chapter describes the nature of the company sample's involvement in licensing, ie the type of intellectual property licensed and the extent to which related or unrelated concerns were involved.

Chapter Eleven analyses questionnaire data concerned with the determinants of the licensing decision. It discovers the extent to which the companies evaluate the licensing option against the alternatives available, and the extent to which licensing is chosen purely as a consequence of host-government controls on these alternatives. It also analyses the relative rankings which the questionnaire respondents attributed to twenty one variables which were identified from the literature review as influences upon the licensing decision. In addition, it analyses the intercorrelations between these variables to determine whether a smaller sub-set of variables can be used to explain the licensing decision.

Both Chapter Twelve and Chapter Thirteen test a number of hypotheses derived from the literature review. In Chapter Twelve multiple regression analysis is applied to suitably transformed data to test nine hypotheses derived from the literature on international licensing. These hypotheses link corporate characteristics such as size and research intensity to involvement in licensing. Chapter Thirteen employs nonparametric statistical techniques to test ten hypotheses derived from transaction cost theory. These hypotheses are concerned with anticipated differences in the characteristics of the intellectual property present in arm's-length and intra-firm licensing agreements.

The final chapter of the thesis, Chapter Fourteen, summarises the main findings of the research, outlines its limitations and its implications, and also proposes areas for future research.

CHAPTER EIGHT - RESEARCH METHODOLOGY

8.1 INTRODUCTION

In order to meet the objectives of the research a carefully selected sample of companies listed in The Times 1000 for 1983-84 (Allen, 1984) were surveyed by means of a mailed questionnaire. The procedure used to select these companies, and the characteristics of the population from which they were drawn, are described in this chapter. In addition, the data-collection method and the procedure for calculating the sample response rate are explained. The basic statistical methods used for analysing the data are also set out, and the advantages and limitations of the research methodology are described.

8.2 SURVEY POPULATION SELECTION PROCEDURE

As the research was concerned with UK-owned MNCs that were involved in international technology licensing, it was necessary to exclude from the survey population those companies listed in The Times 1000 which were either foreign-owned, had no overseas subsidiaries, or did not license technology to overseas companies.

Foreign-owned companies and companies that had no overseas subsidiaries were identified using publicly available sources of information. No such information was available to enable companies not engaged in international technology licensing to be identified, so surrogate measures had to be employed employed to distinguish these companies. The measures chosen were involvement in the manufacturing and construction sectors, and involvement in research and development (R&D). Thus, any companies which were not active in these industrial sectors or did not devote expenditure to R&D were excluded since such companies were deemed unlikely to possess any proprietary technology, and therefore unlikely to have the potential to be involved in licensing. In addition, any companies which had gone into liquidation, or had been taken over since the publication of The Times 1000 for 1983-84, were eliminated.

A company was therefore defined as belonging to the survey population if it was listed in The Times 1000 and possessed the following five characteristics:

(a) Headquarters located in the UK;
(b) Not in liquidation, or the subsidiary of another company;
(c) Involvement in manufacturing or construction;
(d) Multinationality;
(e) Involvement in R&D.

The number of companies possessing all five of these characteristics was found to be 322, and all were sent a copy of the questionnaire.

Because the procedure for defining the survey population involved the use of surrogate measures (involvement in manufacturing or construction, and a committment to R&D) it was recognised that the survey population would include a number of companies that were not actually involved in international technology licensing. Although such companies were likely to possess proprietary technology as a result of their R&D effort there was no guarantee that they would necessarily choose licensing as a means of exploiting this technology. The questionnaire was therefore designed to identify these ineligible companies by the inclusion of a question at the beginning of the questionnaire which asked whether or not the respondents had any technology licensing agreements with overseas companies.

The companies which answered 'no' to this question and returned the questionnaire identified themselves as being outwith the scope of the survey; by subtracting these ineligible companies from the initial, inexact, survey population an amended survey population was obtained which gave a more accurate estimate of the true survey population. The companies which responded positively to this question and completed the remainder of the questionnaire constitute the sample of companies upon which the statistical analysis has been conducted and from which inferences are drawn concerning the amended survey population.

The way in which the survey population came to be chosen is illustrated in Figure 8-1. Information concerning the first two criteria were obtained directly from The Times 1000. A company was deemed to be UK-based if it was listed on the London Stock Exchange, and its ultimate holding company was located in the UK. All companies quoted only on overseas stock markets were therefore eliminated from the survey population. This left a total of 709 UK-based companies. Any company listed in The Times 1000 which had been taken over by another company or had gone into liquidation before the survey commenced, was excluded. The number of companies in this category numbered 31.

The final three stages in the selection procedure involved the processing of information contained in the most recent Annual Reports and Accounts of the remaining companies. A company which had no involvement in either manufacturing or construction was eliminated from the survey population because it was unlikely to be involved in R&D. Thus, 159 companies operating in sectors such as retailing, property, leisure and financial services were excluded.[1]

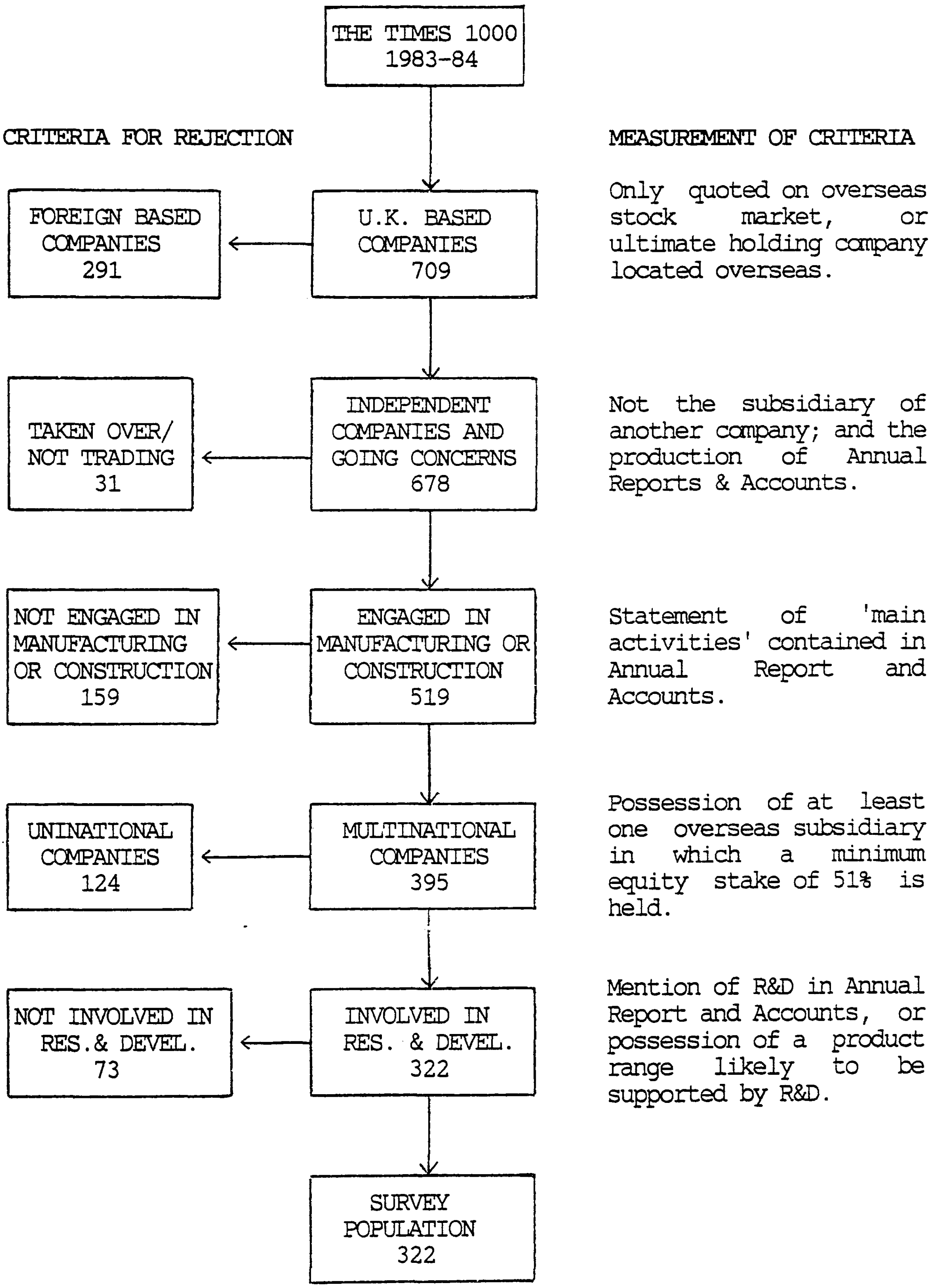
A company was classified as multinational if it had at least one subsidiary incorporated in a country other than the UK. One hundred and twenty four companies failed to meet this requirement and were excluded. Information contained in the Annual Reports and Accounts of the companies which remained after this stage was used to ascertain if they were involved in R&D. The presence of an R&D capability was used as a surrogate for the likely possession of patents and know-how, and thus the likelihood of the company being involved in licensing transactions.

Following Gray (1983), companies were taken to be active in R&D if their accounts possessed any of the following:

- a statement of an accounting policy for R&D;
- any other reference to R&D (usually contained in the Chairman's Statement or the Directors' Report);
- mention of a product range likely to be supported by R&D.

FIGURE 8-1

SURVEY POPULATION SELECTION PROCEDURE



Of the 395 companies remaining after the previous selection stage, 73 were found to have no involvement in R&D. This left a final survey population of 322 companies.

For most of the companies in the population, information concerning criteria (c), (d) and (e) was obtained directly from Annual Report and Accounts. However, for 86 of the companies Annual Reports and Accounts could not be obtained because these companies were under no obligation to make them publicly available since they were not quoted on the stock market. The relevant information for these companies was therefore obtained from "Extel" cards, which provide a summary of companies' Annual Reports and Accounts based upon annual returns submitted to Companies House. In particular, "Extel" cards list the main activities of companies, and the country of incorporation of their subsidiaries, thus allowing selection criteria (c) and (d) to be measured. From this source, 71 companies were classified.

However, because "Extel" cards do not list accounting policies, the final criterion for inclusion in the survey population, involvement in R&D, could not be measured using this information source. The remaining 15 companies had therefore to be classified using personal judgement regarding their likely involvement in R&D, supplemented where possible by the use of "MacCarthy" cards, which provided recent information about the activities of some of the companies in the form of press cuttings. Of these companies, 6 were included in the survey population.

8.3 POPULATION CHARACTERISTICS

The characteristics of the complete Times 1000 population are summarised in Table 8-1, which disaggregates the population by the five exclusion criteria described earlier.

This table illustrates the stages in the selection procedure at which companies were eliminated from the survey population. It should be noted that the five categories are not mutually exclusive;

TABLE 8-1

POPULATION CHARACTERISTICS

TIMES RANK	COMPANIES EXCLUDED					SURVEY POPULATION	TOTAL POPULATION
	FOREIGN BASED	TAKEN OVER/ NOT TRADING	NO MANUF. /CONSTR.	UNI- NATIONAL	NO R&D		
1-100	16	3	7	2	5	67	100
101-200	31	3	11	3	6	46	100
201-300	30	4	16	4	9	37	100
301-400	36	1	13	2	7	41	100
401-500	30	3	17	12	5	33	100
501-600	39	0	19	14	9	19	100
601-700	28	3	20	17	8	24	100
701-800	23	8	20	21	7	23	100
801-900	29	3	12	25	11	20	100
901-1000	29	3	24	24	6	14	100
TOTAL	291	31	159	124	73	322	1000

for example, a foreign-based company could also possess the characteristic of having no involvement in R&D. However, once it had been established that a company was not UK-based there was no need to use the information contained in its Annual Report and Accounts. Similarly, a firm not involved in manufacturing or construction might also have been uninational, but once the first criterion had been satisfied it was not necessary to discover whether it had any overseas subsidiaries. Thus, because of the sequential nature of the selection procedure (illustrated in Figure 8-1) each company is defined as belonging to only one category.

8.4 DATA COLLECTION PROCEDURE

8.4.1 Introduction

Data for this study were collected by means of a mail survey conducted during the autumn of 1984. The questionnaires were mailed to specific individuals within each company. Because company executives responsible for licensing are not generally identified in annual reports and business directories, a number of different categories of executive were contacted.

Those executives that were known to be members of the 'Licensing Executives Society' were first choice. If a company did not have an executive listed in the Directory of this organisation, the questionnaire was sent to those executives known to be working in patent and licensing departments. These executives were listed in the Register published by 'The Chartered Institute of Patent Agents'. Annual Reports were used to identify suitable executives for the remaining companies. Most of the executives chosen from this source occupied board-level positions. Where business development or commercial directors were identified, these were first choice. Otherwise, the questionnaires were mailed to managing directors, finance directors or company secretaries. Where the latter was also legal director, this individual was chosen in preference to the other two since corporate legal departments are often closely involved in the administration of licensing.

All executives contacted were asked to forward the questionnaire to an appropriate person in their company if they were unable to complete it themselves. Each questionnaire was accompanied by two cover letters and a stamp-addressed envelope for returning the questionnaire to the sender.

8.4.2 Cover Letters

Copies of the two cover letters are contained in Appendix A. The letters were individually addressed to each executive and signed by the project supervisor and author respectively.

The first is a letter of introduction from the project supervisor which briefly outlined the objectives of the study and requested the co-operation of the executive. The second is a more lengthy letter from the author which explained the aims of the research in greater detail. In particular, it specified the type of licensing with which the study was concerned and it defined what was meant by technology for the purposes of the study. The letter also assured recipients that their replies would be treated as confidential.

8.4.3 The Questionnaire

The contents of the questionnaire which provided the data used for this study are reproduced in Appendix B. Before completing the first section of the questionnaire respondents had to answer a filter question designed to discover whether or not their company was involved in international technology licensing. If so, the question also asked if the company's licensing agreements were with unrelated overseas companies, or with overseas subsidiaries, or both. Respondents who indicated that their company had no involvement in international technology licensing were asked to turn to the back page of the questionnaire, and use the space allocated for comments to briefly state why their company had no such involvement. They were then asked to return the questionnaire without further completion.

The inclusion of this filter question therefore identified companies that had been mis-specified as members of the survey population. By returning the questionnaire, rather than discarding it because of its lack of relevance to their corporate activities, these respondents enabled the 'true' survey population to be more accurately estimated, and thus enabled a more meaningful sample response rate to be calculated.[2]

Respondents who answered that their companies were only involved in the licensing of overseas subsidiaries were instructed to start the questionnaire from Section III, since the first two sections are concerned solely with the licensing of unrelated overseas firms.

The first section of the questionnaire, titled 'The International Licensing Decision', is concerned with the factors which influence corporate attitudes towards unrelated licensing. The second section, headed 'International Licensing Activity', gathered information about the character and content of these licensing agreements. The section is divided into two parts. The first, Part A, deals with licensing agreements which provide either patents on their own or patents combined with know-how and/or trademarks. The second, Part B, deals with licensing agreements which cater exclusively for transfers of know-how, or know-how combined with trade marks.

International licensing transactions carried out within companies, ie between subsidiaries of the same company, were examined in the third section of the questionnaire, titled 'Intra-Group Licensing'. The final section of the questionnaire, titled 'General Information', obtained data on four major corporate characteristics: sales turnover, research and development, patents, and organizational structure.

8.4.3 Questionnaire Pre-test

Four months before the survey commenced, a draft version of the questionnaire was sent to nine companies in the survey population. It was made clear in the accompanying cover letter that the questionnaire was only in draft form and that alterations would be made in the light of any suggestions made by the recipients.

Personal interviews were conducted with the executives who completed the questionnaire. All the companies selected for the pre-test were chosen because their headquarters were located in Scotland, thus making it convenient for conducting the follow-up interviews.

Of the nine companies surveyed in the pre-test, four returned the questionnaire and were willing to discuss their responses, three indicated that the subject matter of the questionnaire was not applicable to their operations, and the remaining two failed to reply. After the completed questionnaires had been received from the four responding companies a structured interview schedule was drawn up for each company on the basis of the replies given in the questionnaire, and interviews were subsequently held with the executives concerned. Three of these interviews were conducted face-to-face, the other was conducted over the telephone. This latter case was necessitated by the busy schedule of the executive concerned.

The objective of the pre-test survey was to identify any inadequacies in the questionnaire and any useful additions which could be made. Specifically, it set out to discover the following: whether the questions would be interpreted correctly; whether the information being requested was routinely available, and if not, how much time and effort would have to be expended to obtain it; whether the terminology used throughout the questionnaire was understood; and whether respondents felt that the questionnaire took too long to complete, or requested information which was regarded as confidential.

As a result of the pre-test a number of changes were made to the questionnaire. Among the most important of these was the alteration of several questions in Sections II and III to include a scale of response categories for respondents to tick. These scales replaced requests for exact figures contained in the draft questionnaire. It was recognised that this change would result in ordinal-level data being generated rather than interval-level data, but this change was nevertheless regarded as a necessity as the absence of scales would probably have resulted in very little data being generated from the questions concerned.

None of the respondents reported any difficulty in adjusting their answers to the different measurement scales used throughout the questionnaire (seven-point, five-point and four-point scales are used in various places) and none expressed any preference for one particular measurement scale over another. Another change resulting from comments by the pre-test subjects was the addition of two introductory paragraphs at the start of the questionnaire explaining the terms used throughout.

All three of the executives with whom face-to-face interviews were conducted agreed to complete the final version of the questionnaire if it was sent to them, and all duly obliged. In addition to the nine companies contacted in Scotland, the questionnaire pre-test also involved the participation of an intellectual property lawyer from a leading London-based law firm and a licensing executive from one of the largest UK multinationals. Both of these individuals offered comments, by correspondence, on the questionnaire.

8.4.4 Follow-up Procedure

In order to increase the sample response rate two follow-up letters were sent out, at intervals of five and ten weeks after the first mailing, to those executives that had still to reply.

The initial mailing produced reponses from 164 companies. These reponses fell into one of three categories: either the questionnaire was completed by the respondents, or they indicated that it was not applicable to them, or else they stated that they were unwilling to co-operate. The first follow-up letter (reproduced in Appendix A) was therefore posted to the remaining 158 companies. This letter emphasized the need for a large response to achieve valid and meaningful results. It also re-assured recipients of the confidentiality of their replies, and was accompanied by another copy of the questionnaire in case the first one had been mislaid.

A further 80 replies were received as a result of the second mailing, so the final follow-up letter (see Appendix A) was sent to the remaining 78 companies. Once again, the assurance of confidentiality was stressed, and another copy of the questionnaire was included. A further 32 replies were received after this third mailing, yielding a total response of 276. This left 46 firms which failed to respond in one way or another to the survey.

8.5 QUESTIONNAIRE RESPONSE

The responses to the questionnaire survey are analysed in Table 8-2.

TABLE 8-2

ANALYSIS OF RESPONSES TO THE QUESTIONNAIRE SURVEY

Questionnaires mailed			322
Ineligible firms:			
- No involvement in international technology licensing		97	
- Insignificant involvement in international technology licensing		43	
Total ineligible		140	
Eligible firms			182
- Positive responses		86	
- Inadequately completed		2	
- Negative responses		48	
- No response		46	
Percent of positive responses to eligible firms	(86/182)	47%	
Percent of total responses to total possible responses	(276/322)	86%	

As Table 8-2 shows, the number of positive responses totalled 86. These are the companies which returned the questionnaire either fully or partially completed. These 86 positive responses represent 27 per cent of the survey population. This figure is not, however, the sample response rate because the survey population was found to contain 140 companies that should not have been included. These are the companies that responded to the questionnaire by indicating that its subject matter was not applicable to them.

Although the questionnaire only asked if companies had any involvement in international technology licensing, the 'ineligible' responses were broken down into two separate categories on the basis of the replies received: those companies which had no involvement in international technology licensing, and those companies which were involved, but whose level of involvement was insignificant when compared to their overall operations. Of the 140 responses classified as 'ineligible', 97 fell into the first category and 43 into the second category.

A decision was made not to include a question in the questionnaire which gave companies the opportunity of stating that their involvement in international technology licensing was insignificant, since such a question might have induced some firms to answer in the affirmative when their licensing activity was in fact significant, thereby avoiding the need to answer the questionnaire. It was deemed to be more appropriate to let firms state themselves, without prompting, whether they thought that their involvement was insignificant, and 43 duly did so.

When the 140 companies which were found to be outwith the scope of the survey are subtracted from the initial survey population of 322, an amended survey population of 182 companies is obtained. This amended figure of 182 eligible companies was used as the benchmark for calculating the sample response rate for, as Hoinville et al (1978, p71) point out, "the base for calculating the response rate is the number of 'in-scope' elements selected (not the number initially selected)".

The sample response rate was therefore 47 per cent, obtained by expressing the 86 positive responses as a percentage of the 182 eligible firms. The 46 firms that never responded in any way were included in the total number of eligible firms since there was no way of determining that they were ineligible. The overall response rate to the survey was 86 per cent. This rate was obtained by dividing the number of total responses (ineligible firms, positive and negative replies, and inadequately completed questionnaires) by the number of total possible responses.

These response rates compare favourably with those from other questionnaire surveys of MNCs. In a study of performance evaluation practices in US chemical MNCs, Morsicato (1980) achieved an overall response rate of 72 per cent, and a response rate of 36 per cent for eligible firms. Kelly (1981) obtained an overall response rate of 61 per cent for her survey on the foreign investment evaluation practices of US MNCs, and a response rate of 54 per cent for eligible firms. An investigation of the effects of foreign currency translation requirements on the foreign inventories of US MNCs by Bindon (1983) attained an overall response rate of 93 per cent, with 60 per cent of eligible firms responding.

The questionnaire surveys against which it is most appropriate to compare response rates are those concerned specifically with international licensing. Adam's (1985) survey of the costs and benefits of licensing activity among UK firms obtained an overall response rate of 80 per cent, and a response rate of 58 per cent for eligible firms. A survey by the OECD of international technology licensing among its member countries [Vickery (1988)] achieved an overall response rate of 61 per cent, of which 47 per cent were useable. These response rates are reasonably similar to those obtained from the present survey.

Table 8-3 details the nature of the responses obtained from each of the three separate mailings. It shows how important the follow-up requests were in increasing the response to the survey. A total of 164 replies were obtained from the first mailing, 80 were received as a result of the second mailing, and 32 were obtained

TABLE 8-3

BREAKDOWN OF QUESTIONNAIRE RESPONSES BY MAILING SCHEDULE

	1ST REQUEST	2ND REQUEST	3RD REQUEST	TOTAL	
QUESTIONNAIRES MAILED					322
INELIGIBLE FIRMS					
- No involvement in international technology licensing	68	26	3	97	
- Insignificant involvement in international technology licensing	24	14	5	43	
Total Ineligible	92	40	8	140	
ELIGIBLE FIRMS					182
- Positive responses	47	24	15	86	
- Inadequately completed	2	0	0	2	
- Negative responses	23	16	9	48	
- Total Non-responses	-	-	-	46	

after the third mailing. Thus 41 per cent of the total response was achieved from the two follow-up mailings.

Apart from the 86 eligible firms classified as 'positive responses', 2 are classified as 'inadequately completed', 48 as 'negative responses', while the remaining 46 firms did not respond at all. The two firms which fell into the 'inadequately completed' category did not answer enough of the questions to make it worthwhile coding their replies for analysis. The 48 firms falling into the 'negative responses' category replied by indicating that they were unwilling to participate in the survey. Some of these firms gave reasons for their non-participation and some did not. These responses are shown in Table 8-4, ranked in order of the most frequently cited.

The most frequently cited reason for non-participation was 'pressure of work'. Of the 13 executives who gave this reason, 5 attributed the pressure to company reorganisation, while 3 stated that their need to travel extensively overseas severely limited the time that they had available while in the UK. Of the eight company executives who cited the decentralised nature of their companies as the reason for their non-participation, one stated that plans were being contemplated to centralise the licensing function by computerising licensing information from subsidiaries, while another executive stated that the computerisation of licensing data at HQ level was currently taking place in his organisation.

Of the four executives who did not co-operate because they thought the questionnaire would take up too much of their time, two chose to write a letter instead, outlining their company's general attitude towards international technology licensing. Of the executives who gave reasons classified as miscellaneous, one found the questionnaire too complex, one refused to complete a second questionnaire after the first one was lost in the post, and the third declined to take part as his company had just gone into receivership (although individual subsidiaries were still trading).

TABLE 8-4

REASONS CITED BY COMPANIES UNWILLING TO PARTICIPATE IN THE SURVEY

Reasons	Number of Companies	%
Pressure of work	13	27
No reason given	10	21
Company too decentralised	8	17
Confidentiality	4	8
Questionnaire too time-consuming	4	8
Miscellaneous reasons	3	6
Complex organisational structure	2	4
Company policy not to answer questionnaires	2	4
Inadequate resources to answer questionnaire	2	4

Note: The percentages do not add up to 100 because of rounding.

8.6 STATISTICAL PROCEDURES

8.6.1 Introduction

The purpose of this section is to justify the statistical techniques which were chosen to analyse the data generated from the questionnaire survey. This choice was not a straightforward one, for there exists a division of opinion among statisticians and among researchers in the social sciences about the techniques that are appropriate to a particular data set. The debate centres around the issue of the level of measurement of the variables under study.

One school of thought holds that the statistical procedures that can be applied to any data set are dependent upon the level of measurement of the variables that constitute that data set. The other school of thought argues that statistical techniques are not dependent upon the scale of measurement of the variables under study.

In this section the arguments of these opposing schools are considered. Firstly, the properties of different levels of measurement are described. The distinction between parametric and nonparametric procedures is then introduced, and the appropriateness of these procedures at different levels of measurement are considered. The arguments of the other school of thought are then outlined, and the current state of the debate is summarized. Finally, the advantages and disadvantages of parametric and nonparametric procedures are described, and the type of statistical procedures employed in the empirical study are then outlined.

8.6.2 Levels of Measurement

The widely accepted classification scheme for levels of measurement is that devised by Stevens (1946). It contains four levels: nominal, ordinal, interval and ratio. These categories differ from each other in terms of three principal factors: whether the values on a scale can be ordered, whether the distance between them has any meaning, and whether the origin has a unique meaning. These differences are summarised in Table 8-5.

TABLE 8-5

MEASUREMENT LEVELS

Level of Measurement	Does the ORDER of Values have meaning?	Does the DISTANCE between Values have meaning?	Does the ORIGIN have unique meaning?
Nominal	No	No	No
Ordinal	Yes	No	No
Interval	Yes	Yes	No
Ratio	Yes	Yes	Yes

[SOURCE: Adapted from Mills (1977, p4)]

At the nominal level of measurement, a set of mutually exclusive and collectively exhaustive categories are identified into which data may be classified. A variable derived from a YES/NO type question in a questionnaire, for example, is measured at the nominal level. The nominal level is the weakest of the four measurement scales because it makes no assumptions about the ordering of the values asigned to categories, or about the distance between the categories, and it has no arithmetic origin.

When numbers are assigned to the categories of a nominal scale they have no numeric meaning; they are simply a convenient way of labelling or coding the information. In this study, for example, the numbers '1' to '8' were assigned to the responses derived from the last question in the questionnaire, which concerns the organizational structure of companies. This was done so that the responses could be easily read by the computer. The properties of the real number system cannot be assigned to these numbers; they cannot be added, subtracted, multiplied or divided. Their function is purely to identify categories that are different.

The ordinal level of measurement incorporates the classifying and labelling function of the nominal scale, but in addition brings to it a sense of order. When it is possible to say that one category has more or less of a particular property than another category, values can then be assigned to these categories to indicate their relative rankings. Like the nominal level of measurement, the ordinal scale makes no assumption about the distance between the values assigned to different categories. Thus, the real difference between the ranks '1' and '2', for example, may be more or less than the difference between ranks '2' and '3'. It is therefore not meaningful to use the operations of arithmetic on such numbers. Similarly, no meaning can be attached to the shape of the frequency distribution derived from an ordinal scale.

The interval level of measurement has the powers of nominal and ordinal scales plus one additional property: it assumes that the interval (or distance) between any two adjacent values on the scale is the same. Thus, the distance between '1' and '2' equals the distance between '2' and '3'. Meaning can therefore be attached to the slope of a frequency distribution derived from an interval scale. Interval scales also permit certain arithmetic procedures which are untenable at the nominal and ordinal levels of measurement; values can be added or subtracted, or they can be multiplied or divided by constants. It is not possible, however, to multiply two values or divide one value by another, because the interval scale has no absolute zero point. It cannot be assumed, for example, that the ninth point on an interval scale is three times that of the third point.

The strongest level of measurement is the ratio level, for it has all the properties of the interval level and also includes an absolute zero point. As a result, ratio comparisons can be made as well as distance comparisons. It is thus meaningful to say that the ninth point on a ratio scale is three times that of the third point. At this level of measurement, all of the arithmetic procedures of addition, subtraction, multiplication and division are feasible.

A case can be made for defining one further category of measurement level: the dichotomous level. Dichotomous variables are those which have only two possible values; they can thus be regarded as a sub-category of nominal-level variables. They are different from other nominal-level variables because they can be treated as though they are measured at the ordinal or interval level.

Dichotomous variables can be treated as ordinal-level variables because they satisfy the mathematical requirements of ordering; although a rank order may not be inherent in the way in which the two values of a dichotomy are defined, one value can nevertheless be considered as the "high" end of a ranking and the other as the "low" end. The requirement of a distance measure based on equal-sized intervals is also satisfied because there is only one interval, naturally equal to itself. A dichotomy can therefore be treated as either a nominal, ordinal or interval-level measure.

8.6.3 Parametric or Nonparametric Statistics?

The oldest and most heavily used methods of statistical inference are those which depend upon knowing or assuming certain characteristics of the population from which sample data is drawn (usually that the population is normally distributed). Because the measures which describe population characteristics are known as parameters, these statistical techniques have come to be labelled as 'parametric'.

Nonparametric statistics, on the other hand, are not based upon stringent assumptions about population parameters.[3] As a result they do not require that the shape of the population distribution be known, and they are therefore sometimes called 'distribution-free' statistics. They are also referred to as 'ranking' or 'order' statistics, because they are uniquely suited to variables that are measured on an ordinal scale.[4] This arises from the fact that they do not require the use of standard arithmetic operations.

As noted in the previous section, the distances between values on an ordinal scale have no inherent meaning, so the application of any arithmetic procedures to such values would only distort the information gained by the ordinal measurement. For example, the computation of the mean for ordinal-level data would be improper, since it involves addition and then subtraction. The equivalent nonparametric measure of central tendency, the median, requires only counting.

The idea that parametric statistics are only appropriate to variables measured at the interval and ratio levels, and that nonparametric procedures should be used for ordinal and nominal-level variables was originally proposed by Stevens in his 1946 article, and elaborated further by Siegel (1956). However, this viewpoint has been challenged by a number of statisticians and behavioural researchers, most notably by Lord (1953), Savage (1957), Anderson (1961), Baker, Hardyck and Petrinovich (1966) and Labovitz (1967, 1970). The history of the controversy, which remains unresolved, has been cogently summarised by Gardner (1975).

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The counter-arguments to Stevens' and Siegel's position fall into two basic categories: theoretical and empirical. The first kind of counter-argument is based upon an analysis of the mathematical assumptions underlying the various statistical procedures. The second is founded upon empirical evidence concerning the effects of transformations of data upon the probability levels associated with the values of various statistics.

The essence of the first kind of counter-argument was neatly summarised by Baker et al (1966) in their statement that "statistics apply to numbers rather than things" (p292). These researchers were reiterating a point, first made by Lord (1953) and subsequently by Anderson (1961), that statistical tests cannot be cognizant of the empirical meaning of the numbers with which they deal. Consequently, it is argued, the validity of a statistical inference does not depend on the type of measuring scale used.

This conclusion was strongly challenged by Stevens (1968) who, although conceding the basic premise of the counter-argument, did not agree with the conclusion drawn. As he put it:

> "..... however much we may agree that the statistical test cannot be cognizant of the empirical meaning of the numbers, the same principle can scarcely be extended to experimenters. ..... For mathematics, like a computer, obeys commands and asks no questions. It will process any input, however devoid of scientific sense, and it will bedeck in formulas both the meaningful and the absurd. In the behavioural sciences, where the discernment for nonsense is perhaps less sharply honed than in the physical sciences, the vigil must remain especially alert against the intrusion of a defective theory merely because it carries a mathematical visa."[5]

The basis for the second category of counter-argument against the Stevens/Siegel position is that, if the scale of measurement is altered and the same conclusion is reached regardless of whether the data have been transformed or not, then the scale of measurement is of little importance. This reasoning formed the basis of the empirical studies conducted by Baker et al (1966) and

Labovitz (1967, 1970). In his 1967 article, for example, Labovitz invented some hypothetical experimental data of ordinal strength and transformed the data according to seven different arbitrary scoring systems, each consistent with the rank order of the data. He then applied parametric statistics and found that the results obtained were little different from those achieved by applying the appropriate nonparametric procedure to the original data.[6]

In his 1970 study, Labovitz analysed data concerning the relationship between occupational prestige and suicide rates as a basis for determining the degree of error when treating ordinal variables as if they were interval. Twenty different scoring systems were assigned to the values of occupational prestige, eighteen of them generated randomly by computer. Once again, each scoring system was consistent with the monotonic (ordered) nature of the categories. The relationship between suicide rates and occupational prestige, as measured by these different scoring systems, was determined by calculating the Pearson product-moment correlation coefficient. It was found that the value of this parametric statistic was little affected by the type of scoring system used, allowing Labovitz to conclude that ordinal variables can be treated as if they conform to interval scales.

The results of such empirical studies strengthened the position of those who regard the level of measurement as being of little importance in determining permissible statistical operations. After reviewing the evidence from these studies Gardner (1975) concluded that treating ordinal variables as if they were interval would be unlikely to lead to improper conclusions due to the robustness of parametric techniques (ie their ability to maintain their logically deduced conclusions when one or more assumptions have been violated). As a result, he argued that "the parametric/nonparametric issue is not as critical as it was thought to be two decades ago" (1975, p52).

Even Stevens moderated his original position in the light of such evidence. Although still firmly rejecting the theoretical arguments posed by his critics, he conceded that it may be appropriate in some instances to use parametric procedures on ordinal data. For Stevens, the issue had been redefined, so that it now turned:

> ".... not on whether the measurement scale determines the choice of statistical procedure, but on how and to what degree an inappropriate statistic may lead to a deviant conclusion. ...... By spelling out the costs, we may convert the issue from a seeming proscription to a calculated risk."[7]

If one adopts the strict Stevens/Siegel position, then the appropriate statistical procedures for the ordinal data generated from the questionnaire survey are nonparametric ones. However, as critics of the Stevens/Siegel position argue, the risk involved in using parametric procedures on such data may not be very great.

The nature of this risk can be assessed by considering the relative merits of both categories of statistics, which revolve around the concepts of 'power', and 'power efficiency'. The power of a statistical test is defined as the probability of correctly rejecting the null hypothesis, ie rejecting it when it is in fact false. It is represented as follows:

$$\text{Power} = 1 - \beta$$

where β is the probability of a Type II error.[8]

On this criterion, parametric tests win out. Their superiority in terms of power is hardly surprising since they utilise more assumptions about the population than do nonparametric tests. Also, because they deal with actual numerical values rather than rank orders they use more information than equivalent nonparametric tests.

The degree of wastefulness of a nonparametric test can be expressed by the concept of power efficiency, which is concerned with the amount of increase in sample size necessary to make one test as powerful as another. It is calculated from the following formula:

$$\text{Power efficiency of test B} = (100)\frac{N_a}{N_b} \text{ per cent}$$

where N_b is the amount of cases needed by test B to achieve the same power as test A when it (test A) has N_a cases.

The concept of power efficiency demonstrates that, even when all the requirements for a parametric test are satisfied, by increasing the sample size by an appropriate amount it is possible to use a nonparametric test rather than a parametric one and yet retain the same power to reject the null hypothesis. Emory (1980) pointed out that, although "parametric tests have greater power efficiency when their use is appropriate ..... nonparametric tests often achieve a power efficiency of as high as 95 per cent. This means that the nonparametric test will provide the same statistical testing power with a sample of 100 as a parametric test with a sample of 95" (p413).

Thus, even if a researcher was confident that the data being analysed could be treated as interval-level data, the amount of power lost by employing a nonparametric test rather than a parametric test may not be very large. And, if this assumption is not justified, the use of a nonparametric test will yield a result which has greater validity since no assumption is made about the distance between scale intervals or about population parameters.

8.6.4 Conclusion

After reviewing the parametric/nonparametric issue, Kerlinger (1973) recommended that the best procedure for behavioural researchers to adopt "would seem to be to treat ordinal measurements as though they were interval measurements, but to be constantly alert to the possibility of gross inequality of intervals" (p441). A different view on the issue was expressed by Emory (1980), who favoured an approach described as "neutrality with a tilt towards conservatism" (p124).

In this study a broadly neutral approach is adopted, with both parametric and nonparametric procedures used. By and large, nonparametric methods have been preferred, with parametric methods used where the circumstances could be justified. The reasons behind the adoption of the statistical methods used are now described, on a chapter-by-chapter basis.

The analysis of the government statistical data in Chapter Nine uses simple descriptive statistics to identify trends in the use of FDI sales, exports and licensed sales over the period 1964-1984. The degree of correlation between the three forms of overseas sales across industries and geographical areas was also assessed. Despite the fact that the raw government data were of interval strength, Spearman rank-order correlations were calculated rather than Pearson product-moment correlations because of the rather crude estimating procedures which were used to determine the values of overseas sales arising from FDI and licensing.

The analysis in Chapter Ten of the key characteristics of the sample of companies which responded to the questionnaire is also broadly descriptive in nature. A number of the variables are crosstabulated against one other and simple chi square statistics are calculated to determine the degree of association between them. The rankings of international business methods by the companies are analysed using Friedman's two-way analysis of variance test, in accordance with the ordinal nature of the data.

In Chapter Eleven questionnaire data concerning the possible determinants of the international licensing decision are analysed. The data consist of ratings given to a number of variables, on a seven-point scale. The analysis involved the use of both nonparametric and parametric statistical methods. In the first stage of the analysis the nonparametric Kendall coefficient of concordance was used to determine the relative importance of the rankings attributed to the variables defined in the questionnaire.

The second stage of the analysis involved an examination of the intercorrelations between the variables, using the parametric technique of factor analysis, to ascertain if a smaller number of underlying variables could be used to explain the international licensing decision. It may be argued that the use of factor analysis is inappropriate since the variables are measurements of opinions, which are inherently ordinal. Nevertheless, factor analysis is commonly applied to such variables in business research [see eg Johansson and Nebenzahl (1986), Tansuhaj and Gentry (1987), Barker (1987), Black (1988)].[9] This use stems from a common assumption that ordinal variables may be assigned numeric values without distorting their underlying properties [Kim and Mueller (1978, p73)].

The legitimacy of using factor analysis on ordinal data is reinforced by the existence of evidence which suggests that the basic inputs for factor analysis, correlation coefficients, are fairly robust with respect to ordinal distortions in their measurement [Labovitz (1967, 1970), Kim (1975)]. Nevertheless, to limit the possibility of any distortions being introduced in this study, Spearman rank-order correlations were used rather than Pearson product-moment correlations, as recommended by Rummel (1970).

The research methods employed in Chapter Eleven are a mixture of the deductive and the inductive, with the emphasis primarily upon the former. The nonparametric analysis is deductive in nature as it is conducted upon variables derived from the literature review. The factor analysis, on the other hand, is inductive in nature as it attempts to produce a smaller subset of variables to account for the international licensing decision.

In Chapter Twelve the analysis is entirely deductive, as it involves the testing of hypotheses about the types of companies likely to be involved in international licensing. As the potential explanatory power of nine variables were tested, the parametric technique of multiple linear regression was used in order to capture the simultaneous effect of all of the variables, despite the fact that some of them were only measured at the nominal and ordinal levels. The use of multiple linear regression had the added benefit that it ensured comparability with previous studies of international licensing which also employed this technique. Nevertheless, the ordinal character of the data was utilised when assessing the extent of any multicollinearity among the independent variables through the use of a Spearman rank-order correlation matrix.

Chapter Thirteen also tested a number of hypotheses, although in this case nonparametric techniques were employed as the data, derived from the questionnaire, were all of ordinal strength. The bulk of the data measures the extent to which patents, know-how and trademarks were present in international licensing agreements with independent firms and with subsidiaries. The anticipated differences in the intellectual property content of these two categories of licensing agreement provided the basis for nine hypotheses, each of which was tested using the Wilcoxon matched-pairs signed-ranks test. A further hypothesis was tested using the the Kolmogorov-Smirnov one-sample test because it was only concerned with a characteristic of one category of international licensing agreement (ie know-how agreements with independent firms).

8.7 ADVANTAGES AND LIMITATIONS OF THE RESEARCH METHODOLOGY

Buckley et al (1976) commented that "no research methodology is perfect. In fact ..... it is possible to critique any research effort" (p33). In this section a critique of the research methodology employed in this study is provided.

With the exception of the government statistical data analysed in the next chapter, the data for this study were generated using the survey method. According to Kerlinger (1973) this method "studies populations by selecting and studying samples chosen from the populations to discover the relative incidence, distribution and interrelations among variables" (p410).[10] In this survey the population consists of the 186 firms defined as eligible, while the sample consists of the 86 positive responses received. The possibility that the characteristics of the firms in this self-selected sample may differ from the characteristics of the firms which did not reply introduces the risk that the results may contain non-response bias.

The survey research method falls under the general category of 'ex post facto' research, defined by Kerlinger (1973) as "systematic empirical enquiry in which the scientist does not have direct control of independent variables because their manifestations have already occured or because they are inherently not manipulable" (p379). This type of research was contrasted by Kerlinger with experimental research, in which the researcher has some degree of control over independent variables. Relationships identified by survey research are therefore weaker than those obtained by experimental research. However, the impossibility of controlling the independent variables in this study necessitated the adoption of the survey approach.

The main advantage of the survey method is its ability to gather a great deal of data from a large sample. A wide variety of standard statistical procedures can then be used on this data to make inferences to large populations. The particular type of survey method employed in this study was the mail questionnaire. This was favoured over other survey methods (personal interviews, telephone interviews, and the panel technique) because it has the ability to reach the largest sample at the lowest cost. Another advantage of this method is that there is no interviewer present. As a result there is no interviewer bias, thus removing one of the most important disadvantages of interview methods.

The mail questionnaire does, however, have a number of limitations as a survey method. Firstly, there is the possibility of getting a poor response rate. In order to improve the response rate in this study the questionnaire was directed to a targetted individual in each company in the survey population. In addition, two follow-up requests, with additional questionnaires, were mailed to companies that had not answered, at intervals of five and ten weeks, after the initial mailing.

A second limitation of the mail questionnaire concerns the reliability of the responses obtained. Since, in most cases, actual behaviour within firms cannot be observed, most of the data which comes from respondents are not verifiable. In this study the only information which could be verified was certain factual responses (eg information concerning R&D) and where possible these were checked with information contained in annual reports.

Another limitation of the mail questionnaire concerns the validity of the measurements obtained. Because the researcher has no opportunity to amplify or clarify questions for the respondent, the questionnaire must be designed so that all questions have a clear and common meaning. In order to satisy this requirement a pre-test survey was conducted, details of which were provided earlier in the chapter.

CHAPTER EIGHT

NOTES

1. It is, of course, possible that some companies may possess intellectual property even if they are not active in R&D, eg companies in the financial services sector may acquire know-how concerning the operation of electronic payments technology purchased from a supplier.

2. The 'true' survey population could have been determined exactly by also sending the questionnaire to the 678 firms deleted from the original population of 1000 firms, and asking these firms to confirm that they were correctly excluded from the survey. However, the additional resources which this task would have consumed were not deemed to be worth the pay-off, especially since the information used to assess a number of the exclusion criteria (eg whether a company was UK-based) were not in dispute.

3. As Mosteller and Rourke (1973) pointed out, the term nonparametric is actually something of a misnomer because nonparametric statistics do in fact deal with population parameters, such as the median.

4. Some nonparametric techniques are also applicable to variables measured at the nominal level.

5. Stevens, 1968, p's 849 & 853.

6. The parametric procedures which Labovitz applied to his data were point biserial correlation and Students' t-test. The results were found to be generally consistent with those obtained from the nonparametric procedure used, the Wilcoxon matched-pairs signed ranks test.

7. Stevens, 1968, p852; also cited in Gardner, 1975, p53.

8. A Type II error refers to the mistake of accepting the null hypothesis when in fact it is false. Conversely, a Type I error is committed when the null hypothesis is rejected when in fact it is true.

9. There is no nonparametric equivalent to factor analysis.

10. This quote has been slightly paraphrased in order to enhance readability. The underlying meaning remains unaltered.

REFERENCES

ADAM, Y.A., The Costs and Benefits of Licensing Activity: An Empirical Investigation of UK Companies Involved in Such Operations, Unpublished PhD Thesis, University of Manchester, 1985.

ALLEN, M. (ed.), The Times 1000: 1983-84, London: Times Books, 1984.

ANDERSON, N.A., 'Scales and Statistics: Parametric and Nonparametric', Psychological Bulletin, Vol 58, No. 4, 1961, pp 305-16.

BAKER, B.O., HARDYCK, C.D. & PETRINOVICH, L.F., 'Weak Measurement vs. Strong Statistics: An Empirical Critique of S.S. Stevens' Prescriptions on Statistics', Educational and Psychological Measurement, Vol 26, 1966, pp 291-309.

BARKER, A.T., 'A Study of Attitudes Towards Products Made in Australia', Journal of Global Marketing, Vol 1, Nos 1/2, Fall/Winter 1987, pp 131-144.

BINDON, K.R., Inventories and Foreign Currency Translation Requirements, Ann Arbor, Michigan: UMI Research Press, 1983.

BLACK, J.S., 'Work Role Transitions: A Study of American Expatriate Managers in Japan', Journal of International Business Studies, Vol 48, No 2, pp 277-293.

BUCKLEY, J.W., BUCKLEY, M.M. & CHIANG, H.F., Research Methodology and Business Decisions, US: National Association of Accountants & Society of Management Accountants, 1976.

EMORY, C.W., Business Research Methods, 2nd ed., Homewood, Illinois: Richard D. Irwin Inc., 1980.

GARDNER, P.L., 'Scales and Statistics', Review of Educational Research, Vol 45, No. 1, 1975, pp 43-57.

GRAY, R.H., 'Research and Development', in Tonkin, D.J. & Skerrat, L.C.L. (eds.), Financial Reporting 1983-84: A Survey of Published Accounts, London: ICAEW, 1983.

HOINVILLE, G., JOWELL, R. et al, Survey Research Practice, London: Heinemann Educational Books, 1978.

JOHANSSON, J. & NEBENZAHL, I.D., 'Multinational Production: Effect on Brand Value', Journal of International Business Studies, Vol 43, No 3, Fall 1986, pp 101-126.

KELLY, M.W., Foreign Investment Evaluation Practices of US Multinational Corporations, Ann Arbor, Michigan: UMI research Press, 1981.

KERLINGER, F.N., Foundations of Behavioural Research, 2nd ed., New York: Holt, Rinehart & Winston Inc., 1973.

KIM, J.O., 'Multivariate Analysis of Ordinal Variables', American Journal of Sociology, Vol 81, 1975, pp 261-298.

KIM, J.O. & MUELLER, C.W., Introduction to Factor Analysis: What it is and how to do it, London: Sage Publications Ltd, 1978.

LABOVITZ, S., 'Some Observations on Measurement and Statistics', Social Forces, Vol 46, No. 2, December 1967, pp 151-160.

LABOVITZ, S., 'The Assignment of Numbers to Rank Order Categories', American Sociological Review, Vol 35, No. 3, June 1970, pp 515-524.

LORD, F.M., 'On the Statistical Treatment of Football Numbers', American Psychologist, Vol 8, 1953, pp 750-751.

MILLS, R.L., Statistics for Applied Economics and Business, New York: McGraw-Hill, 1977.

MORSICATO, H.G., Currency Translation and Performance Evaluation in Multinationals, Ann Arbor, Michigan: UMI Research Press, 1980.

MOSTELLER, F.M. & ROURKE, R.E., Sturdy Statistics: Nonparametric and Order Statistics, Reading, Mass.: Addison-Wesley, 1973.

RUMMELL, R.J. Applied Factor Analysis, Evanston: Northwestern University Press, 1970.

SAVAGE, R.S., 'Nonparametric Statistics', Journal of the American Statistical Association, Vol 52, No. 279, September 1957, pp 331-344.

SIEGEL, S., Nonparametric Statistics for the Behavioural Sciences, New York: McGraw-Hill, 1956.

STEVENS, S.S., 'On The Theory of Scales of Measurement', Science, Vol 103, 1946, pp 677-680.

STEVENS, S.S., 'Measurement, Statistics, and the Schemapiric View', Science, Vol 161, No. 3844, 30 August 1968, pp 849-856.

TANSUHAJ, P.S. & GENTRY, J.W., 'Firm Differences in Perceptions of the Facilitating Role of Foreign Trade Zones in Global Marketing and Logistics', Journal of International Business Studies, Vol 44, No 1, Spring 1987, pp 19-33.

VICKERY, G., 'A Survey of International Technology Licensing', STI Review, No 4, December 1988, pp 7-49.

CHAPTER NINE - THE INTERNATIONAL BUSINESS ACTIVITIES OF UK COMPANIES: 1964 - 1984

CHAPTER NINE - THE INTERNATIONAL BUSINESS ACTIVITIES OF UK COMPANIES: 1964 - 1984

9.1 INTRODUCTION

9.1.1 The Available Data

This chapter presents an analysis of the international business activities of UK companies over the twenty year period up to and including 1984, when the questionnaire survey was carried out. The analysis was carried out on data collected by the UK Government Statistical Service (GSS).

The levels of exporting and FDI are measured annually by the GSS for balance of payments purposes. The figures are reported in some detail, disaggregated by country of destination and industrial classification. FDI, for example, is recorded by capital flows, earnings, and, every three years, book values of overseas assets.

Unfortunately, no such detailed information is gathered on the extent to which UK companies engage in alternative forms of international business: joint ventures are included in FDI statistics without being separately identified, while the various forms of non-equity arrangements are not individually identified and recorded.

Nevertheless, some estimate of the magnitude of non-equity international business generally, and licensing in particular, can be gathered from the annual surveys of overseas transactions carried out by the Department of Trade and Industry (DTI). In addition to recording the volume of exports and direct investment flows and earnings, the DTI also carries out a survey of "overseas royalties and similar transactions" for the invisibles account of the UK balance of payments. Detailed figures from the enquiry are published each year by the Business Statistics Office in <u>Business Monitor MA4, Overseas Transactions</u>. Although these data on overseas royalty transactions are crude, they are the only data available, and they do give useful clues on the extent, structure and direction of non-equity transactions.

The transactions covered by the term "royalties" include licences conferring the right to use "patents, trademarks, designs, copyrights, manufacturing rights, use of technical 'know-how' and technical assistance, and royalties on printed matter, sound recordings and performing rights" [HMSO (1983, p4)]. Film royalties are also collected and disclosed under separate "films and television" statistics.

The figures for "royalties" received by UK companies are broken down into four components. The first two components define the type of company from which payment is received: either a "related" or an "unrelated" overseas concern. The former is essentially a company in which the recipient has some form of ownership connection; transactions may therefore take place at transfer prices.[1] The latter is an independent company and transactions will therefore be accomplished at arm's-length prices.

The second pair of categories describe, very broadly, the nature of the knowledge for which royalties are received: either "technological and mineral" or "printed matter, sound recordings or performing rights".

9.1.2 Limitations of the Data

Before proceeding to examine this data on overseas transactions its deficiencies require to be pointed out. First of all, the coverage acheived by the DTI is not complete. Since the data are derived from a voluntary enquiry, estimates have to be made for non-response in order to calculate the magnitude of transactions for all companies. In 1981, for example, returns for outward direct investment were received from companies accounting for 69 per cent of total net earnings from outward direct investment. Estimates for the remaining companies were constructed from company accounts and any other available information.

The number of companies responding to the inquiry into overseas royalty transactions in 1981 accounted for about 70 per cent of total receipts. As it is not possible to allocate the non-response by country or industry, the breakdown of the data by these two variables is based solely on returns received in the enquiry. The coverage of the enquiry into royalties is also hampered by the fact that a large number of companies and individuals receiving small payments for royalties are not approached. However, an allowance is made for this omission in estimating the royalty receipts of all UK companies.

Another defect concerning the coverage of the government's survey of overseas royalty transactions is that it only encompasses those forms of collaboration which involve monetary payments. It therefore excludes reciprocal licensing agreements in which both parties exchange intellectual property rights with one another without exchanging cash. In addition, differing methods of royalty payments may distort the figures. For example, part of the payment for technology may consist of an initial lump sum fee, with subsequent yearly royalty payments proportionately reduced. Also, returns to foreign licensing may be understated if part of the payment consists of equity in the licensee. Another problem arises in situations where royalties are received from related overseas concerns, for these are likely to be affected by transfer pricing, for which no allowance is made.

A final problem with the goverment data is that it does not make any allowance for the effects of changes in domestic price levels and changes in the exchange rate. Consequently, the figures for direct investment, exporting and royalties will be exaggerated in years of relativly high UK inflation and in years when sterling has been weak.

9.2 ANALYSIS OF THE DATA

9.2.1 Introduction

The following analysis of UK government data attempts to estimate the quantitative significance of the UK's non-equity international business over time, and more specifically to estimate the relative share that has been accounted for by technology licensing relative to the two main alternatives of direct investment and exporting. It builds upon previous studies by Buckley and Davies (1979, 1981), Byrne (1980), Dunning and Cantwell (1981), Davies and Rosser (1984), Clegg (1987) and Buckley and Prescott (1989).[2]

9.2.2 Non-Equity International Business

The best approximation of the extent of non-equity international business in general is provided by the figures for "royalties and similar transactions". These figures include both "technological and mineral" royalties and royalties for "printed matter, sound recordings and performing rights".

These royalties are obtained by companies that are engaged in both manufacturing and non-manufacturing activities. The former can be regarded as a measure of the payments from licensing activities, while the latter can be viewed as the payments from non-licensing activities such as management contracts, turnkey agreements, etc.

The UK receipts of royalties and similar transactions from unrelated and related overseas concerns, over the period 1964-1984, are shown in Table 9-1. Following Dunning and Cantwell (1981) the balance of royalties between between unrelated (Ru) and related (Rr) concerns is measured by the ratio Ru/Rr. It is assumed that UK companies charged their subsidiaries a market-determined royalty rate (ie no transfer pricing occurred).

TABLE 9-1

UK RECEIPTS OF ROYALTIES AND SIMILAR TRANSACTIONS FROM UNRELATED & RELATED OVERSEAS CONCERNS, 1964-1984 (million) 1.

Year	Receipts from Unrelated concerns (Ru)	Receipts from Related Concerns (Rr)	Ru/Rr
1964	38.5	19.7	1.95
1965	43.0	21.8	1.97
1966	52.7	23.3	2.26
1967	54.1	27.4	1.97
1968	76.5	32.7	2.34
1969	78.1	38.8	2.01
1970	97.7	44.4	2.20
1971	103.6	43.4	2.39
1972	118.0	48.2	2.45
1973	142.3	59.2	2.40
1974	168.5	76.8	2.19
1975	187.5	86.9	2.16
1976	274.1	112.9	2.43
1977	296.3	127.0	2.33
1978	308.2	151.8	2.03
1979	296.9	170.2	1.74
1980	286.8	200.7	1.42
1981	338.4	237.5	1.42
1982	339.3	229.0	1.48
1983	393.3	307.3	1.27
1984	405.9	340.1	1.19

1. Excluding oil companies, banks and insurance companies.

[SOURCES: Business Monitor MA4 1984 & M4 1973.]

It is evident from Table 9-1 that royalty receipts from unrelated overseas concerns have exceeded those from related overseas concerns in each of the twenty one years between 1964 and 1984. The Ru/Rr ratio has been fairly stable for most of this period, with unrelated royalties running at just over twice the level of related royalties. From the late 1970s onwards, however, there has been a noticeable downward trend in the Ru/Rr ratio, reflecting an increase in the level of related royalties relative to the level of unrelated royalties.

9.2.3 The Relative Magnitude of Licensing, Exporting and FDI

Any Attempt to assess the magnitude of licensing vis-a-vis the main alternatives of FDI and exporting requires a decision to be made about the appropriate measurement bases to adopt for each mode of business. Data on licensing is available indirectly in the form of royalty payments, data on exports in the form of export sales, and data on FDI comes in the form of capital flows, earnings or the book value of assets.

The ideal way to compare the three methods of business is to standardise the measurement basis for each of them. Since they all represent alternative methods of servicing a foreign market this is best achieved by estimating the value of sales associated with each type of operation. This method of comparison was used by Buckley and Davies (1979, 1981), Byrne (1980), Davies and Rosser (1984), Clegg (1987) and Buckley and Prescott (1989), and it is the method which is adopted here.

The calculation of the overseas sales associated with UK technology licensing which follows is based upon the figures for "technological and mineral royalties".[3] These exclude what are termed "artistic" royalties, ie royalties for "printed matter, sound recordings and performing rights".

Following Buckley and Davies (1979, 1981) the distribution of total royalty receipts across industries was examined to determine the proportion which came from non-manufacturing industries. These non-manufacturing royalties were taken as a proxy for payments from non-licensing activities (management contracts, turnkey operations etc). They were then used to deflate the technological and mineral royalties to derive an estimate of the royalties from licensing activities alone.

The proportion of non-manufacturing royalties was calculated for each year from 1964-1984. This follows the procedure adopted by Buckley and Prescott (1989), and it represents an improvement over Buckley and Davies (1979, 1981) who used a standard 20 per cent figure for each year on the basis that this proportion was fairly stable over the time period of their study.[4]

Having estimated the value of licensing royalties, the next step was to estimate the sales associated with these royalties. This was done by assuming that royalties averaged 5 per cent of sales revenues. The value of licensed sales was therefore estimated by multiplying licensing royalties by 20.[5]

The estimate of sales arising from FDI was based upon the book values of UK overseas assets, which are estimated every three years by the DTI and published as Business Monitor MO4, Census of Overseas Assets. To maintain comparability with the licensing data, only the overseas asset values of companies involved in manufacturing activities were used.[6] Values for the sales generated from these assets were derived by multiplying the asset values by an appropriate sales/assets ratio. In the absence of any UK data on sales/overseas assets ratios, it has been common practice to estimate UK FDI sales using US sales/overseas assets ratios. Buckley and Davies (1979,1981), Byrne (1980) and Davies and Rosser (1984) used a value of 2:1 based upon a study by Polk, Meister and Veit (1966) which used this ratio to estimate the sales associated with US FDI in 1965.[7] A study by Belli (1970) revealed that the actual ratio for 1965 was 2.189:1, which was very close to that employed by Polk et al.

An alternative method of estimating the FDI sales of UK companies was proposed by Clegg (1987), who applied the UK's domestic capital:output ratio to the UK's overseas capital stock. However, the approach adopted in this study is to supplement the data of Polk et al with more recent data on US sales/overseas assets ratios, derived from Brereton (1986), to estimate the sales associated with UK FDI.[8] It is therefore assumed, in common with Buckley and Prescott (1989), that the comparability of UK FDI is closer to US FDI than to domestic UK investment in terms of capital:output ratios.

Table 9-2 shows the structure of UK sales in foreign markets using the estimation methods just described. Since the book values

TABLE 9-2

THE STRUCTURE OF UK SALES ABROAD, 1965-1984 (million)

			1965	1968	1971	1974	1978	1981	1984
1.	Licensed sales	(L)	575	1,023	1,307	2,114	3,797	4,618	4,797
2.	Direct investment sales	(I)	3,597	4,772	5,699	8,568	17,299	23,022	34,335
3.	Exports	(X)	2,846	3,762	5,556	9,314	19,060	24,142	32,434
4.	Foreign Production	(L+I)	4,172	5,795	7,006	10,682	21,096	27,640	39,132
5.	Total Foreign Sales	(L+I+X)	7,018	9,557	12,562	19,996	40,156	51,782	71,566
6.	Exports as a Percentage of Total Foreign Sales	$\frac{X}{L+I+X}$	40.5	39.4	44.2	46.6	47.5	46.6	45.3
7.	Foreign Production as a Percentage of Total Foreign Sales	$\frac{L+I}{L+I+X}$	59.4	60.6	55.8	53.4	52.5	53.4	54.7
8.	Direct investment sales as a Percentage of Total Foreign Sales	$\frac{I}{L+I+X}$	51.3	49.9	45.4	42.8	43.0	44.5	48.0
9.	Licensed Sales as a Percentage of Foreign Production	$\frac{L}{L+I}$	13.8	17.7	18.7	19.8	18.0	16.7	12.2
10.	Licensed Sales as a Percentage of Total Foreign Sales	$\frac{L}{L+I+X}$	8.2	10.7	10.4	10.6	9.5	8.9	6.7

[SOURCES: Business Monitor MA4 and M4, and Supplements, Business Monitor MO4, Annual Abstract of Statistics (Various Editions)] of overseas assets, used to estimate direct investment sales, are only estimated trienially by the DTI, the figures for all three forms of foreign sales were calculated at three yearly intervals, from 1965 to 1974 and from 1978 to 1984.[9] The values of UK exports for these years were obtained from the 'External Trade Statistics' published annually as part of the CSO's Annual Abstract of Statistics. The figures relate to manufactured goods, in order to maintain comparability with the other data.[10] An adjustment was made to remove the exports from subsidiaries of foreign companies based in the UK, since the aim was to determine the value of the export sales of UK companies alone. This was achieved by using the figures for the percentage of UK exports from foreign-owned companies which were published in Business Monitor MA4 up to 1981.[11]

Table 9-2 shows that sales from direct investment made up the largest component of the UK's total foreign sales in 1965, 1968 and 1971, but were then overtaken by exports which made up the largest component in 1974, 1978 and 1981. This ranking was reversed in 1984, when direct investment sales overtook exports once again. It is reasonable to presume that the relative decline in manufactured exports between 1981 and 1984 was symptomatic of the weakening of the UK economy's manufacturing base in the early 1980s, reflected in the first ever peacetime defecit in UK manufactured trade being recorded in 1983.[12]

Licensed sales accounted for the smallest proportion of total foreign sales in all years. However, as Buckley and Davies (1979, pp17-18) point out, the importance of licensing is likely to be under-estimated since the figures for direct investment are heavily weighted with long-standing investments, while the generally short-term nature of licensing agreements means that licensed sales are associated almost exclusively with relatively recent ventures.

The proportion of licensed sales to total foreign sales increased between 1965 and 1968 and then appears to have levelled off before declining noticeably in 1984. A similar pattern is reflected in the trend over time of the proportion of licensed sales to foreign production. It would therefore appear that licensing was less significant as a foreign market-servicing strategy in the mid-1980s than it was in the mid-1960s.

The data in Table 9-2 gives an aggregate picture of the foreign sales of UK companies as a whole. To find out if this overall picture masked any important differences between industries and geographical areas, the data was disaggregated on the basis of these two variables. This analysis of the industrial and geographical distribution of overseas sales was conducted over a shorter time series, ie the years 1974, 1978, 1981 and 1984.

9.2.4 The Industrial Composition of Licensing, Exporting and FDI

Estimating licensed sales from the disaggregated data posed an additional problem, which stems from the fact that the DTI's annual inquiry does not cover all companies with royalty transactions. The royalty data which is disaggregated by industry and by geographical area only represents the transactions of companies which responded to the DTI inquiry, and are referred to as the "returns received"; the aggregated royalty data, on the other hand, represents estimates for all UK companies.

In using the disaggregated data it was therefore necessary to 'gross-up' the royalty figures to take account of non-response. The level of non-response associated with technological and mineral royalties from unrelated concerns was determined by calculating the proportion of "returns received" for both categories of royalty to the estimates of technological and mineral royalties for all companies.[13] This ratio was then used to gross up the disaggregated royalty data. The value of licensed sales for each industry group was then estimated by applying the 5 per cent royalty estimate (ie multiplying the grossed-up royalties by 20).[14]

Direct investment sales were estimated by multiplying the book values of overseas assets for each industry group by the sales/overseas assets ratios of the equivalent US industries, derived from the 1982 Benchmark Survey of US FDI [Whichard and Shea

(1985)].[15] The use of a different ratio for each industry group avoided any distortion which would have been caused by the use of a common ratio across all industries.[16]

Exports for 1978, 1981 and 1984 were estimated using data drawn from the Business Monitor MQ10 series which analyses the UK's overseas trade in terms of industries.[17] In the absence of any data from this source for 1974, exports were estimated by firstly calculating the proportion of UK-owned exports to total exports for each industry group, based upon export data published in the 1974 edition of Business Monitor MA4. These proportions were then applied to the total value of UK manufacturing exports for 1974 to derive the estimated industry breakdown.[18]

The estimated industrial breakdown of licensed sales, direct investment sales and exports, for the years 1974, 1978, 1981 and 1984, is shown in Table 9-3. It is apparent that particular forms of market-servicing dominate certain industries. Exports accounted for the highest proportion of foreign sales in the majority of industries in each of the four years apart from 1984, when it was over-taken by direct investment. Licensing accounted for the smallest proportion of foreign sales in all industries in each of the four years, with the exception of shipbuilding in 1981, when it ranked above the other two business methods.[19]

Exports were the most popular form of market penetration in the metal manufacture, motor vehicles, mechanical and instrument engineering, electrical engineering, and textiles sectors. Sales via direct investment were most prevalent in the food, drink and tobacco, chemicals and allied, paper printing and publishing, and rubber industries. Although licensing was the least important form of market servicing, it was clearly more significant in some sectors than in others; in the chemicals and allied, shipbuilding, paper printing and publishing and other manufacturing sectors, it often accounted for more than 10 per cent of total foreign sales.

The relatively high values of licensed sales recorded for the research-intensive chemicals and allied sector conflicts with the

TABLE 9-3

ESTIMATED LICENSED SALES, ESTIMATED SALES ARISING FROM FDI, AND EXPORTS (£ million) CLASSIFIED BY INDUSTRY

INDUSTRY GROUP	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORTS	TOTAL FOREIGN SALES	LICENSED SALES AS % OF TOTAL FOREIGN SALES	DIRECT INVESTMENT SALES AS % OF TOTAL FOREIGN SALES	EXPORTS AS % OF TOTAL FOREIGN SALES
1974							
Food, Drink, Tobacco	43	2,562	999	3,604	1.2	71.1	27.7
Chemicals and Allied industries	695	1,418	1,555	3,668	18.9	38.7	42.4
Metal manufacture	31	281	1,124	1,436	2.2	19.5	78.3
Mech. & Inst. Engineering	184	633	1,280	2,097	8.8	30.2	61.0
Electrical Engineering	217	921	1,130	2,268	9.6	40.6	49.8
Shipbuilding	N.A.	65	884	--	--	--	--
Motor Vehicles	60	227	767	1,054	5.7	21.5	72.8
Textiles, Leather, Clothing & Footwear	29	603	1,047	1,679	1.7	35.9	62.4
Paper, Printing & Publishing	110	541	272	923	11.9	58.6	29.5
Rubber	47	224	67	338	13.9	66.3	19.8
Other Manufacturing Industries	558	736	935	2,229	25.0	33.0	42.0
1978							
Food, Drink, Tobacco	176	5,492	1,638	7,306	2.4	75.2	22.4
Chemicals and Allied industries	837	3,644	2,897	7,378	11.3	49.4	39.3
Metal manufacture	69	558	1,431	2,058	3.4	27.1	69.5
Mech. & Inst. Engineering	552	912	4,376	5,840	9.5	15.6	74.9
Electrical Engineering	371	1,658	2,643	4,672	7.9	35.5	56.6
Shipbuilding	N.A.	87	204	--	--	--	--
Motor Vehicles	96	350	2,983	3,429	2.8	10.2	87.0
Textiles, Leather, Clothing & Footwear	32	857	1,435	2,324	1.4	36.9	61.7
Paper, Printing & Publishing	145	1,038	532	1,715	8.5	60.5	31.0
Rubber	30	451	582	1,063	2.8	42.4	54.8
Other Manufacturing Industries	1,141	1,514	1,780	4,435	25.7	34.2	40.1

N.A. = Data not available
-- = Cannot be computed from available data

TABLE 9-3 (Contd.)

ESTIMATED LICENSED SALES, ESTIMATED SALES ARISING FROM FDI, AND EXPORTS (£ million) CLASSIFIED BY INDUSTRY

INDUSTRY GROUP	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORTS	TOTAL FOREIGN SALES	LICENSED SALES AS % OF TOTAL FOREIGN SALES	DIRECT INVESTMENT SALES AS % OF TOTAL FOREIGN SALES	EXPORTS AS % OF TOTAL FOREIGN SALES
1981							
Food, Drink, Tobacco	250	7,234	2,017	9,501	2.6	76.2	21.2
Chemicals and Allied industries	1,649	5,575	4,017	11,241	14.7	49.6	35.7
Metal manufacture	45	330	2,016	2,391	1.9	13.8	84.3
Mech. & Inst. Engineering	485	1,318	5,499	7,302	6.6	18.1	75.3
Electrical Engineering	328	2,238	3,457	6,023	5.4	37.2	57.4
Shipbuilding	284	25	126	435	65.3	5.7	29.0
Motor Vehicles	86	852	4,005	4,943	1.8	17.2	81.0
Textiles, Leather, Clothing & Footwear	27	962	1,606	2,595	1.0	37.1	61.9
Paper, Printing & Publishing	161	1,087	676	1,924	8.4	56.5	35.1
Rubber	27	825	778	1,630	1.7	50.6	47.7
Other Manufacturing Industries	787	1,815	2,078	4,680	16.8	38.8	44.4
1984							
Food, Drink, Tobacco	372	7,387	2,567	10,326	3.6	71.5	24.9
Chemicals and Allied industries	1,566	8,724	6,013	16,303	9.6	53.5	36.9
Metal manufacture	57	788	2,617	3,462	1.6	22.8	75.6
Mech. & Inst. Engineering	219	2,374	5,908	8,501	2.6	27.9	69.5
Electrical Engineering	229	3,389	6,058	9,676	2.4	35.0	62.6
Shipbuilding	N.A.	N.A.	327	--	--	--	--
Motor Vehicles	762	N.A.	4,793	--	--	--	--
Textiles, Leather, Clothing & Footwear	91	N.A.	2,011	--	--	--	--
Paper, Printing & Publishing	265	1,177	1,019	2,461	10.8	47.8	41.4
Rubber	N.A.	N.A.	959	--	--	--	--
Other Manufacturing Industries	614	6,674	2,540	9,828	6.3	67.9	25.8

N.A. = Data not available
-- = Cannot be computed from available data

views expressed by theorists who belong to the internalisation school of thought [eg Buckley and Casson (1976), Rugman (1981), Magee (1977)]. These authors hold that the inherent difficulties of exploiting the fruits of R&D via licensing agreements make internal markets superior vehicles for extracting economic rents. One possible explanation for the relatively high values of licensed sales in the chemicals and allied sector is the prevalence of reciprocal licensing agreements, which oblige companies to license any new technologies to their competitors.

It should be noted, however, that the pattern of overseas sales in other sectors could be used to support the predictions of the internalisation theorists. For example, it could be hypothesised that companies in the food, drink and tobacco sector would be expected to have a strong preference for FDI over licensing; these companies typically incur high advertising expenditures to differentiate their products, and would therefore have a strong preference for wholly-owned subsidiaries in order to ensure strict quality control procedures to protect their brand names. It could therefore be argued that the low proportions of licensed sales recorded for this sector, and the correspondingly high proportions recorded for direct investment sales, support the internalisation perspective.

To determine whether there was any association between the three forms of overseas sales across industries, Spearman rank-order correlation coefficients were calculated between the three possible pairings of overseas sales (see Appendix 9.1).[20] Only the Spearman coefficients between direct investment sales and exports were found to be significant. High negative values were calculated for each of the four years, indicating that a high level of direct investment sales was associated with a low level of exports.

The analysis of the industrial breakdown of UK overseas sales was taken a stage further by identifying sectors in which particular modes of business were predominant. Following Byrne (1980) it was decided to classify industries as export- or FDI-dominated if 70 per cent of their overseas sales were derived from either of these modes of business. Industries were classified as licensing-dominated if licensed sales accounted for more than 10 per cent of overseas sales, and neither of the other two business modes accounted for more than 60 per cent individually. Any industries which did not fit into either of these three categories were classified as having no dominant mode of UK foreign involvement.

The results of this classification exercise are shown in Table 9-4. Among the noticeable features of this table is the fact that food, drink and tobacco was the only sector which was classified as FDI-dominated, a position which it occupied in each of the four years. Apart from other manufacturing industries, the sector most frequently classified as licensing-dominated was chemicals and allied, which was listed under this heading in every year other than 1984, when it came under the heading of 'no dominant mode'. This change in classification was due to a gradual increase in the relative share of overseas sales accounted for by direct investment, a trend which is evident in Table 9-3. The paper, printing and publishing sector was classified as licensing-dominated in 1974, but was then listed under 'no dominant mode' in 1978 and 1981. By 1984, however, the relative proportion of licensed sales had increased such that the sector was once again classified as licensing-dominated.

Apart from the metal manufacture and motor vehicles sectors, which were classified as export-dominated in most years, the other sectors were more often than not classified as having no dominant mode of business.

9.2.5 The Geographical Composition of Licensing, Exporting And FDI

The estimation of the geographical breakdown of licensed sales involved a number of additional steps over and above those involved in calculating the industrial breakdown of licensed sales. This stemmed from the fact that the royalty data was categorised differently, and also from the need to eliminate royalties associated with non-manufacturing activities.

TABLE 9-4

UK INDUSTRIAL SECTORS CLASSIFIED BY RELATIVE DOMINANCE OF LICENSED SALES, DIRECT INVESTMENT SALES AND EXPORT SALES IN OVERSEAS MARKETS

	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORT SALES	NO DOMINANT MODE
1974	Chemicals & Allied Paper, Printing, Publ. Other Manuf. Inds.	Food, Drink, Tobacco	Metal Manufacture Motor Vehicles	Mech. & Inst. Engin. Electrical Engin. Textiles, Leather, etc. Rubber
1978	Chemicals & Allied Other Manuf. Inds.	Food, Drink, Tobacco	Mech. & Inst. Engin. Motor Vehicles	Metal Manufacture Electrical Engin. Textiles, Leather, etc. Paper, Printing, Publ. Rubber
1981	Chemicals & Allied Shipbuilding Other Manuf. Inds.	Food, Drink, Tobacco	Metal Manufacture Mech. & Inst. Engin. Motor Vehicles	Electrical Engin. Paper, Printing, Publ. Rubber
1984	Paper, Printing, Publ.	Food, Drink, Tobacco	Metal Manufacture	Chemicals & Allied Mech. & Inst. Engin. Electrical Engin. Other Manuf. Inds.

The first step taken in the estimation process was to calculate the proportion of total royalties in each area which were received from unrelated concerns. The second step involved multiplying the values of technological and mineral royalties disclosed for each area by this proportion, which gave values for technological and mineral royalties from unrelated concerns. The third step involved calculating the proportion of manufacturing royalties to total royalties. On the assumption that this ratio was constant across all areas it was applied to the values obtained from the second step to derive the values of unrelated manufacturing technological and mineral royalties in each area.

The fourth step involved grossing-up these values to take account of non-response. This was done on the basis of the ratio of total "returns received" for unrelated technological and mineral royalties to the estimates of total unrelated technological and mineral royalties for all companies. The fifth and final step in the estimation process involved multiplying the values calculated up to this point by 20 (on the assumption of an average 5 per cent royalty rate) to derive values for licensed sales in each area.

The values of direct investment sales in each area were estimated by multiplying the book values of overseas manufacturing assets by the US sales/overseas assets ratios for those areas. These ratios were derived from the 1982 Benchmark Survey of US FDI [Whichard and Shea (1985)] and it was assumed that these ratios were constant across the four years for which figures were calculated.[21]

Data on the value of UK manufactured exports by destination were obtained from the GSS publication Overseas Trade Statistics of the United Kingdom, now published annually in the Business Monitor series as MA20.[22] The raw data was deflated by a common factor in each of the four years to eliminate exports by non-UK-owned companies.[23]

The estimated geographical breakdown of licensed sales, direct investment sales and exports for the years 1974, 1978, 1981 and 1984 is shown in Table 9-5.[24] It is apparent that the pattern of UK foreign involvement varies across different markets. Exports accounted for the largest component of foreign sales in Western Europe and the Rest of the World. The proportion of UK exports to Western Europe increased over the years studied, mainly due to an increase in exports to the EEC countries. Commensurate with this increase in exports, direct investment sales in EEC countries declined, a finding which is not surprising in view of the UK's entry to the EEC in 1972 and the consequent elimination of the common external tariff barrier.

These trends in the UK's direct investment sales and export sales to EEC countries are the opposite of those commonly associated with sales to countries which become part of a customs union. For example, there is evidence which suggests that the sales achieved by the European subsidiaries of US MNCs increased relative to export sales in the years following the creation of the EEC [see Hood and Young (1979, pp 174-175)]. A similar trend could be expected to be found for the UK's sales to the smaller European customs union, EFTA, given the need to pay an external tariff on exports to EFTA countries. The figures do show a gradual increase in the proportion of direct investment sales to EFTA countries and a gradual, though far less marked, relative decline in export sales, which started from a very high base in 1974.

The proportion of the UK's foreign sales accounted for by exports in the Rest of the World has remained relatively unchanged over the period under study. The countries which make up this category are the less developed countries, including the newly industrialising countries. It is noticeable that the proportion of UK sales accounted for by licensing in these countries was virtually unchanged between 1974 and 1978, and increased slightly in 1981; however, between 1981 and 1984 there was a noticeable decline in the proportion of licensed sales, from 10.4 per cent to 6.3 per cent, almost entirely at the expense of an increase in direct investment sales.

This trend appears to contradict the views of some economists,

TABLE 9-5

ESTIMATED LICENSED SALES, ESTIMATED SALES ARISING FROM FDI, AND EXPORTS (million) CLASSIFIED BY GEOGRAPHICAL AREA

AREA/COUNTRY	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORTS	TOTAL FOREIGN SALES	LICENSED SALES AS % OF TOTAL FOREIGN SALES	DIRECT INVESTMENT SALES AS % OF TOTAL FOREIGN SALES	EXPORTS AS % OF TOTAL FOREIGN SALES
1974							
Western Europe	582	2,789	4,672	8,043	7.2	34.7	58.1
EEC	433	2,486	3,019	5,938	7.3	41.9	50.8
EFTA	80	180	1,300	1,560	5.1	11.6	83.3
Other	69	123	353	545	12.7	22.5	64.8
North America	490	1,507	1,326	3,323	14.7	45.4	39.9
Canada	22	512	294	828	2.7	61.8	35.5
US	468	995	1,032	2,495	18.8	39.9	41.3
Other Developed Countries	333	2,356	1,078	3,767	8.8	62.6	28.6
Australasia	41	1,413	552	2,006	2.1	70.4	27.5
Japan	240	24	184	448	53.6	5.4	41.0
South Africa	52	919	342	1,313	4.0	70.0	26.0
Rest of the World	372	1,056	2,503	3,931	9.5	26.9	63.6
World Total	1,777	7,708	9,579	19,064	9.3	40.4	50.3
1978							
Western Europe	730	5,607	10,323	16,660	4.4	33.7	61.9
EEC	515	4,987	7,125	12,627	4.1	39.5	56.4
EFTA	92	415	2,639	3,146	2.9	13.2	83.9
Other	123	205	559	887	13.9	23.1	63.0
North America	874	4,218	2,355	7,447	11.7	56.7	31.6
Canada	32	916	421	1,369	2.3	66.9	30.8
US	842	3,302	1,934	6,078	13.9	54.3	31.8
Other Developed Countries	653	3,524	1,380	5,557	11.8	63.4	24.8
Australasia	57	2,083	681	2,821	2.0	73.8	24.2
Japan	562	79	298	939	59.9	8.4	31.7
South Africa	34	1,362	401	1,797	1.9	75.8	22.3
Rest of the World	912	2,154	6,383	9,449	9.7	22.8	67.5
World Total	3,169	15,503	20,441	39,113	8.1	39.6	52.3

TABLE 9-5 (Contd.)

ESTIMATED LICENSED SALES, ESTIMATED SALES ARISING FROM FDI, AND EXPORTS (£ million) CLASSIFIED BY GEOGRAPHICAL AREA

AREA/COUNTRY	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORTS	TOTAL FOREIGN SALES	LICENSED SALES AS % OF TOTAL FOREIGN SALES	DIRECT INVESTMENT SALES AS % OF TOTAL FOREIGN SALES	EXPORTS AS % OF TOTAL FOREIGN SALES
1981							
Western Europe	633	6,227	11,805	18,665	3.4	33.4	63.2
EEC	386	5,589	8,817	14,792	2.6	37.8	59.6
EFTA	96	428	2,394	2,918	3.3	14.7	82.0
Other	151	210	594	955	15.8	22.0	62.2
North America	1,102	7,198	2,873	11,173	9.9	64.4	25.7
Canada	83	1,260	439	1,782	4.7	70.7	24.6
US	1,019	5,938	2,434	9,391	10.9	63.2	25.9
Other Developed Countries	874	4,103	1,783	6,760	12.9	60.7	26.4
Australasia	50	2,334	673	3,057	1.6	76.4	22.0
Japan	771	89	343	1,203	64.1	7.4	28.5
South Africa	53	1,680	767	2,500	2.1	67.2	30.7
Rest of the World	1,200	2,727	7,619	11,546	10.4	23.6	66.0
World Total	3,809	20,255	24,080	48,144	7.9	42.1	50.0
1984							
Western Europe	891	8,207	16,512	25,610	3.5	32.0	64.5
EEC	524	7,312	12,549	20,385	2.6	35.9	61.5
EFTA	142	851	3,087	4,080	3.5	20.8	75.7
Other	225	44	876	1,145	19.7	3.8	76.5
North America	1,458	12,179	5,118	18,755	7.8	64.9	27.3
Canada	88	2,544	597	3,229	2.7	78.8	18.5
US	1,370	9,635	4,521	15,526	8.8	62.1	29.1
Other Developed Countries	919	6,002	2,210	9,131	10.1	65.7	24.2
Australasia	117	3,907	951	4,975	2.4	78.5	19.1
Japan	719	512	512	1,743	41.4	29.3	29.3
South Africa	83	1,583	747	2,413	3.4	65.6	31.0
Rest of the World	818	3,544	8,618	12,980	6.3	27.3	66.4
World Total	4,086	29,932	32,458	66,476	6.2	45.0	48.8

reported by Oman (1981, 1984), that FDI was becoming superceded by "new" forms of investment in the North-South context.[25] It also lends support to the hypothesis that the debt crisis of the early 1980's reduced the ability of LDC's to finance "new" forms of investment, thus making equity investment relatively more attractive.

Sales arising from direct investment accounted for the major part of the UK's foreign sales in North America and Other Developed Countries. Within North America, more UK sales to Canada were financed by direct investment than were UK sales to the US, although this gap between Canada and the US narrowed over the period studied. Of the three Other Developed Countries, Australasia (ie Australia and New Zealand) accounted for the bulk of the UK's direct investment sales.

Sales from licensing accounted for the smallest percentage of the UK's foreign sales in all markets with the exception of Japan. In Japan, licensed sales were of great significance to UK companies; in 1974, 1978 and 1981 they accounted for more than 50 per cent of total sales, although this value declined to 41.4 per cent in 1984.[26] The fact that the Japanese market has been difficult to penetrate by means of FDI and exports, because of government intervention, may account in large measure for the significance of licensing, although cultural differences are also likely to have played a role by making FDI less attractive.

The levels of rank-order correlation between licensed sales and both direct investment sales and exports were found to be low and not statistically significant when calculated across geographic areas; significant Spearman correlations were only found between direct investment sales and exports (see Appendix 9.1).[27]

Having estimated the breakdown of the UK's overseas sales by geographic area, the analysis was then taken a stage further by classifying these areas according to the dominant mode of business. The classification criteria employed were the same as those used for the industry classification. The results are shown in Table 9-6.

TABLE 9-6

OVERSEAS MARKETS CLASSIFIED BY RELATIVE DOMINANCE OF LICENSED SALES, DIRECT INVESTMENT SALES AND EXPORT SALES

	LICENSED SALES	DIRECT INVESTMENT SALES	EXPORT SALES	NO DOMINANT MODE
1974	US JAPAN	AUSTRALASIA SOUTH AFRICA	EFTA	EEC OTHER WESTERN EUROPE CANADA REST OF WORLD
1978	US JAPAN	AUSTRALASIA SOUTH AFRICA	EFTA	EEC OTHER WESTERN EUROPE CANADA REST OF WORLD
1981	JAPAN	CANADA AUSTRALASIA	EFTA	EEC OTHER WESTERN EUROPE US SOUTH AFRICA REST OF WORLD
1984	JAPAN	CANADA AUSTRALASIA	EFTA OTHER WESTERN EUROPE	EEC US SOUTH AFRICA REST OF WORLD

It is clear from the table that the majority of the areas had no dominant mode of business for the period under study. Present and past Commonwealth countries feature under the 'FDI-dominated category'; this reflects both the legacy of past overseas investment by UK companies in Commonwealth countries, and also the importance of Commonwealth ties in reducing the risks associated with investing overseas.

The table also highlights the importance of Japan as a source of licensing revenues. It is interesting to note that the US was also classified as 'licensing-dominated' in 1974 and 1978, but reverted to the 'no dominant mode' category thereafter as direct investment sales became relatively more significant.

9.3 CONCLUSIONS

Despite the limitations of the data which have been analysed, a number of important conclusions can be drawn about the market-servicing behaviour of UK companies.

Firstly, the income received by UK companies from non-equity international business, insofar as it is reflected in royalty receipts from both unrelated and related overseas concerns, has grown steadily since 1964. The former category of royalties have always exceeded the latter, although there has been a noticeable increase in the proportion of royalties received from related concerns in the early 1980s.

Secondly, exports and direct investment sales accounted for roughly similar amounts of the UK's overseas sales over the entire period under study, with direct investment sales becoming more prevalent by 1984. Sales generated from licensing have always constituted the smallest proportion of total foreign sales; this has varied over time, from a high of 10.7 per cent in 1968 to a low of 6.7 per cent in 1984, but is still sufficiently large enough to merit serious attention.

Thirdly, the relative importance of sales from licensing, FDI and exports varies widely across industries and markets, suggesting that industry-specific and market-specific factors may have an influence on the form of market-servicing. There is also evidence that licensed sales are not associated with either direct investment sales or export sales, which suggests that they may require separate explanation.

The analysis of the international business activities of UK companies which has been presented in this chapter has had to be cast at a high level of aggregation, in view of the data which was available. Nevertheless, these results provide a useful backdrop for the micro level analysis of UK companies which follows in the remaining chapters..

CHAPTER NINE

NOTES

1. "Related" concerns are defined as "overseas parent companies, overseas branches, overseas subsidiaries or overseas associates of the reporting concern" [HMSO (1983, p4)]. Comparisons with years prior to 1979 are distorted by a change which occurred that year in the classification of "overseas fellow subsidiaries", ie "overseas concerns which have the same ultimate overseas parent company as overseas owned UK companies and branches, but which have no direct interest in the UK concern" (Op cit, p4). Prior to 1979 these subsidiaries were treated as unrelated concerns, but are now treated as related concerns.

2. The 1981 paper by Buckley and Davies is simply a reformulation of their 1979 paper with data for an additional two years included in their analysis.

3. The royalty figures that are published in the Business Monitor MA4 series are on an after-tax basis, ie they have had, where appropriate, UK or overseas tax deducted.

4. The proportion of royalties derived from non-manufacturing activities in each of the seven years between 1965 and 1984 were as follows:

   1965 - 14.2%
   1968 - 14.9%
   1971 - 19.1%
   1974 - 21.3%
   1978 - 27.4%
   1981 - 20.0%
   1984 - 28.1%

   These figures were used to deflate the technological and mineral royalty figures to obtain values for licensing royalties in each of these years. The figures reveal that the proportion of royalties from non-manufacturing activities varied between 14.2% and 28.1% over this time period, which illustrates the flaw in the Buckley and Davies assumption of a constant 20% proportion of royalties from non-manufacturing activities.

5. The assumption of a 5 per cent average royalty rate was employed by Buckley and Davies (1979,1981), Davies and Rosser (1984) and Buckley and Prescott (1989) without any justification being provided for the appropriateness of this particular figure. Byrne (1980) used a 3 per cent figure on the basis of Telesio's (1979) results. The use of a 5 per cent royalty rate in the present study is justified on the basis of the responses to those questions in Section II of the questionnaire concerning royalty rates (see Appendix B).

6. The value of overseas manufacturing assets could not be obtained for 1965 and 1968, so they were estimated by multiplying the value of total overseas assets for these two years (which were available) by the average of the ratios of 'manufacturing to total overseas assets' in 1971 and 1974. The ratios in both of these years turned out to be 60%, so this was the figure which was used in the estimation procedure. The ratios for the years 1978, 1981 and 1984 were excluded from the calculation of the average ratio because the number of industries included in the DTI survey was expanded in 1978, thereby distorting the ratios calculated from then on.

7. Byrne (1980) did not provide any justification for his use of a 2:1 sales/overseas assets ratio, but it is reasonable to presume that it was derived from Polk et al.

8. Brereton's (1986) article in the Survey of Current Business provided data on the sales and overseas assets of the foreign affiliates of US MNCs for the years 1977, 1982, 1983 and 1984. The sales/overseas assets ratios for these years were 1.322, 1.245, 1.180 and 1.183 respectively. These figures are lower than Belli's (1970) ratio for 1965 of 2.189, and seem to indicate a decline in the ratio over time. However, because of the absence of any data between 1965 and 1977 it was decided to use the average of the five available US ratios, 1.424, and apply this to the figures for UK overseas assets from 1965 to 1984. This ratio is very close to the average ratio employed by Buckley and Prescott (1989, p193) of "approximately 1.4:1."

9. The four year gap between 1974 and 1978 was caused by the expansion in the coverage of the inquiry in 1978, which included results from oil companies and banks for the first time (insurance companies were added in 1981).

10. In the Annual Abstract of Statistics exports are classified by industry in accordance with the Standard International Trade Classification (Revision 2), in which 'manufactured goods' occupy sections 5 to 8.

11. The percentage of total UK exports accounted for by UK-owned companies were as follows for the years indicated below:

1971 - 71%
1974 - 70%
1978 - 68%
1981 - 69%

The publication of export figures in Business Monitor MA4 was discontinued after 1981 because the 1981 Companies Act no longer required companies to publish the value of their exports in their accounts, thus making it impossible for the DTI to include estimates for companies which did not respond to their voluntary inquiry. As no clear trend is apparent in the four values shown above, the average value of these values, 69.5%, was assumed to represent the percentage of total exports from UK-owned companies in 1984. This value was also applied to the export figures for 1965 and 1968, in the absence of data for these two years.

12. The existence of a trend away from manufacturing exports towards direct investment sales in the early 1980s is supported by a report which was published in 1983, disclosing that overseas production rose by 24% between 1980 and 1982, whereas exports only rose by 9.7% over the same period [Labour Research (1983)].

13. The ratios used for grossing-up, expressed in percentage terms, were as follows for the four years indicated:

1974 - 74.2%
1978 - 69.7%
1981 - 67.4%
1984 - 69.9%

The "returns received" from unrelated concerns are not split up into the two royalty categories ("technological and mineral" and "printed matter etc") and so the numerator of the ratio used for grossing-up relates to both activities.

14. It should be noted that the rather crude assumption of a 5% royalty rate across all industries may provide a distored picture of the industrial breakdown of licensed sales if royalty rates vary across different industries.

15. US industry ratios from the 1982 Benchmark Survey were used because of the scarcity of disaggregated data from other sources; data from the 1982 Benchmark Survey were also used by Buckley and Prescott (1989) to estimate overseas sales from UK direct investment over the period 1975 to 1983. It is realised, nevertheless, that the application of common US industry ratios to the years 1974, 1978, 1981 and 1984 in this study may have distorted the values of UK direct investment sales over time for those industries in which industry ratios are likely to have changed.

16. Both the US SIC and the UK SIC are based upon the UN's International Standard Industrial Classification (ISIC). US industry groups are therefore very similar to UK industry groups, and so the US industry ratios are likely to be close proxies for their UK equivalents.

17. The exports for each industry group were adjusted downwards by a common factor in each of the three years to eliminate exports from non UK-owned companies. This was achieved by multiplying the export values by the ratios of UK-owned to total UK exports derived from Business Monitor MA4 (see note 11).

18. The total value of manufacturing exports published in Business Monitor MA4 for 1974 only related to the returns received from the DTI's inquiry. An estimate of the actual value was therefore obtained by adjusting the value of total manufacturing exports published in the Annual Abstract of Statistics. This adjustment involved a grossing-up of the data to account for the fact that the Annual Abstract of Statistics uses the Standard International Trade Classification (SITC) rather then the SIC.

19. Data on the extent of all three forms of market servicing in the shipbuilding sector could only be obtained for 1981.

20. For 1974, 1978 and 1981 the levels of correlation between the three forms of market servicing were calculated across ten industry groups; the shipbuilding sector was left out of the 1981 calculations in order to maintain comparability with the previous two years. In 1984, data was available for only seven sectors.

21. Since it was impossible to calculate a sales/overseas assets ratio for the US from the 1982 Benchmark Survey data, the sales/overseas assets ratio for the UK was used instead. It was therefore assumed that UK companies generated the same amount of sales from their US assets as US companies generated from their UK assets.

22. The exports data for 1984 were derived from the Annual Statement of the Overseas Trade of the United Kingdom, which was discontinued after 1985. Data for the subsequent years were derived from its replacement, the Overseas Trade Statistics of the United Kingdom. Both publications use the SITC to categorise industries, so UK manufacturing exports were defined as sections 5 to 8 of the SITC.

23. This elimination of manufacturing exports by non-UK-owned companies was achieved using appropriate data from the Business Monitor MA4 series (see note 11).

24. The values relating to the EEC and EFTA are based upon the membership of these customs unions for the years in question. Thus, the EEC data is based the following countries: Belgium, Luxembourg, Denmark, France, Irish Republic, Italy, Netherlands and West Germany, with Greece added on in 1984. The data relating to EFTA is based upon the following countries: Austria, Finland, Norway, Portugal, Sweden and Switzerland, with Iceland added on in 1984.

25. Oman (1984, p32) argued that the hypothesis that new forms of investment were superceding FDI in the North-South context had "yet to be proved". He also surmised (p33) that many of the LDCs which in the 1970s had adopted strategies of debt-financed growth and greater use of the new forms of investment were more likely to place a greater reliance on traditional FDI in the 1980s as it would become the more cost-effective means of obtaining investment resources.

26. Buckley and Prescott (1989), who analysed the structure of the UK's sales to individual countries within the EEC and EFTA, found that Spain and Italy were important markets for UK licensed sales, although both were much less significant than Japan.

27. In calculating the Spearman rank-order correlations across geographic areas, seven categories were used: EEC, EFTA, Other Western Europe, Canada, US, Other Developed Countries and Rest of the World.

REFERENCES

BELLI, R.D., 'Sales of Foreign Affiliates of US Firms 1961-5, 1967 and 1968', Survey of Current Business, October 1970.

BRERETON, B., 'US Multinational Companies: Operations in 1984', Survey of Current Business, September 1986, pp 27-38.

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

BUCKLEY, P.J. & DAVIES, H., 'The Place of Licensing in the Theory and Practice of Foreign Operations', University of Reading Discussion Paper in International Investment and Business Studies, No. 47, November 1979.

BUCKLEY, P.J. & DAVIES, H., 'Foreign Licensing In Overseas Operations: Theory and Evidence From The U.K.', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer And Economic Development, London: JAI Press Inc., 1981, pp 75-89.

BUCKLEY, P.J. & PRESCOTT, K., 'The Structure of British Industry's Sales in Foreign Markets', Managerial and Decision Economics, Vol 10, 1989, pp 189-208.

BYRNE, J.F., The Sale, Pricing and Management of the Transfer of Company Know-How in International Business, Unpublished PhD Thesis, Manchester Business School, January 1980.

CLEGG, J., Multinational Enterprise and World Competition, London: Macmillan, 1987.

DAVIES, H. & ROSSER, N., 'International Trade in Technology: A Survey', in Lowe, J. & Crawford, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon Press, 1984, pp 187-209.

DUNNING, J.H. & CANTWELL, J.A., 'Joint Ventures and Non-Equity Foreign Involvement by British Firms with Particular Reference to Developing Countries: An Exploratory Study', University of Reading Discussion Paper in International Investment and Business Studies, No. 68, 1981.

DUNNING, J.H. & PEARCE, R.D., 'Some Observations on the New Forms of International Resource Transfer', UNCTC Report, January 1982. (Mimeographed).

HMSO, Annual Abstract of Statistics, London: Central Statistical Office. (Various issues).

HMSO, Business Monitor MA4: Overseas Transactions, and its predecessor M4, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MO4: Census Of Overseas Assets, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MQ10: Overseas Trade Analysed In Terms Of Industries, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MA20: Overseas Trade Statistics of the United Kingdom, London: Business Statistics Office. (Various issues).

HOOD, N. & YOUNG, S., The Economics of Multinational Enterprise, London: Longman, 1979.

LABOUR RESEARCH DEPARTMENT, 'Multinationals: Better at Exporting Jobs than Goods', Labour Research, April 1983, pp 97-99.

MAGEE, S.P., 'Multinational Corporations, the Industry Technology Cycle and Development', Journal of World Trade Law, July/August, 1977, pp 297-321.

OMAN, C., 'New North-South Investment Strategies', The OECD Observer, September 1981, pp 13-15.

OMAN, C., New Forms of International Investment in Developing Countries, Paris: OECD, 1984.

POLK, J., MEISTER, W. & VEIT L., US Production Abroad And The Balance of Payments, New York: The National Industrial Conference Board, 1966.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York:Praeger, 1979.

WHICHARD, O.G. & SHEA, M.A., '1982 Benchmark Survey of US Direct Investment Abroad', Survey of Current Business, December 1985, pp 37-45.

APPENDIX 9.1 CORRELATIONS BETWEEN FORMS OF UK OVERSEAS SALES

SPEARMAN RANK-ORDER CORRELATIONS ACROSS INDUSTRIES

1974	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	0.309	-0.406	--
Export Sales	-0.879*	--	
Direct Investment Sales	--		

1978	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	-0.148	-0.142	--
Export Sales	-0.915*	--	
Direct Investment Sales	--		

1981	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	0.285	-0.467	--
Export Sales	-0.964*	--	
Direct Investment Sales	--		

1984	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	0.607	-0.607	--
Export Sales	-1.000*	--	
Direct Investment Sales	--		

* Significant at the 0.01 level (two-tailed test).
All other values not significant at the 0.05 or 0.01 level.
Number of industries, N=10 (except 1984, N=7).

SPEARMAN RANK-ORDER CORRELATIONS ACROSS GEOGRAPHICAL AREAS

1974	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	-0.214	0.071	--
Export Sales	-0.964*	--	
Direct Investment Sales	--		

1978	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	-0.027	-0.098	--
Export Sales	-0.964*	--	
Direct Investment Sales	--		

1981	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	0.036	-0.143	--
Export Sales	-0.964*	--	
Direct Investment Sales	--		

1984	Direct Investment Sales	Export Sales	Licensed Sales
Licensed Sales	-0.286	0.286	--
Export Sales	-1.000*	--	
Direct Investment Sales	--		

* Significant at the 0.01 level (two-tailed test).
All other values not significant at the 0.05 or 0.01 level.
Number of areas, N=7.

CHAPTER TEN - CHARACTERISTICS OF THE COMPANY SAMPLE

CHAPTER TEN - CHARACTERISTICS OF THE COMPANY SAMPLE

10.1 INTRODUCTION

This chapter presents the key characteristics of the sample of companies which answered the questionnaire and depicts the nature of their involvement in international business generally, and licensing in particular. The data which are presented were obtained from both the questionnaire and secondary sources.

The basic research questions addressed in this chapter are as follows:

- What kinds of companies were in the sample?

  More specifically, how large were the companies, what industries did they operate in, and how active were they in R&D?

- What was the nature of the companies' involvement in international business?

  More specifically, what importance did they attach to FDI, joint ventures, exporting and licensing. Were these likely to change in the future, and did they vary in accordance with the type of country with which the companies conducted business?

- What kind of licensing agreements were the companies involved in?

  More specifically, were the agreements with independent firms or overseas subsidiaries, to what extent did involve patents, know-how and trademarks, and what were the relative income-generating capacities of these three forms of intellectual property?

10.2 SIZE, INDUSTRY AND R&D PROFILES

10.2.1 Size Profile

The total population was defined to be those companies making up the Times 1000 list of the largest UK companies for 1983-84, from which a smaller survey population of 322 companies was constructed. The size distribution of the 86 companies from which fully completed questionnaires were received is shown in Table 10-1. The table shows the number of companies falling into each decile of the total population of 1000 companies.

TABLE 10-1

SIZE DISTRIBUTION OF COMPANIES BY TIMES 1000 RANKING

Times 1000 Ranking	Number of Companies	Per Cent of Companies
1-100	26	30.2
101-200	14	16.3
201-300	9	10.5
301-400	11	12.8
401-500	5	5.8
501-600	4	4.7
601-700	4	4.7
701-800	4	4.7
801-900	6	7.0
901-1000	3	3.5
Total	86	100.0

It is evident from Table 10-1 that the respondent companies are clustered towards the upper deciles of the Times 1000. This clustering partly reflects the fact that most of the 322 companies comprising the survey population were resident in the upper reaches of the Times 1000.

The size distribution of the respondent companies by their worldwide turnover is shown in Table 10-2.[1]

TABLE 10-2

SIZE DISTRIBUTION OF COMPANIES BY GLOBAL TURNOVER

Global Turnover (£)		Number of Companies	Per Cent of Companies
Less than 100m	(small)	20	23.3
100m - 300m	(medium)	21	24.4
300m - 1 bn	(large)	23	26.7
1 bn and over	(very large)	22	25.6
Total		86	100.0

The four size categories in Table 10-2 were chosen as they provided four groups of approximately equal size. It should be recognised, however, that the companies were generally large in size, and the category labels (small, medium, large and very large) should be understood in this context.

The size distribution of the respondent companies by their number of worldwide employees is shown in Table 10-3.[2]

TABLE 10-3

SIZE DISTRIBUTION OF COMPANIES BY EMPLOYEES

Number of Employees		Number of Companies	Per Cent of Companies
Less than 3,000	(small)	20	23.3
3,000 - 10,000	(medium)	23	26.7
10,000 - 30,000	(large)	24	27.9
30,000 and over	(very large)	19	22.1
Total		86	100.0

Once again, the size categories were chosen in order to provide four groups of approximately the same size. In addition, it should be noted that the numbers of employees in the size categories are greater than are usually associated with the terms small, medium and large because the company sample is biased towards large companies. For example, Lowe and Crawford's (1984) study of licensing by small and medium sized UK companies covered employee numbers ranging up to only 500.

10.2.2 Industry Profile

The main industries in which the respondent companies operated are shown in Table 10-4. The companies have been classified in accordance with the Financial Times Actuaries (FTA) groups, which form the basis for the UK Stock Exchange's classification of industries.

It is evident from the thirty eight FTA groups in the table that the companies spanned a wide range of industries. The FTA group within which most companies were classified is 'Miscellaneous Mechanical Engineering', which is defined as encompassing "engineering contractors erecting plant and systems", and which accounted for twelve of the companies.[3] The next most popular FTA groups were 'Motor Components' and 'Pharmaceutical Products', accounting for six companies each.

In order to provide a more aggregate picture of the industrial breakdown of the companies, the FTA groups were re-classified into one of four broader categories: 'processing', 'engineering', 'textiles' and 'others'. These four categories were proposed by Pratten (1971) as a means of classifying manufacturing industries on the basis of the production processes which they employed. These categories are also similar to the "meta-groups" proposed by Sudersanam (1984) as a means of classifying companies into broader industrial groups such that the constituent companies exhibit homogeneity in terms of a number of industry-related economic variables.[4]

TABLE 10-4

DISTRIBUTION OF COMPANIES BY FTA INDUSTRY GROUP

FTA Industry Group	FTA Code	Number of Companies	Per Cent of Companies
Industrial Holding Company	11	5	5.8
Building Materials	14	3	3.5
Cement & Concrete	15	1	1.2
Contracting & Construction	18	3	3.5
Electricals (Excl Radio & TV)	19	3	3.5
Industrial plant etc	22	1	1.2
Mechanical Handling	23	1	1.2
Pumps & Valves	24	3	3.5
Steel & Chemical Plant	25	2	2.3
Misc Mechanical Engineering	27	12	14.0
Misc Engineering Contractors	29	2	2.3
Heating & Ventilating	30	2	2.3
Metallurgy	32	2	2.3
Special Steels	33	1	1.2
Radio & TV	36	1	1.2
Household Appliances	39	1	1.2
Kitchen & Tableware	40	1	1.2
Motor Components	41	6	7.0
Motor Distributors	42	1	1.2
Motor Vehicles	43	1	1.2
Breweries	45	1	1.2
General Food Manufacturing	49	3	3.5
Milling & Flour	50	1	1.2
Publishing & Printing	53	1	1.2
Packaging & Paper	54	1	1.2
Stores, Multiple	58	2	2.3
Clothing	59	1	1.2
Miscellaneous Textiles	62	2	2.3
Tobacco	63	1	1.2
Plastic & Rubber Fabricators	66	1	1.2
Pharmaceutical Products	67	6	7.0
General Chemicals	68	3	3.5
Office Equipment	69	1	1.2
Oil	70	1	1.2
Industrial Conglomerate	73	4	4.7
Laundries & Cleaners	74	1	1.2
Mining Finance	92	3	3.5
Overseas Trade	97	1	1.2
TOTAL		86	100.0

The way in which the thirty eight FTA industry groups were re-classified into the four broader categories of 'processing', 'engineering', 'textiles' and 'others' is shown in Table 10-5.

TABLE 10-5

DISTRIBUTION OF COMPANIES BY BROAD INDUSTRY GROUP

Broad Industry Group	FTA Code	Number of Companies	Per Cent of Companies
PROCESSING			
Building Materials	14	3	3.5
Cement & Concrete	15	1	1.2
Metallurgy	32	2	2.3
Special Steels	33	1	1.2
Breweries	45	1	1.2
General Food Manufacturing	49	3	3.5
Milling & Flour	50	1	1.2
Packaging & Paper	54	1	1.2
Tobacco	63	1	1.2
Plastic & Rubber Fabricators	66	1	1.2
Pharmaceutical Products	67	6	7.0
General Chemicals	68	3	3.5
Oil	70	1	1.2
Total		25	29.1
ENGINEERING			
Electricals (Excl Radio & TV)	19	3	3.5
Industrial plant etc	22	1	1.2
Mechanical Handling	23	1	1.2
Pumps & Valves	24	3	3.5
Steel & Chemical Plant	25	2	2.3
Misc Mechanical Engineering	27	12	14.0
Misc Engineering Contractors	29	2	2.3
Heating & Ventilating	30	2	2.3
Radio & TV	36	1	1.2
Household Appliances	39	1	1.2
Motor Components	41	6	7.0
Motor Vehicles	43	1	1.2
Total		35	40.7
TEXTILES			
Clothing	59	1	1.2
Miscellaneous Textiles	62	2	2.3
Total		3	3.5
OTHERS			
Industrial Holding Company	11	5	5.8
Contracting & Construction	18	3	3.5
Kitchen & Tableware	40	1	1.2
Motor Distributors	42	1	1.2
Publishing & Printing	53	1	1.2
Stores, Multiple	58	2	2.3
Office Equipment	69	1	1.2
Industrial Conglomerate	73	4	4.7
Laundries & Cleaners	74	1	1.2
Mining Finance	92	3	3.5
Overseas Trade	97	1	1.2
Total		23	26.7
OVERALL TOTAL		86	100.0

It is clear from Table 10-5 that the categories of 'engineering' (35 per cent) and "processing" (25 per cent) accounted for the bulk of the activities of the companies. The "textiles" category accounted for a very small proportion of the companies (only 3.5 per cent). The fourth category, represented by the label 'others', is essentially a residual grouping for those companies that did not fit into any of the other three categories.

10.2.3 Research and Development Profile

The breakdown of the company sample according to absolute R&D expenditure is shown in Table 10-6, which reports the data obtained from Question 2(a) in Section IV of the questionnaire. This question asked companies to estimate the amount devoted to R&D expenditure in the "last" accounting year (ie 1983/84). It was answered by 78 of the 86 companies in the sample.

TABLE 10-6

DISTRIBUTION OF COMPANIES BY ABSOLUTE LEVEL OF R&D EXPENDITURE

R&D Expenditure (£)	Number of Companies	Per Cent of Companies
Less than 1 m	18	23.1
1 m - 10 m	43	55.1
10 m - 50 m	11	14.1
50 m - 100 m	5	6.4
100 m and over	1	1.3
Total	78	100.0

The level of R&D expenditure was also measured by asking companies to indicate the number of their employees engaged in R&D activities. The resulting data is displayed in Table 10-7.

TABLE 10-7

DISTRIBUTION OF COMPANIES BY NUMBER OF EMPLOYEES ENGAGED IN R&D ACTIVITIES

Employees engaged in R&D activities	Number of Companies	Per Cent of Companies
Less than 100	40	54.8
100 - 500	27	37.0
500 - 1,000	3	4.1
5,000 and over	3	4.1
Total	73	100.0

In order to provide an indication of the importance of R&D expenditure relative to company size, companies were also asked to express their R&D expenditure as a percentage of their sales turnover. The data derived from the 71 companies which answered this question are displayed in Table 10-8.

TABLE 10-8

DISTRIBUTION OF COMPANIES BY LEVEL OF R&D EXPENDITURE RELATIVE TO SALES TURNOVER

R&D Expenditure/ Sales Turnover	Number of Companies	Per Cent of Companies
Less than 1 %	19	26.8
1 - 2.5 %	32	45.1
2.5 - 5 %	10	14.1
5 - 7.5 %	4	5.6
7.5 - 10 %	3	4.2
10 % and over	3	4.2
Total	71	100.0

In order to find out how the R&D intensity of the companies (measured by R&D expenditure relative to sales turnover) varied in accordance with company size (measured by sales turnover), these two variables were crosstabulated. The result is shown in Table 10-9.

TABLE 10-9

CROSSTABULATION OF COMPANY SIZE AGAINST R&D INTENSITY

R&D INTENSITY	COMPANY SIZE								
	Small		Medium		Large		Very large		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 1%	2	14.3	5	23.8	9	40.9	3	21.4	
1 - 2.5%	8	57.1	12	57.1	6	27.3	6	42.9	
> 2.5%	4	28.6	4	19.0	7	31.8	5	35.7	
Total	14	100.0	21	100.0	22	100.0	14	100.0	6.37811 (0.3822)

In Table 10-9, R&D intensity has been classified into three categories (by amalgamating the three uppermost categories in Table 10-8) while company size remains classified into four categories (as in Table 10-2). Each 'cell' in the table contains two values. The first of these is simply the number of companies that fall into the cell, while the second is the number of companies in each size category (the columns) expressed as a percentage of all the companies in each size category.

The pattern of the data in Table 10-9 appears to suggest that the small and medium sized companies were more R&D intensive than the large and very large companies.[5] Although this result reinforces the findings of Vickery (1988, p47) it must nevertheless be regarded as a tentative one as the chi square statistic of 6.37811 was not statistically significant.[6] Another problem with the crosstabulation is that it did not meet the condition specified by Cochran (1954) for the chi square test to be meaningful, namely that fewer than 20 per cent of cells have an expected value of less than 5. However, this condition has been challenged by Conover (1980, p156) who cited studies which have shown it to be "overly conservative". He concluded that expected frequencies could be as low as one without endangering the validity of the chi square test. On this criterion, therefore, the result reported above can be regarded as meaningful, although not statistically significant.

10.3 INVOLVEMENT IN INTERNATIONAL BUSINESS

In order to find out the nature of UK MNCs' involvement in international business, the questionnaire contained a question (Section I, Question 6) which asked companies to rank-order four principal methods of international business in accordance with the extent of their adoption. The methods ranked were direct investment, joint ventures, licensing and exporting.

Companies were asked to rank these four methods in terms of their existing adoption (ie as of 1984) and also in terms of their anticipated adoption over the next decade (ie over the period to 1994). The data has therefore been dichotomised into 'current' and 'future' rankings. Companies were also asked to rank the four methods over three different categories of overseas markets: developed countries (DCs), newly industrializing countries (NICs) and less developed countries (LDCs).[7]

The overall rankings achieved by each of the business methods are shown in Table 10-10. These were arrived at by calculating the mean rank for each method over all of the companies and then ranking the methods from four (most use) to one (least use) on the basis of these mean ranks.

TABLE 10-10

RANK-ORDER OF OVERSEAS BUSINESS METHODS

Overseas Business Method	Developed Countries	Newly Industrializing Countries	Less Developed Countries
	(Rating Scale: 4=most use; 1=least use)		
CURRENT			
Direct Investment	3	1	1
Joint Venture	1	2	2
Licensing	2	3	3
Exporting	4	4	4
FUTURE			
Direct Investment	3	1	1
Joint Venture	1	2	2
Licensing	2	3	3
Exporting	4	4	4

Two features are immediately obvious from an examination of the overall rankings in Table 10-10. The first is that there is no difference between the rankings associated with 'current' and 'future' overseas business methods. The second is that the rankings associated with the NICs are identical to those associated with the LDCs.

Exporting emerged as the most popular overseas business method over all three categories of country and over both time periods. Direct investment ranked second in popularity, but only for the DCs; for the NICs and LDCs licensing was ranked in second place. Licensing was ranked in third place for the DCs, while joint ventures occupied this position for the NICs and LDCs. The least popular business method for the DCs was joint ventures, while for the NICs and LDCs direct investment turned out to be the least popular. The overall rankings in Table 10-10 tend to suggest, therefore, that there are differences in the relative adoption (both current and future) of direct investment, joint ventures and licensing between DCs and NICs/LDCs.

It is useful to compare the 'current' (ie 1984) rankings in Table 10-10 with the rankings of business methods which are implicit in the government statistics reported in Chapter Nine. The comparison can be made using the 1984 data reported in Table 9-5, from which rankings can be derived for direct investment sales, exports and licensed sales for both DCs and non-DCs (ie NICs and LDCs). Joint ventures are excluded from the comparison since no government statistics on them were available.[8] The comparison between the two sets of rankings reveals two main differences, relating to DCs and non-DCs. Firstly, for the DCs, direct investment is ranked as the most popular method on the basis of the government data, whereas it is ranked second to exports on the basis of the questionnaire responses; licensing ranks below the other two methods in both. Secondly, for the non-DCs, licensing is ranked in third position according to the government data, but is accorded second rank on the basis of the questionnaire responses; exporting is ranked first in both.

It is also of interest to compare the rankings in Table 10-10 with those produced by McGreevy (1978) from his survey of 100 US MNCs. The rank order of business methods expected to be used by his sample of US MNCs during the 1980s in LDCs is identical to the 'current' rankings for LDCs produced by the present survey of UK MNCs.[9] However, the rank order of business methods expected to be used by US MNCs in DCs during the 1980s differs from that produced by the present survey (McGreevy did not gather data for NICs). In McGreevy's survey licensing was predicted to be the most popular method of expansion in the 1980s, with direct investment the least popular. According to the present survey, exporting is the most popular 'current' method used by UK MNCs, followed by direct investment, with licensing occupying third place. It would thus appear that US and UK MNCs have a similar approach to market-servicing in LDCs, but differ in their approach to DCs.

Although there is no difference between the current and future overall rankings reported in Table 10-10, comparisons of the mean ranks (which were used to determine the overall rankings) revealed changes in the expected popularity of the four business methods over the two periods. The trends are indicated in Table 10-11, which reports the mean ranks for each of the four business methods over the three categories of country.

TABLE 10-11

FORECAST TRENDS IN OVERSEAS BUSINESS METHODS

Overseas Business Method	Developed Countries			Newly industrializing Countries			Less Developed Countries		
	CURRENT	FUTURE	TREND	CURRENT	FUTURE	TREND	CURRENT	FUTURE	TREND
Direct Investment	2.72	2.78	0	1.88	1.98	+	1.77	1.72	0
Joint Venture	2.01	2.17	+	2.25	2.34	0	2.17	2.28	+
Licensing	2.21	2.19	0	2.56	2.59	0	2.62	2.76	+
Exporting	3.06	2.86	-	3.30	3.09	-	3.44	3.24	-

Trends: + increasing; - decreasing; 0 stable.

A change in the mean rankings of 0.1 or greater has been interpreted as representing a trend (either increasing or decreasing) while any change below this level has been regarded as being too small to suggest the existence of a trend.

The data in Table 10-11 suggest that exporting is anticipated to be used less in the future in all three categories of country, although it is still expected to remain as the most popular business method. Both licensing and joint ventures are expected to be used more in LDCs, while direct investment is expected to become more popular in NICs. In DCs, joint ventures are expected to be used more.

In order to determine whether the differences between the mean rankings were statistically significant, the Friedman test was employed (Friedman, 1937). This test, also commonly referred to as two-way analysis of variance (ANOVA) by ranks, was used for two reasons: firstly, because of the ordinal nature of the data and, secondly, because the data come from related (rather than independent) samples since the same respondent ranked each method of business for each company.

The results of the Friedman test are shown in Table 10-12 which reports the Friedman chi square test statistics and their associated significance levels for each of the three categories of country, and for each of the two time periods.[10]

TABLE 10-12

DIFFERENCES BETWEEN RANKINGS OF OVERSEAS BUSINESS METHODS: FRIEDMAN TWO-WAY ANOVA RESULTS

Categories of Country	Degrees of Freedom	Friedman Chi Square	Significance
CURRENT			
Developed Countries	3	32.0884	.0000
Newly industrializing Countries	3	50.0605	.0000
Less Developed Countries	3	72.5201	.0000
FUTURE			
Developed Countries	3	18.4253	.0004
Newly industrializing Countries	3	28.9253	.0000
Less Developed Countries	3	57.9669	.0000

Since all of the test statistics in Table 10-12 are significant at the .05 level it can be concluded that there were significant differences between the companies in their ranking of both current and future business methods for all three categories of country.

The Friedman test was also used to test two further hypotheses. The first of these was that there existed significant differences between the rankings attributed to current and future business methods. Testing for this involved converting the values given to current and future business methods into a rank of either one or two (corresponding to the two time periods) and then testing for any significant differences between the means of these ranks over all of the companies for each of the three categories of country.

The results in Table 10-13 show that none of the Friedman chi squares were significant at the .05 level, so it can be concluded that there were no significant differences between the current and future rankings of any of the business methods. The lack of any statistical significance is not surprising, however, since each test statistic had only one degree of freedom.[11] Nevertheless, the results suggest that none of the trends indicated in Table 10-11 are statistically significant.

TABLE 10-13

DIFFERENCES BETWEEN RANKINGS OF CURRENT AND FUTURE OVERSEAS BUSINESS METHODS: FRIEDMAN TWO-WAY ANOVA RESULTS

Overseas Business Method	Degrees of Freedom	Friedman Chi Square	Significance
DEVELOPED COUNTRIES			
Direct Investment	1	.0540	.8162
Joint Venture	1	1.9459	.1630
Licensing	1	.0000	1.0000
Exporting	1	.8648	.3524
NEWLY INDUSTRIALIZING COUNTRIES			
Direct Investment	1	2.2838	.1307
Joint Venture	1	1.6351	.2010
Licensing	1	.3378	.5611
Exporting	1	1.3513	.2450
LESS DEVELOPED COUNTRIES			
Direct Investment	1	.2104	.6464
Joint Venture	1	2.5789	.1083
Licensing	1	1.8946	.1678
Exporting	1	1.8946	.1687

It is interesting to note from Table 10-13 that licensing in developed countries had a Friedman chi square of zero (p=1.0000) indicating that all of the companies ranked this method identically for current and future adoption.[12] It is also worth noting that joint ventures in less developed countries came closest to being statistically significant (p=.1083).

The second additional hypothesis to be tested was that there existed significant differences between the rankings attributed to the business methods in each of the three categories of country. Testing for this involved converting the values attributed to the business methods into ranks of one, two or three (since there were three categories of country) and then computing the test statistic from the resulting mean rankings. The results are given in Table 10-14.

TABLE 10-14

DIFFERENCES BETWEEN RANKINGS OF OVERSEAS BUSINESS METHODS IN EACH CATEGORY OF COUNTRY: FRIEDMAN TWO-WAY ANOVA RESULTS

Overseas Business Method	Degrees of Freedom	Friedman Chi Square	Significance
CURRENT			
Direct Investment	2	41.1491	.0000
Joint Venture	2	7.1946	.0274
Licensing	2	3.4543	.1778
Exporting	2	2.5907	.2738
FUTURE			
Direct Investment	2	35.8356	.0000
Joint Venture	2	5.3699	.0682
Licensing	2	3.4726	.1762
Exporting	2	2.2808	.3197

As far as current overseas business methods are concerned, it is clear that there were significant differences between the rankings attributed to direct investment and joint ventures in each of the three countries. There were no significant differences between the rankings attributed to the other business methods. Looking at the future overseas business methods, only direct investment had significant differences between its rankings over the three categories of country.

10.4 INVOLVEMENT IN LICENSING

10.4.1 Related and Unrelated Licensing

Since the reasons for licensing may differ considerably depending upon whether or not the licensee is independent of the licensor, companies were asked to indicate if their licensing agreements were with unrelated overseas companies, with overseas subsidiaries (defined as companies in which the parent had a minimum equity stake of 51 per cent) or with both.

In classifying their licensing agreements into one of these categories, companies were asked to regard the licensing of associated companies and of joint ventures in which they had no overall control as belonging to the 'unrelated' licensing category rather than the 'related' category. The breakdown of the sample of eighty six companies according to the type of company to which intellectual property was licensed is shown in Table 10-15.

TABLE 10-15

DISTRIBUTION OF COMPANIES ACCORDING TO TYPE OF LICENSEE

Type of Licensee	Number of Companies	Per Cent of Companies
Unrelated	25	29.1
Related	2	2.3
Both	59	68.6
Total	86	100.0

It is evident from Table 10-15 that most licensing activity by UK MNCs involves both related and unrelated licensees. Just over two-thirds of the company sample were involved in both forms of licensing. This figure is very close to the OECD average reported by Vickery (1988, p22). By constrast, only two of the company sample were involved solely in the licensing of related companies, a proportion well below the OECD average. The proportion of companies involved solely in unrelated licensing is also below the OECD average, but not by so much.

10.4.2 Intellectual Property Content of Licensing Agreements

Since the motives for and characteristics of licensing agreements are likely to differ according to the type of intellectual property that is licensed, companies were asked to provide information about their involvement in licensing according to whether or not they licensed patents, know-how, trademarks, or some combination of them. They were asked to provide this information for their licensing agreements with unrelated companies in Section II of the questionnaire and for related companies in Section III of the questionnaire.

Unrelated Licensing

Section II of the questionnaire was split into two parts: the first was completed by companies that were involved in 'patent licensing', defined as the licensing of patents on their own, or in combination with know-how and/or trademarks; the second was completed by companies involved in 'know-how licensing', defined as the licensing of know-how on its own, or in combination with trademarks

The breakdown of the 83 companies providing information about the intellectual property content of their unrelated licensing agreements (as defined in the questionnaire) is shown in Table 10-16.[13]

TABLE 10-16

DISTRIBUTION OF COMPANIES BY INTELLECTUAL PROPERTY CONTENT OF UNRELATED LICENSING AGREEMENTS

Intellectual Property type	Number of Companies	Per Cent of Companies
Patents	15	18.1
Know-how	28	33.7
Both	40	48.2
Total	83	100.0

The table shows that almost half of the UK MNCs were involved in both 'patent licensing' and 'know-how licensing'. These companies therefore had licensing agreements covering patents (or patents in combination with know-how and/or trademarks) and also licensing agreements covering know-how (or know-how in combination with trademarks). Of the remaining companies, almost twice as many were involved in 'know-how licensing' as were involved in 'patent licensing'. It would thus appear that know-how is a more significant component of licensing agreements than patents for UK MNCs.

Related Licensing

Since MNCs may not necessarily provide their overseas subsidiaries with intellectual property, the first question in Section III of the questionnaire ascertained the extent to which companies in the sample did actually provide intellectual property (in the form of patents and know-how) to their licensees. Once this was established, the next question ascertained the extent to which those companies that did provide patents and know-how to their subsidiaries enacted the transfer by means of formal licensing agreements. It was important to find out this information as parents may allow subsidiaries to use their intellectual property without obtaining remuneration in the form of licensing royalties.

The distribution of the company sample according to the extent to which patents and know-how were made available to their overseas subsidiaries is shown in Table 10-17.[14]

TABLE 10-17

EXTENT OF PATENT AND KNOW-HOW PROVISION TO OVERSEAS SUBSIDIARIES

	PATENTS		KNOW-HOW	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
In all cases	29	38.2	36	44.4
In most cases	25	32.9	26	32.1
Sometimes	10	13.2	9	11.1
Very rarely	1	1.3	2	2.5
Never	11	14.5	8	9.9
Total	76	100.0	81	100.0

Question: To what extent are the company's patents and know-how made available to overseas subsidiaries?

It is apparent from the Table 10-17 that the vast majority of the companies did make their patents and know-how available to their overseas subsidiaries: over seventy per cent of the responses relating to both patents and know-how fell into the 'in all cases' or 'in most cases' categories. It is also clear from the table that the distribution of responses across the five categories is very similar for the two types of intellectual property. The strength of the correlation between the responses for patents and know-how can be gauged from the fact that the Spearman rank correlation coefficient was computed at 0.8116 (significant at the .05 level).

The breakdown of the companies according to the extent to which they used formal licensing agreements to transfer patents and know-how to their overseas subsidiaries is displayed in Table 10-18.[15]

TABLE 10-18

EXTENT OF PATENT AND KNOW-HOW LICENSING TO OVERSEAS SUBSIDIARIES

	PATENTS		KNOW-HOW	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
In all cases	13	20.6	15	21.1
In most cases	20	31.7	22	31.0
Sometimes	11	17.5	14	19.7
Very rarely	8	12.7	10	14.1
Never	11	17.5	10	14.1
Total	63	100.0	71	100.0

Question: To the extent that patents and know-how are made available to overseas subsidiaries, how far is this dealt with by means of formal licensing agreements?

The respones show that the majority of companies did provide patents and know-how to their overseas subsidiaries by means of licensing agreements: just over fifty per cent of companies fell into the 'in all cases' or 'in most cases' categories. It is also clear that a not insignificant minority of companies either 'very rarely' or 'never' entered into formal licensing agreements with their overseas subsidiaries. Another obvious feature of the responses in Table 10-18 is the similarity of the distribution across the five categories for patents and know-how: the Spearman rank correlation coefficient between the responses for these two types of intellectual property was calculated to be 0.9244 (significant at the .05 level).

10.4.3 Unrelated Patent Licensing

A number of features of the unrelated patent licensing agreements possessed by the sample of companies were examined in Section II, Part A, of the questionnaire. The first of these was the extent to which unrelated patent licensing was the outcome of voluntary negotiation between patent holders and foreign licensees.

CHAPTER 10

Voluntary Patent Licensing

The fact that a company possesses a patent licensing agreement with an independent foreign company does not necessarily imply that it has come by it of its own volition. Companies may be forced by foreign patent authorities to grant a licence to local companies if they have not worked a patent within a certain time period after its registration (usually three years) or if they have not worked it as fully as possible within the country concerned (eg by importing goods which utilise the patent rather than manufacturing them locally). This type of licence, called a 'compulsory licence', may also be granted if it can be shown that the patent holder is not willing to grant a licence on reasonable terms, or if a licence is refused for a patented product that is necessary to work another patented product.

There are circumstances, however, in which a company's failure to exploit its patents in foreign markets may not be a result of its own deliberate policy. It may be that a company does not possess the resources it requires to work its patents in all the countries where they are registered, or it may not have found any local companies interested in doing so. In these circumstances a company can register its patents as ones for which 'licences of right' will be made available. In doing so it undertakes to negotiate a licence with any interested party and to allow the local patent authorities to fix the terms if there is any disagreement.

If the patent licences granted by a company cannot be classified as compulsory licences or as licences of right then they must correspond to what are termed 'voluntary licences'.[16] These are licences that are freely negotiated between two parties for the use of patents for which a licence will not automatically be granted.

It was important to ascertain the extent to which the patent licences granted by the companies fell into each of these three categories. A high proportion of companies stating that their licences were not 'voluntary licences' would have implied that patent licensing could not have been freely evaluated as an alternative to other methods of international business. The questionnaire therefore contained a question (Section II, Question 2) which asked companies to estimate the percentage of their patent licensing agreements which fell into each of the three categories. The results are summarised in Table 10-19.[17]

TABLE 10-19

DISTRIBUTION OF COMPANIES BY CATEGORY OF UNRELATED PATENT LICENSING AGREEMENTS: VOLUNTARY LICENCES, LICENCES OF RIGHT, OR COMPULSORY LICENCES

Per Cent of Patent Licensing Agreements	VOLUNTARY LICENCES		LICENCES OF RIGHT		COMPULSORY LICENCES	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
0	0	0.0	44	84.6	49	94.2
1 - 20	1	1.9	6	11.5	2	3.8
21 - 40	0	0.0	1	1.9	1	1.9
41 - 60	1	1.9	0	0.0	0	0.0
61 - 80	1	1.9	1	1.9	0	0.0
81 - 99	5	9.6	0	0.0	0	0.0
100	44	84.6	0	0.0	0	0.0
Total	52	100.0	52	100.0	52	100.0

It is apparent from Table 10-19 that the vast majority of patent licences possessed by UK MNCs are 'voluntary licences'. A very high proportion of the companies (84.6 per cent) indicated that 100 per cent of their patent licensing agreements corresponded to 'voluntary licences'. The same proportion of companies (84.6 per cent) indicated that none of their patent licensing agreements could be classified as 'licences of right', while an even greater proportion (94.2 per cent) replied that they possessed no 'compulsory licences'.

The evidence from Table 10-19 that patent licensing is overwhelmingly a voluntary activity allows one to conclude that the companies did have the option of using patent licensing as an alternative to other methods of market penetration.

The nature of the voluntary patent licences possessed by the companies was also explored in the study. Freely-negotiated agreements differ from one another in accordance with the bargaining strength of the parties concerned and the nature of the competition which they both face. Although a wide variety of potential agreements are possible, most voluntary agreements can be placed into one of three categories: a 'sole' agreement, an 'exclusive' agreement or a 'non-exclusive' agreement [Maddison (1981, p48)]. They differ from one another in terms of the extent to which they protect the licensee from competition from the licensor and from other local firms.

If a 'sole' licence is negotiated, the licensor agrees not to license other any other firms in the territory covered by the licence, thus allowing the licensee a free run against the competition . An 'exclusive' licence also obliges the licensor not to license other firms in the territory covered by the licence, but it additionally restricts the licensor from competing directly against the licensee in that territory. A 'non-exclusive' licence gives the licensor the most flexibility since it does not contain either of these obligations.

To ascertain the relative popularity of these three types of voluntary agreements, Question 3 in Section II of the questionnaire asked the companies to estimate the percentage of their voluntary agreements which corresponded to each of the three categories. The results are given in Table 10-20.[18]

TABLE 10-20

DISTRIBUTION OF COMPANIES BY CATEGORY OF VOLUNTARY UNRELATED PATENT LICENSING AGREEMENTS: SOLE LICENCES, EXCLUSIVE LICENCES, OR NON-EXCLUSIVE LICENCES

Per Cent of Patent Licensing Agreements	SOLE LICENCES		EXCLUSIVE LICENCES		NON-EXCLUSIVE LICENCES	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
0	23	45.0	17	33.2	18	35.2
1 - 20	13	25.4	12	23.5	6	11.8
21 - 40	4	7.9	4	7.9	4	7.9
41 - 60	3	5.9	4	7.9	5	9.8
61 - 80	2	4.0	2	4.0	7	13.7
81 - 99	0	0.0	3	5.9	5	9.8
100	6	11.8	9	17.6	6	11.8
Total	51	100.0	51	100.0	51	100.0

The responses in Table 10-20 are fairly evenly distributed across the three categories of voluntary agreement, indicating that none was dominant. Sole licences appear to have been the most unpopular, with 45 per cent of the companies indicating that they had no such agreements. The pattern of responses for exclusive and non-exclusive licences is very similar, although the latter appear to have been marginally more popular. Overall, the data in Table 10-20 suggest that UK companies have no distinct preference for a particular type of voluntary agreement.

Know-how and Trademark Content

The extent to which unrelated patent licensing agreements also provided for the supply of know-how and the use of trademarks is indicated in Table 10-21.

TABLE 10-21

KNOW-HOW AND TRADE MARK CONTENT OF UNRELATED PATENT LICENSING AGREEMENTS

Proportion of Patent Licensing Agreements	SUPPLY OF KNOW-HOW IN THE TECHNICAL FIELD OF THE PATENT		SUPPLY OF KNOW-HOW ON A BROADER BASIS		USE OF COMPANY TRADE MARKS	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	0	0.0	13	25.5	8	15.7
A Few	6	11.8	13	25.5	19	37.3
About half	4	7.8	6	11.8	4	7.8
Most	17	33.3	8	15.7	12	23.5
All/Virtually All	24	47.1	11	21.5	8	15.7
Total	51	100.0	51	100.0	51	100.0

The data were derived from Question 4 in Section II of the questionnaire. The companies were asked to estimate the proportion of their patent licensing agreements which provided for two separate categories of know-how: that which related to the technical field of the patent and that which was supplied on a broader basis. This distinction was made so that those agreements in which know-how was supplied to enable the patent to be properly utilised could be discriminated from those agreements in which the supply of know-how was unrelated to the patent.

It is evident from Table 10-21 that agreements that provided for the supply of know-how in the technical field of the patent substantially outnumbered those that provided for its supply on a broader basis. Thus, 80.4 per cent of companies said that 'most' or 'all/virtually all' of their agreements provided for the supply of know-how in the technical field of the patent, while 51 per cent of companies said that 'none' or 'a few' of their agreements supplied know-how on a broader basis. This pattern is consistent with that found by Taylor and Silberston in their (1973) investigation of the economic impact of the UK patent system.[19]

The distribution of responses across the five categories relating to the use of company trademarks is more symmetrical than the distribution of responses relating to the two types of know-how. Thus, the same number of companies (15.7 per cent) indicated that 'none' of their agreements involved the use of company trademarks as indicated that 'all/virtually all' of their agreements involved trademarks. The extent to which company trademarks were included in agreements appears, therefore, to vary quite widely.

It is of interest to note from Table 10-21 that there were no companies in the sample that only possessed what may be defined as 'pure' patent licensing agreements, ie agreements that did not involve the supply of either know-how or trademarks. Although 15.7 per cent of companies reported that none of their agreements involved trademarks, and 25.5 per cent reported that none of their agreements involved the supply of know-how on a broader basis, there were no companies which reported that none of their agreements involved the supply of know-how in the technical field of the patent.

Number of Licensing Agreements

In order to gain an impression of the extent of their involvement in unrelated patent licensing, the companies were asked (Section II, Question 5) to indicate the number of agreements which they possessed. The results obtained from the fifty companies which answered the question are shown in Table 10-22.

TABLE 10-22

DISTRIBUTION OF COMPANIES BY NUMBER OF UNRELATED PATENT LICENSING AGREEMENTS

Number of Agreements	Number of Companies	Per Cent of Companies
1 - 5	14	28.0
5 - 20	19	38.0
20 - 50	9	18.0
50 - 100	6	12.0
100 - 200	2	4.0
200 and over	0	0.0
Total	50	100.0

It is apparent from the table that most of the companies possessed a relatively small number of agreements: two-thirds indicated that they had twenty agreements or less. Nevertheless, it is possible for the income earned from a small number of agreements to be quite substantial. Therefore, to gain an impression of the value of their licensing agreements, the companies were asked to indicate the broad range within which their annual, post-tax, income from licensing fell in the previous accounting year (ie 1983-84).

Licensing Income

The data from the forty seven companies which answered the question concerning licensing income (Section II, Question 6) are displayed in Table 10-23.

TABLE 10-23

DISTRIBUTION OF COMPANIES BY INCOME GENERATED FROM UNRELATED PATENT LICENSING AGREEMENTS

Licensing Income (£)	Number of Companies	Per Cent of Companies
Less than 0.1m	13	27.7
0.1 - 1m	21	44.7
1 - 5m	10	21.3
5 - 10m	1	2.1
10 - 20m	1	2.1
20m and over	1	2.1
Total	47	100.0

It is apparent that the vast majority of companies (72.4 per cent) earned less than £1 million from unrelated licensing in 1983-84, with few companies earning over £5 million (only three out of the 47).

In addition to indicating the category into which their level of licensing income fell, the companies were also asked to give an exact figure for their level of licensing income. They were obviously reluctant to disclose this information (or were not aware of the exact figure) as only five did so.[20]

Trend in Licensing Income

In order to establish whether the income generated from licensing had been increasing or decreasing over the early 1980s, companies were asked to indicate how their most recent licensing earnings (reported in 1983/84) compared with the amount earned five years previously. In doing so they were asked to take account of the effect of inflation over this period.

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The results obtained from the forty nine companies which answered the question on the change in their licensing income (Section II, Question 7) are reported in Table 10-24.

TABLE 10-24

DISTRIBUTION OF COMPANIES BY TREND IN INCOME FROM UNRELATED PATENT LICENSING AGREEMENTS

Trend in Licensing Income	Number of Companies	Per Cent of Companies
Significantly more	14	28.6
Slightly more	16	32.7
Approximately the same	13	26.5
Slightly less	3	6.1
Significantly less	3	6.1
Total	49	100.0

It would appear that, for most companies, income was increasing in the early 1980s: 61.3 per cent of respondents reported that their company's income was either 'significantly more' or 'slightly more' compared with the amount earned five years previously. While just over a quarter of respondents indicated that their company's income was 'approximately the same', only 12.2 per cent of respondents reported that their company's income was either 'slightly less' or 'significantly less'.

Industry, Size and R&D Breakdown of Licensing Income

In order to ascertain whether the level of unrelated patent licensing income was related to the industries in which the companies operated, or their size, or relative level of R&D expenditure, these three variables were crosstabulated against licensing income.

The breakdown of unrelated patent licensing income by industry is shown in Table 10-25. The companies were classified into one of the three broad industry groups defined earlier in the chapter. The 'textiles' category was amalgamated with the 'others' category since it only contained three companies. Licensing income was classified into three groups by combining the three uppermost categories contained in the questionnaire.

TABLE 10-25

CROSSTABULATION OF UNRELATED PATENT LICENSING INCOME AGAINST INDUSTRY

LICENSING INCOME (£)	INDUSTRY						
	Processing		Engineering		Others		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	0	0.0	8	40.0	5	31.3	
0.1 - 1 m	5	45.5	6	30.0	10	62.5	
> 1 m	6	54.5	6	30.0	1	6.3	
Total	11	100.0	20	100.0	16	100.0	11.88733 (0.0182)

The size of the expected values in each cell conformed to Conover's (1980) condition that no expected values be less than one, and the chi square statistic of 11.88733 was significant at the .05 level. We can conclude, therefore, that the broad industry groups into which the companies fell were associated with the level of unrelated patent licensing income which they earned.

The pattern of the data in Table 10-25 indicates that companies in the 'processing' category earned more from their licensing agreements than companies in the other two industry groups: a higher percentage of companies in this category earned more than £1 million, and a lower percentage earned less than £1 million, compared to the other two industry groups. No clear conclusion could be drawn about the relative earning power of the remaining two industry groups because of the inconsistency of the trends in the data across the three levels of licensing income.

The breakdown of unrelated patent licensing income by company size, as measured by global turnover, is shown in Table 10-26. Companies were grouped into the four size categories described earlier in the chapter. Although two of the cells in the table were not occupied by any of the companies, these cells did have expected values greater than one, thus enabling Conover's condition to be satisfied.

TABLE 10-26

CROSSTABULATION OF UNRELATED PATENT LICENSING INCOME AGAINST COMPANY SIZE

LICENSING INCOME (£)	COMPANY SIZE								
	Small		Medium		Large		Very large		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	5	55.6	4	33.3	4	26.7	0	0.0	
0.1 - 1 m	4	44.4	5	41.7	7	46.7	5	45.5	
> 1 m	0	0.0	3	25.0	4	26.7	6	54.5	11.15900
Total	9	100.0	12	100.0	15	100.0	11	100.0	(0.0856)

The distribution of the data in Table 10-26 suggests the existence of an association between company size and the level of unrelated patent licensing income. Thus, the percentage of companies earning more than £1 million increased as company size increased, while the percentage of companies earning less than £0.1 million decreased as company size increased. Although this relationship is not statistically significant at the .05 level, the chi square statistic of 11.1590 is nevertheless close to being significant at this level. By reducing company size to two categories ('small/medium' and 'large/very large') the statistical significance of the chi square statistic was increased to 0.0592.

The breakdown of unrelated patent licensing income by R&D intensity (ie R&D as a proportion of sales turnover) is shown in Table 10-27. R&D intensity was classified into the same three categories used earlier in Table 10-9.

TABLE 10-27

CROSSTABULATION OF UNRELATED PATENT LICENSING INCOME AGAINST R&D INTENSITY

LICENSING INCOME (£)	R&D INTENSITY						
	< 1%		1 - 2.5%		> 2.5%		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	5	41.7	2	14.3	3	20.0	
0.1 - 1 m	7	58.3	7	50.0	5	33.3	
> 1 m	0	0.0	5	35.7	7	46.7	
Total	12	100.0	14	100.0	15	100.0	8.39592 (0.0781)

Although the data in Table 10-27 satisfy Conover's condition, the chi square statistic of 8.39592 falls a little short of meeting the .05 significance level. Nevertheless, the distribution of the companies across these two variables appears to suggest that the level of licensing income increased in line with R&D intensity. Therefore, companies which spent a higher proportion of their turnover on R&D generally earned more from their unrelated patent licensing agreements than companies which spent a lower proportion of their turnover on R&D.

10.4.4 Unrelated Know-how Licensing

In Section II, Part B of the questionnaire a number of aspects of the unrelated know-how licensing agreements of the company sample were examined.

Trademark Content

The extent to which the right to use company trademarks were included in unrelated know-how licensing agreements is shown in Table 10-28.

TABLE 10-28

TRADEMARK CONTENT OF UNRELATED KNOW-HOW LICENSING AGREEMENTS

Proportion of Know-how Licensing Agreements	Number of Companies	Per Cent of Companies
None	17	25.4
A Few	17	25.4
About half	8	11.9
Most	10	14.9
All/Virtually All	15	22.4
Total	67	100.0

It is apparent that the companies are fairly evenly distributed across the five categories, indicating that the extent to which trademarks were included in agreements varied quite widely across the companies.

The distribution of responses in Table 10-28 is similar to that reported in Table 10-21 for the use of trademarks in unrelated patent licensing agreements. The Spearman rank correlation coefficient was computed to determine the extent to which the two classes of response were correlated. The calculation was based upon responses from 37 companies, despite the fact 67 companies had provided information about the trademark content of their know-how agreements. This was because of the smaller number of companies engaged in patent licensing, and the existence of missing values for both types of agreement.

The value of the correlation coefficient was calculated to be 0.9294 (significant at the .05 level). This high degree of correlation indicates that there was very little difference between the trademark content of the patent and know-how licensing agreements possessed by the companies involved in both forms of licensing activity.

As trademarks are often included in licensing agreements as a means of maintaining control over the quality of the licensee's output, it may be hypothesised that the companies perceived no difference between unrelated patent and know-how licensing agreements in terms of the extent to which they were likely to give rise to quality control problems.

Number of Licensing Agreements

The involvement of the companies in unrelated know-how licensing, as measured by the number of agreements they had entered into, is shown in Table 10-29.

TABLE 10-29

DISTRIBUTION OF COMPANIES BY NUMBER OF UNRELATED KNOW-HOW LICENSING AGREEMENTS

Number of Agreements	Number of Companies	Per Cent of Companies
1 - 5	22	33.3
5 - 20	31	47.0
20 - 50	6	9.1
50 - 100	6	9.1
100 - 200	0	0.0
200 and over	1	1.5
Total	66	100.0

The table reveals the fact that the vast majority of companies possessed a relatively small number of agreements. Just over eighty per cent of the companies which answered the relevant question (Section II, Question 15) indicated that they had twenty agreements or less. This is greater than the proportion of companies involved in patent licensing which reported twenty agreements or less (66 per cent).

In fact it would appear, from a comparison of the distribution in Table 10-29 with that in Table 10-22, that companies involved in know-how licensing tended to have fewer agreements than those involved in patent licensing. This is despite the fact that one know-how licensing company reported that its number of agreements fell into the '200 or more' category, a category which was not occupied by any of the companies involved in patent licensing.

The Spearman rank correlation coefficient between the two classes of response was computed to be 0.7017 (significant at the .05 level). This value was based upon responses from 36 companies involved in both patent licensing and know-how licensing.

Licensing Income

Data on the level of after-tax income earned from unrelated know-how licensing was obtained from Question 16 in Section II of the questionnaire. The distribution of the 62 responding companies over six categories of know-how earnings is shown in Table 10-30.

TABLE 10-30

DISTRIBUTION OF COMPANIES BY INCOME GENERATED FROM UNRELATED KNOW-HOW LICENSING AGREEMENTS

Licensing Income (£)	Number of Companies	Per Cent of Companies
Less than 0.1m	22	35.5
0.1 - 1m	29	46.8
1 - 5m	9	14.5
5 - 10m	0	0.0
10 - 20m	2	3.2
20m and over	0	0.0
Total	62	100.0

It is evident that the bulk of the companies reported their level of licensing income in the lower categories: 82.3 per cent indicated that their know-how earnings fell into one of the first two categories (less than £1 million). This is a greater proportion of companies than reported their level of patent licensing income as less than £1 million (72.4 per cent).

Indeed, comparing the breakdown of know-how licensing income in Table 10-30 with that for patent licensing income in Table 10-23, it would appear that the companies earned less from know-how licensing than they did from patent licensing. To determine the degree of correlation between the two classes of responses the Spearman rank correlation coefficient was calculated. A value of 0.6611 (significant at the .05 level) was obtained from responses from thirty two companies that were involved in both patent and know-how licensing.

Comparing this value with that relating to the number of licensing agreements (0.7017), it can be concluded that there was less similarity between the two sets of companies in terms of their licensing income and more similarity in terms of the number of licensing agreements which they possessed.

The supplementary part of Question 16 which asked companies to give a precise figure for know-how earnings drew a very low response, with only ten companies providing the information requested.

Trend in Licensing Income

The change in the level of income earned from unrelated know-how licensing over the five years prior to 1983/84 is shown in Table 10-31.

TABLE 10-31

DISTRIBUTION OF COMPANIES BY TREND IN INCOME FROM UNRELATED KNOW-HOW LICENSING AGREEMENTS

Trend in Licensing Income	Number of Companies	Per Cent of Companies
Significantly more	23	35.9
Slightly more	15	23.4
Approximately the same	18	28.1
Slightly less	8	12.5
Significantly less	0	0.0
Total	64	100.0

It would appear from the table that the know-how licensing income earned by most of the companies had been increasing in the early 1980s. Of the sixty four companies which answered the relevant question, 59.3 per cent of them reported that their income was either 'significantly more' or 'slightly more' than the amount earned five years previously. At the other end of the scale, none of the companies reported that their income was 'significantly less' than before, while only 12.5 per cent reported that their income was 'slightly less' than before.

Comparing the breakdown of the companies involved in know-how licensing in Table 10-31 with the breakdown of the companies involved in patent licensing in Table 10-24, there appears to be very little difference between the two sets of companies in terms of the trend in income which they experienced. However, this apparent similarity was not confirmed by the Spearman rank correlation coefficient between the two sets of data, which was computed at only 0.4999 (significant at the .05 level). The relatively low correlation coefficient is attributable to the fact that it was computed from only thirty four cases (once all the missing values had been taken into account).

It can be concluded, therefore, that there was little correlation between the trends in licensing income experienced by companies involved in both patent licensing and know-how licensing, despite the fact that the trends experienced by all companies involved in patent licensing and all companies involved in know-how licensing were very similar.

Industry, Size and R&D Breakdown of Licensing Income

The breakdown of unrelated know-how licensing income by the three industry groups defined earlier in the chapter is shown in Table 10-32.

TABLE 10-32

CROSSTABULATION OF UNRELATED KNOW-HOW LICENSING INCOME AGAINST INDUSTRY

LICENSING INCOME (£)	INDUSTRY						
	Processing		Engineering		Others		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	4	20.0	8	36.4	10	50.0	
0.1 - 1 m	12	60.0	10	45.5	7	35.0	
> 1 m	4	20.0	4	18.2	3	15.0	4.03733
Total	20	100.0	22	100.0	20	100.0	(0.4010)

The data in Table 10-32 satisfy Conover's condition, but the significance of the chi square statistic falls well short of the .05 level. We can conclude, therefore, that there was no association between the level of unrelated know-how licensing income earned by the companies and the broad industry groups in which they were classified.

The breakdown of unrelated know-how licensing income by company size is shown in Table 10-33.

TABLE 10-33

CROSSTABULATION OF UNRELATED KNOW-HOW LICENSING INCOME AGAINST COMPANY SIZE

LICENSING INCOME (£)	COMPANY SIZE								
	Small		Medium		Large		Very large		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	10	66.7	5	33.3	4	23.5	3	20.0	
0.1 - 1 m	4	26.7	9	60.0	9	52.9	7	46.7	
> 1 m	1	6.7	1	6.7	4	23.5	5	33.3	
Total	15	100.0	15	100.0	17	100.0	15	100.0	12.27424 (0.0561)

The distribution of companies across these two variables suggests that, in general, know-how licensing income increased in line with company size. Although Conover's condition was satisfied, the significance of the chi square statistic fell just short of the .05 level. However, by reducing company size to two categories ('small/medium' and 'large/very large') a chi square statistic significant at the 0.0222 level was produced.

The breakdown of know-how licensing income by R&D intensity is shown in Table 10-34.

TABLE 10-34

CROSSTABULATION OF UNRELATED KNOW-HOW LICENSING INCOME AGAINST R&D INTENSITY

LICENSING INCOME (£)	R&D INTENSITY						
	< 1%		1 - 2.5%		> 2.5%		Chi Square
	Number	Per Cent	Number	Per Cent	Number	Per Cent	(Signif.)
< 0.1 m	7	43.8	7	30.4	3	23.1	
0.1 - 1 m	8	50.0	11	47.8	7	53.8	
> 1 m	1	6.3	5	21.7	3	23.1	
Total	16	100.0	23	100.0	13	100.0	2.70342 (0.6086)

The distribution of companies in Table 10-34 appears to suggest that the level of licensing income generally increased in line with R&D intensity. However, although the data satisfy Conover's condition, the chi square statistic falls far short of being significant at the .05 level. There is therefore no basis for concluding that there was an association between corporate R&D intensity and the level of income earned from unrelated know-how licensing.

10.4.5 Related Patent Licensing

The characteristics of the related patent licensing agreements possessed by the companies were explored in Section III of the questionnaire, titled 'Intra-Group Licensing'.

Know-how and Trademark Content

The extent to which related patent licensing agreements also involved the transfer of know-how and trademarks is shown in Table 10-35.[21]

TABLE 10-35

KNOW-HOW AND TRADE MARK CONTENT OF RELATED PATENT LICENSING AGREEMENTS

Proportion of Patent Licensing Agreements	SUPPLY OF KNOW-HOW IN THE TECHNICAL FIELD OF THE PATENT		SUPPLY OF KNOW-HOW ON A BROADER BASIS		USE OF COMPANY TRADEMARKS	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	2	4.4	5	11.6	6	13.3
A Few	2	4.4	4	9.3	7	15.6
About half	1	2.2	1	2.3	1	2.2
Most	9	20.0	13	30.2	10	22.2
All/Virtually All	31	69.0	20	46.6	21	46.7
Total	45	100.0	43	100.0	45	100.0

The data clearly indicate that the vast majority of related patent licensing agreements also involved the supply know-how. Almost ninety per cent of the companies which answered the relevant question (Section III, Question 3) indicated that 'most' or 'all/virtually all' of their patent licensing agreements involved the supply of know-how in the technical field of the patent, while a smaller proportion (76.7 per cent) indicated that know-how was supplied on a broader basis in 'most' or 'all/virtually all' of their agreements.

The supply of trademarks was less prevalent than either of these two categories of know-how, with only 68.9 per cent of companies indicating that 'most' or 'all/virtually all' of their agreements involved the transfer of this property right.

Comparing the distribution of reponses for related patent licensing in Table 10-35 with those for unrelated patent licensing in Table 10-21, it is apparent that the supply of know-how and trademarks were more prevalent in related patent licensing agreements. The reasons for this are explored in Chapter Thirteen.

Licensing Income

Question 6 in Section III of the questionnaire asked companies to indicate which one of six categories corresponded most closely to the revenue generated from their related patent licensing agreements. Twenty seven companies answered this question, and the resulting breakdown is shown in Table 10-36.

TABLE 10-36

DISTRIBUTION OF COMPANIES BY INCOME GENERATED FROM RELATED PATENT LICENSING AGREEMENTS

Licensing Income (£)	Number of Companies	Per Cent of Companies
Less than 0.1m	17	60.7
0.1 - 1m	7	25.0
1 - 5m	4	14.3
5 - 10m	0	0.0
10 - 20m	0	0.0
20m and over	0	0.0
Total	28	100.0

The distribution of companies across income categories suggests that related patent licensing is a relatively low income-earner, with 60.7 per cent of companies claiming that they earned less than £1 million.

A comparison the distribution of companies involved in related patent licensing in Table 10-36 with the distribution of companies involved in unrelated patent licensing in Table 10-23 suggests that related licensing was less profitable. However, this must be qualified by the fact that a much smaller set of data was available for related licensing income.

In addition, it is possible that the companies may have been utilising their related licensing agreements as a means of extracting royalty income from countries in situations where dividend repatriations were restricted or more costly. In such a scenario the remuneration from related licensing would be different from that generated from equivalent unrelated agreements involving the same property rights. A further factor which clouds the comparison between unrelated and related royalty figures is the potential use of transfer pricing by MNCs to lower reported royalties in high-tax countries and increase reported royalties in low-tax countries.

It would appear that there was a greater reluctance among the companies to disclose exact figures for related patent licensing income than there was to disclose exact figures for unrelated patent licensing income. Only two companies reported precise figures for their related patent licensing income (equivalent to 4.3 per cent of companies that could have provided such information). The comparative proportion of eligible companies reporting precise figures for their unrelated patent licensing income was 9.1 per cent (5 companies).

Trend in Licensing Income

The change in the amount of income earned from related patent licensing, allowing for inflation, over the five year period prior to 1983/84 is shown in Table 10-37.

TABLE 10-37

DISTRIBUTION OF COMPANIES BY TREND IN INCOME FROM RELATED PATENT LICENSING AGREEMENTS

Trend in Licensing Income	Number of Companies	Per Cent of Companies
Significantly more	4	12.1
Slightly more	9	27.3
Approximately the same	16	48.5
Slightly less	2	6.1
Significantly less	2	6.1
Total	33	100.0

The data in Table 10-37 indicate that, for a substantial number of companies, remuneration from related patent licensing was constant over the early 1980s: 48.5 per cent of companies reported that their income had remained 'approximately the same'. Of the remaining companies, approximately three times as many reported an increase as reported a decrease.

Comparing this trend with the trend in unrelated patent licensing income over the same period (see Table 10-24) it is apparent that a greater proportion of the companies involved in unrelated licensing reported a positive income growth trend.

10.4.6 Related Know-how Licensing

Data on the income generated from related know-how licensing, and the trend in this income, were also obtained from Section III of the questionnaire.

Licensing Income

Forty companies provided information on the income they earned from related know-how licensing in 1983/84. This is displayed in Table 10-38.

TABLE 10-38

DISTRIBUTION OF COMPANIES BY INCOME GENERATED FROM RELATED KNOW-HOW LICENSING AGREEMENTS

Licensing Income (£)	Number of Companies	Per Cent of Companies
Less than 0.1m	16	40.0
0.1 - 1m	16	40.0
1 - 5m	7	17.5
5 - 10m	0	0.0
10 - 20m	1	2.5
20m and over	0	0.0
Total	40	100.0

The majority of companies reported their licensing income in the lower categories: exactly 80 per cent indicated that their earnings were below £1 million. The distribution of the forty companies across the six income categories in Table 10-38 is very similar to that reported for the 62 companies involved in unrelated know-how licensing income in Table 10-30, although related know-how licensing appears to have been slightly less profitable.

Comparing the distribution for related know-how licensing in Table 10-38 with the distribution for related patent licensing in Table 10-36, it would appear that related know-how licensing generated more income than related patent licensing. Interestingly, this trend is the opposite of that which was found to exist between unrelated know-how and patent licensing (compare Tables 10-30 and 10-23). This difference is, however, most likely explained by the fact that related patent licensing agreements had a greater know-how content than unrelated patent licensing agreements (compare Tables 10-35 and 10-21).

Only eight companies chose to report an exact figure for their related know-how licensing income, accounting for 14.5 per cent of companies that could have provided this information. This is exactly the same proportion of eligible companies that reported a precise figure for their unrelated know-how licensing income, which suggests that there was no difference between the companies in terms of their reluctance to disclose exact earnings figures for unrelated and related know-how licensing.

Trend in Licensing Income

The change in related know-how licensing earnings over the five year period prior to 1983/84, taking account of inflation, is shown in Table 10-39.

Most of the companies reported a positive trend: 46.5 per cent indicated that their income was either 'significantly more' or 'slightly more', while only 13.9 per cent reported that their income was 'slightly less' or 'significantly less'. The remainder (39.5 per cent) reported that their income level had remained 'approximately the same'.

TABLE 10-39

DISTRIBUTION OF COMPANIES BY TREND IN INCOME FROM RELATED KNOW-HOW LICENSING AGREEMENTS

Trend in Licensing Income	Number of Companies	Per Cent of Companies
Significantly more	11	25.6
Slightly more	9	20.9
Approximately the same	17	39.5
Slightly less	5	11.6
Significantly less	1	2.3
Total	43	100.0

In comparison with the trend in unrelated know-how income (see Table 10-31) the trend in related know-how income was in the same positive direction, but was less pronounced. However, the positive trend in related know-how income was much more pronounced than that reported for related patent income (see Table 10-37).

10.5 CONCLUSIONS

From the foregoing analysis we may draw the following conclusions concerning the key characteristics of the company sample.

The companies were generally large in size, and operated in a wide range of industries. The majority of them spent between £1 million and £10 million on R&D, with the smaller companies spending more of their turnover on R&D than the larger ones.

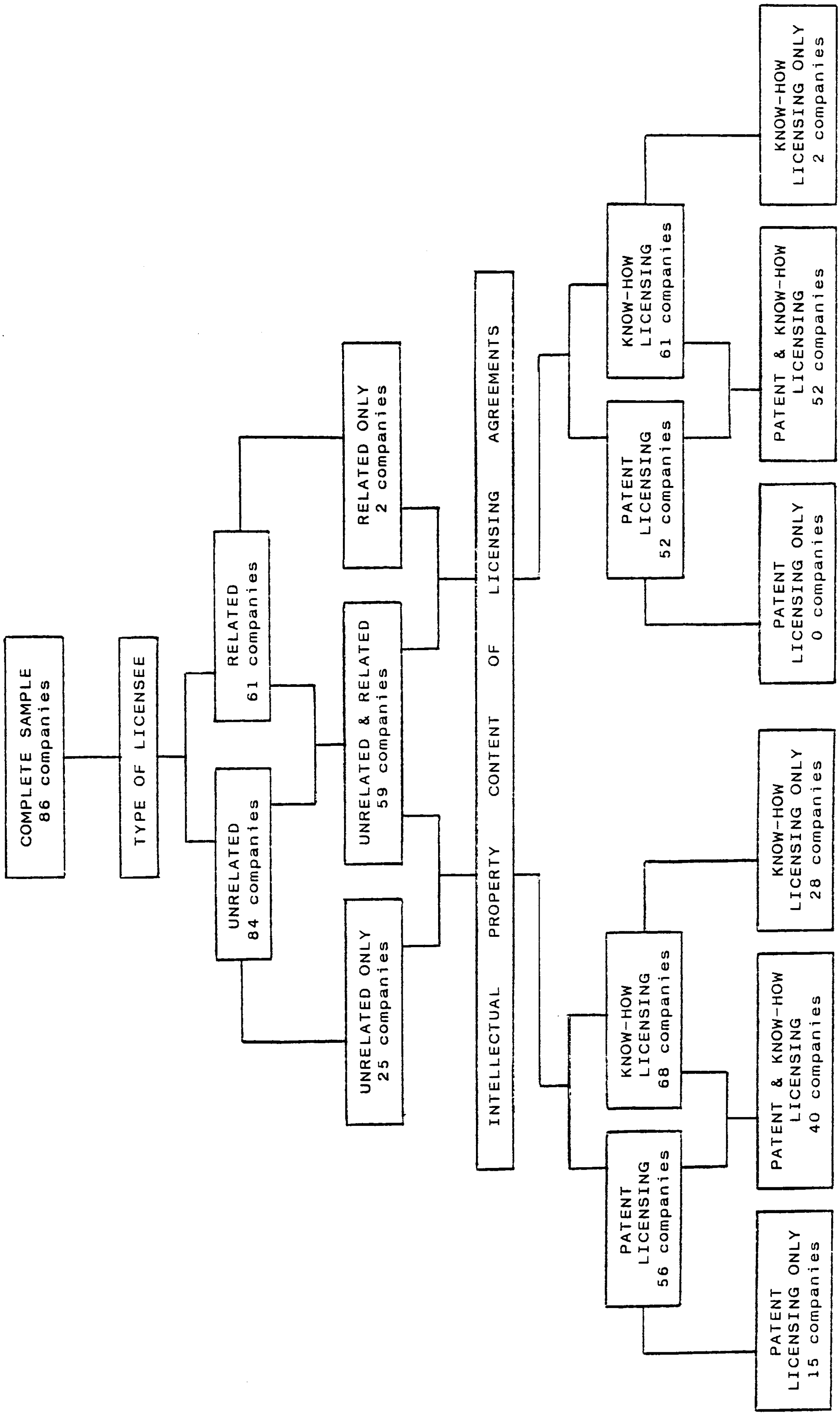
Of the four principal methods of servicing overseas markets, the companies ranked exporting as the method which they 'currently' used most frequently in developed countries (ie as of 1984). This was followed by direct investment, licensing and joint ventures. In newly industrializing and less developed countries exporting was also the most popular business mode 'currently' employed, but licensing was ranked in second place, followed by joint ventures and finally by direct investment.

The overall rankings attributed to the business methods expected to be used in the 'future' (ie over the ensuing decade) were the same as those that were 'currently' adopted in each category of country. It can be therefore be concluded that licensing was used more frequently by UK companies in NICs and LDCs than it was is in DCs, and that this pattern is likely to have prevailed throughout the 1980s.

The nature of the company sample's involvement in licensing is summarised in Figure 10-1, which sub-divides the companies according to whether or not they were involved in related or unrelated licensing, and also according to whether or not this involvement consisted of patent or know-how licensing (as defined earlier).[22]

FIGURE 10-1

BREAKDOWN OF COMPANIES BY TYPE OF LICENSEE AND INTELLECTUAL PROPERTY CONTENT OF LICENSING AGREEMENTS



All of the 86 companies, with the exception of two, were involved in unrelated licensing, and just over two-thirds of them were also involved in related licensing. Only 25 were involved solely in unrelated licensing. For both categories of licensing (related and unrelated) know-how agreements were more common than patent agreements, although the majority of companies possessed both types of agreement. Of the companies involved in either patent agreements or know-how agreements on their own, the latter were more numerous than the former.

The picture which emerged was therefore one in which most companies were active in both unrelated and related licensing, and in which know-how played a more prominent role than patents. The inclusion of trademarks was also a common component of patent and know-how licensing agreements.

The unrelated patent licensing agreements possessed by the companies were found to consist almost entirely of 'voluntary licences' (rather than 'licences of right' or 'compulsory licences') which indicated that the vast majority of the companies chose to license their patents, as opposed to having this option forced upon them. The voluntary licences possessed by the companies were fairly evenly spread between 'sole' licences, 'exclusive' licences and 'non-exclusive' licences.

There was little difference between the extent of the companies' involvement in unrelated patent and know-how licensing when measured by the number of agreements which they possessed; most of the companies possessed a relatively small number of agreements, typically less than twenty. However, when income was used as the yardstick, unrelated know-how licensing appeared to be less significant than unrelated patent licensing. For the majority of companies, income from both categories of licensing was on an upward trend in the early 1980s.

The levels of unrelated patent licensing income earned by the companies were found to be significantly related to the broad industry groups into which they were classified, with the 'processing' group associated with the highest income levels. No significant relationship was found to exist between the levels of unrelated know-how licensing income and the same industry groups.

The crosstabulations of company size with the levels of unrelated patent and know-how licensing income suggested that the larger companies tended to earn more income. The significance of these relationships were close enough to the .05 level for them to be considered as material. The significance of the relationship between unrelated patent licensing income and R&D intensity was also fairly close to the .05 level, allowing the tentative conclusion of a positive relationship between these two variables to be drawn. However, no such conclusion could be drawn about the relationship between unrelated know-how licensing income and R&D intensity as the significance level was too far removed from the cut-off level.

Finally, the following conclusions can be made about the companies' related licensing agreements.[23] Related know-how agreements appeared to generate more income than related patent agreements. Both categories of related licensing appeared to be less profitable in comparision with their unrelated licensing equivalents. The trend in income earned from related know-how licensing was more positive than that for related patent licensing, although both were less pronounced than the trends identified in earnings from unrelated licensing.

CHAPTER TEN

NOTES

1. Turnover figures were obtained from Annual Reports published in 1984 (and therefore relating to trading activities over the previous year).

2. The numbers of employees were also obtained from the 1984 Annual Reports.

3. This definition is taken from the London Stock Exchange Yearbook 1983-84, p926.

4. Sudersanam used multiple discriminant analysis to investigate the degree of homogeneity exhibited by FTA groups with respect to a number of economic variables related to industrial structure, such as profitability and financial gearing. From his analysis he identified four broad "meta- groups" which exhibited the highest degree of homogeneity, ie processing, engineering, textiles and food. (Although the latter is classified as a separate meta-group, it did exhibit characteristics which placed it close to the processing meta-group).

5. A very similar pattern was obtained when the number of employees was used as a surrogate for company size in place of sales turnover.

6. When the size categories were reduced to two ('small/medium' and 'large/very large') this had the effect of increasing the significance of the chi square statistic to 0.1286.

7. Developed countries were defined in the questionnaire as those nations which belonged to the OECD, while newly industrializing countries were defined as those nations from the non-communist developing world which were signficant exporters on a world scale (such as Mexico and India). Less developed countries were defined as those nations which comprised the remainder of the non-communist developing nations (such as Chile and Egypt).

8. The rankings derived from the government statistics reported in Table 9-5 were as follows (where 3=most used; 1=least used):

	DCs	non-DCs
Direct investment sales	3	2
Licensed sales	1	1
Exports	2	3

9. McGreevy's (1978) study produced rankings for the four business methods used in the present survey and also for management contracts. However, since management contracts always achieved the lowest overall rankings from his sample of US MNCs his results can be usefully compared with those from the present survey.

10. Friedman (1937) demonstrated that when the number of rows and/or columns is not too small the test statistic is approximated by the chi square distribution, rather than by the F distribution used for parametric analysis of variance.

11. When there are only two ranks the Friedman test becomes equivalent to the sign test, and has a relatively low power efficiency (64 per cent) compared to its parametric equivalent. The corresponding power efficiencies for Friedman tests involving four ranks and three ranks are 76 per cent and 72 per cent respectively [for further details see Blalock (1972, p353)].

12. The mean rankings for licensing in developed countries are slightly different in Table 10-11 because there were more cases for the current ranking (78) than for the future ranking (74).

13. Data are not presented for three of the 86 companies in the sample: two of the them did not complete Section II of the questionnaire as they were only involved in related licensing, while the third did not answer Question 10 in Section II of the questionnaire concerning its involvement in know-how licensing.

14. Only 76 responses were available for patents since four of the sample companies had no patents (or a negligible number of them) and six did not provide an answer to the question. Five companies did not answer the part of the question relating to know-how, resulting in a total of 81 responses for this category of intellectual property.

15. Of the 23 missing responses for patent licensing, eleven were accounted for by companies that never made their patents available to overseas subsidiaries, four were accounted for by companies having no patents (or an insignificant number of them) while the remaining eight were accounted for by companies failing to answer the question. Of the 15 missing responses for know-how licensing, eight were attributable to companies that never made their know-how available to overseas subsidiaries, while the remaining seven arose from companies that did not provide an answer to the question.

16. The categorisation of licensing agreements as either 'voluntary licences', 'licences of right' or 'compulsory licences' is derived from Maddison (1981, pp 47-48).

17. Of the 34 companies that did not provide details of the breakdown of their patent licensing agreements, 28 were involved solely in know-how licensing, two were involved solely in related licensing, while the remaining four did not answer the question.

18. The reason why there are 51 responses in Table 10-20, compared with a total of 52 in Table 10-19, is that an additional company did not answer the question. The same comment applies to Table 10-21.

19. The results of Taylor and Silberston's (1973) study of the economic impact of the UK patent system were based upon a questionnaire survey of (and follow-up interviews with) thirty quoted UK companies. These companies operated in five broad industry classes: chemicals, oil refining, electrical engineering, mechanical engineering and textiles.

20. The interval-level data on unrelated patent licensing income were not analysed because of the very small number of cases available. Similarly, the interval-level data on unrelated know-how licensing income (referred to in Section 10.4.4.) and on related patent licensing income (Section 10.4.5) and related know-how licensing income (Section 10.4.6) were not analysed for the same reason.

21. Of the 86 companies in the sample, 24 did not answer the question concerning know-how and trademark content because they were not involved in related licensing, while a further 11 did not respond because they only licensed know-how to overseas subsidiaries. Any additional non-responses arose from companies that were involved in related patent licensing and chose not to provide an answer.

22. Some of the sub-totals in Figure 10-1 do not correspond with the totals reported above them because of the influence of missing values.

23. Related licensing income was not crosstabulated against the industry, company size and R&D intensity variables because the smaller number of cases available for related licensing income would have made it very unlikely that any statistically significant relationships would be found to exist between these variables.

REFERENCES

BLALOCK, H.M., Social Statistics, 2nd ed, Tokyo: McGraw-hill, 1972.

COCHRAN, W.G., 'Some Methods for Strengthening the Common X^2 Tests', Biometrics, Vol 10, 1954, pp 417-451.

CONOVER, W.J., Practical Nonparametric Statistics, 2nd ed, Toronto: John Wiley & Sons, 1980.

FRIEDMAN, M., 'The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance', Journal of the American Statistical Association, Vol 32, 1937, pp 675-701.

LOWE, J. & CRAWFORD, N., Innovation and Technology Transfer for the Growing Firm, Oxford: Pergamon, 1984.

MADDISON, R., Patent and Patent Licensing Law in Europe: Recent Trends and Current Developments, Economist Intelligence Unit Special Report No 97, London: Economist Publications, 1981.

McGREEVY, E.R., Some Effects of Environmental Changes on Strategic Planning of US-Based Industrial Multinational Corporations, University of Arkansas, PhD Dissertation, 1978

PRATTEN, C., Economies of Scale in Manufacturing Industry, Cambridge: Cambridge University Press, 1971.

STOCK EXCHANGE PRESS, London Stock Exchange Yearbook 1983-84, Basingstoke, Hants.: MacMillan, 1984

SUDERSANAM, P.S., 'How Homogeneous Are The London Stock Exchange Industry Groups?', The Investment Analyst, Vol 72, April 1984, pp 24-31.

TAYLOR, C.T. & SILBERSTON, A., The Economic Impact of the Patent System: A Study of the British Experience, Cambridge: The University Press, 1973.

CHAPTER ELEVEN - DETERMINANTS OF THE INTERNATIONAL LICENSING DECISION

CHAPTER ELEVEN - DETERMINANTS OF THE INTERNATIONAL LICENSING DECISION

11.1 INTRODUCTION

The basic research question tackled in this chapter is as follows: what is the relative importance attached by the sample of companies to the variables found in the literature on the international licensing decision (hereafter referred to simply as the licensing decision)? An additional question addressed is whether or not there exists a smaller grouping of variables, derived from the larger set existing in the literature, which explains the decision of the companies to opt for licensing rather than FDI or exports.

The data analysed are derived from the first five questions in Section I of the questionnaire. The first aspect of the licensing decision to be explored was the 'strategic' context within which it is made. This involved finding out whether or not the licensing option was evaluated against alternative international business strategies, or whether it was considered independently of them. Those companies that did take a 'strategic view' of the licensing decision (ie did evaluate it against the available alternatives) were then asked to define the extent to which licensing was chosen solely as a result of host government controls on these alternatives.

The analysis then focused on those companies which were found to take a strategic view of licensing and for which the decision to opt for licensing was not solely a consequence of governmental restrictions on the alternatives. The companies were asked to rate a list of key variables in terms of their significance in influencing their decision to license. These variables were drawn from the review of the extant literature on international licensing and the MNC, and classified according to whether or not they were likely to indirectly promote the licensing option (by ruling out the alternatives of direct investment and exporting) or whether they were likely to be more directly associated with the licensing option itself.

The analysis of these variables consisted of two stages. Firstly, the distribution of responses to the variables was examined to assess the extent to which they were perceived to be important by the responding companies. The (nonparametric) Kendall coefficient of concordance was then used to determine the relative importance attached to these variables by the companies.

The second stage consisted of an analysis of the intercorrelations between these variables. Given the large number of variables involved (twenty one in total) and the much greater number of resulting correlations among them, it would have been difficult to analyse all the intricacies of the various interrelationships using the intercorrelation matrix alone. Factor analysis was therefore employed in order to identify a small number of underlying constructs which could be used to explain the intercorrelations among the variables. The technique is based upon the presumption that variables which have substantial intercorrelations with one another overlap in what they measure, and that there therefore exist some underlying constructs which can serve as satisfactory substitutes for the much larger number of intercorrelated variables.

The factor constructs which were identified were then examined to assess their fit with the modern theory of the MNC, represented by the all-embracing eclectic paradigm of international production, as recently restated by Dunning (1988). According to the paradigm, a firm will choose to license its technology (an ownership advantage) in the absence of any locational and internalisation advantages.

Because each of the twenty one variables that were chosen for inclusion in Questions 3 and 4 in Section I of the questionnaire correspond to either ownership, locational or internalisation parameters, it was only to be expected that the factor constructs would also be consistent with Dunning's eclectic paradigm. However, the question explored was the extent to which the groupings of variables which comprised these factor constructs had some common characteristic which would enable them to be meaningfully explained.[1]

The analysis of these twenty one variables was, however, not in itself sufficient to fully explain the propensity of companies to opt for licensing rather than direct investment or exporting. The reasons for this are twofold. Firstly, some of the motives for licensing cannot be easily articulated in terms of ownership, locational or internalisation characteristics, eg the motive of adopting licensing to diversify the form of company income as a means of reducing risk. Secondly, the response of any two companies faced with the same set of ownership, locational and internalisation parameters are likely to differ according to the particular business strategies that they are pursuing, eg a company may be prepared to license its technology in circumstances where internalisation advantages exist if in doing so it pre-empts the development of competing technologies, thereby maximising profits in the longer term.

For these reasons Question 5 asked companies to indicate the importance which they attached to a number of objectives which their pursuit of licensing may have been intended to achieve. These objectives were then analysed in the two-stage manner described above. The data were derived from all the sample companies except those for which licensing was simply a result of government restrictions on alternative business methods.

11.2 THE STRATEGIC CONTEXT OF THE INTERNATIONAL LICENSING DECISION

The first question in the Section I of the questionnaire sought to discover the extent to which the licensing option was compared against the alternatives of equity investment (ie direct investment and joint ventures) and exporting.

Table 11-1 reveals the extent to which companies evaluated licensing as an alternative to FDI, joint ventures and exporting. Of the 86 companies which answered the questionnaire, 84 replied to this question. The question was not applicable to the other two companies because they only licensed technology to their overseas subsidiaries.

TABLE 11-1

LICENSING AS A STRATEGIC DECISION

	Frequency	Per cent
Always	9	10.7
In most cases	24	28.6
In some cases	34	40.5
Very rarely	10	11.9
Never	7	8.3
Total	84	100.0

Question: In approximately how many instances does the company evaluate licensing as an alternative to direct investment, joint ventures and exporting, rather than consider it independently of these other methods of servicing a foreign market?

As the table shows, only 10.7 per cent of the companies 'always' evaluated licensing against the alternative methods of international business. The majority of companies (40.5 per cent) answered that they evaluated licensing against other methods 'in some cases', while only 8.3 per cent of the companies indicated that they 'never' evaluated licensing in this manner. For this latter group of companies, licensing was not viewed as a strategic decision as it was considered independently of the alternative methods of foreign market servicing.

It is apparent from the data in Table 11-1 that the vast majority of the sample of companies viewed licensing as a 'strategic' decision, at least for a proportion of their foreign market servicing decisions. The next question in the questionnaire explored the extent to which licensing was adopted solely as a response to host-government controls on direct investment, joint ventures or exports. The responses obtained are shown in Table 11-2.

TABLE 11-2

LICENSING AS A RESPONSE TO HOST-GOVERNMENT CONTROLS

	Frequency	Per cent
Always	6	7.8
In most cases	16	20.8
In some cases	32	41.6
Very rarely	14	18.2
Never	9	11.7
Total	77	100.0

Question: To what extent is international licensing used by the company solely as a substitute for direct investment, joint ventures and/or exports when these methods are not possible because of host-government controls?

The number of companies answering this question is seven fewer than the number answering the first question. This is because seven companies answered the first question by indicating that they never evaluated licensing against alternative methods of international business. The second question was therefore not applicable to these companies.

The distribution of responses to this question is very similar to that obtained from the first question. The majority of companies (41.6 per cent) answered that they were forced to adopt licensing because of host-government controls 'in some cases'. A slightly smaller percentage of companies (7.8 per cent) answered that licensing was 'always' adopted because of this reason, while a slightly larger percentage of companies (11.7 per cent) indicated that this reason was 'never' responsible for their decision to license.

The data in Table 11-2 suggest that those companies which do evaluate licensing against alternative business methods are unlikely to opt for licensing solely because of host-government controls on the alternatives.

11.3 NONPARAMETRIC ANALYSIS OF THE INTERNATIONAL LICENSING DECISION

11.3.1 Introduction

Having identified and filtered-out those companies which did not evaluate licensing against the alternatives available, or which only adopted licensing as a response to host-government controls on equity investment and exports, the next question sought to discover the significance which the remaining companies attached to a number of variables which could possibly rule out the FDI and exporting options in favour of licensing.[2]

The question asked these companies to rate each variable, on a scale of one to seven, to indicate their relative significance in making licensing the favoured option. Companies could also indicate if a particular factor was not applicable to them. (For example, a company producing a very light-weight product could indicate that 'high transport costs' were not applicable in the decision to forego exporting in favour of licensing.)

The relative importance of the variables listed in Question 3 was determined using the Kendall coefficient of concordance (Kendall, 1948). This statistic, W, provides a measure of the degree of association among the rankings attributed to each of the variables by the companies. The best estimate of the true ranking of any number of variables is provided, when W is significant, by the order of the various sums of ranks [Siegel (1956, p238)]. Alternatively, the mean ranks (ie the sums of the ranks divided by the number of observations) may be used since they will produce the same rank-ordering.

Since W was found to be significant, the values of the mean ranks were used to rank-order the variables in terms of their relative importance. These mean ranks were found using the Nonparametric Tests procedure on SPSS^{X} which computes the Kendall coefficient of concordance. This procedure ranked each of the N variables from N to 1 for each company and then found the mean of these ranks across all the companies for each variable. For example, the nine variables listed under 'Direct Investment' in Question 3 were assigned a rank from 9 to 1 according to the mean rankings which they obtained (where 9=most influential and 1=least influential). Thus the variable achieving the highest mean rank was ranked as 9th. The variable with the next highest mean rank was ranked as 8th, and so on, until all the factors were ranked.

The mean rank attributed to each variable should not be confused with the mean rating, which is simply the average rating obtained by each variable on the rating scale zero to seven. This statistic could have been used to rank-order the variables in terms of their relative importance. (The higher the mean rating of a particular variable, the greater would have been its relative importance to the respondents in the sample). Although the use of the mean to describe ordinal-level data is common in business research [eg Yunker (1982), Mascarenhas (1984), Newton (1984)] its calculation involves the use of arithmetic operations which, as was pointed out in Chapter Eight, may not be suitable for variables measured at the ordinal level. As a result it was not used in this study.

Another alternative to using the mean to rank-order the variables would have been to use the median, which does not involve the use of any arithmetic operations. However, because there were only eight values on the rating scale it would not have been possible to obtain unique values of the median for each variable. Of the fifteen variables listed in Question 3, none were found to have a median value that was not also possessed by another variable. Thus, whereas the mean would have enabled all the variables to be ranked in order of relative importance, the use of the median would have produced a number of variables with the same score, so it would not have been possible to discriminate between variables.[3]

The precise steps involved in the computation of the Kendall coefficient of concordance are as follows. Firstly, the ratings assigned to each of the N variables by the k responding companies are used to rank the variables from N to 1 for each company. Thus, for the 9 variables listed under 'Direct Investment' each is assigned a rank from 9 to 1 depending upon the rating it obtained on the rating scale (somewhere between 0 and 7). Similarly, the six variables listed under 'Exporting' are each given a rank from 6 to 1 based upon their ratings.

The next step in the computation of W is the summation of the ranks assigned to each of the variables by the k companies. These sums (R_j 's) are then added together and divided by the number of variables, N, to produce the mean value of the R_j 's across all variables. The individual R_j 's for each variable are then expressed as deviations from this mean value. When the sum of the squares of these deviations, s, is computed, the value of W may be derived from the following formula:

$$W = \frac{s}{\frac{1}{12} k^2 (N^3 - N)}$$

where the denominator represents the maximum possible sum of the squared deviations, ie the sum, s, which would occur with perfect agreement among the k rankings. (Where tied rankings occur, their effect is to depress the value of W. SPSS^x therefore uses a correction factor to increase slightly the value of W over what it would have been if uncorrected.) [4]

The value of W ranges between zero and one. If there is complete agreement (concordance) among the respondents about the ranks assigned to variables, the coefficient will have a value of one; if there is complete disagreement it will take a value of zero.

11.3.2 Analysis of Direct Investment and Exporting Variables

The results of the rank-ordering of the data from Question 3 are shown in Table 11-3a. The variables listed under 'Direct Investment' and 'Exporting' are ranked in order of relative importance from most important to least important. The first column of the table reports the overall rank attributed to each variable, while the final column reports the mean ranks used to determine these overall rankings.

For each variable listed, the percentage of companies ticking each point on the rating scale from zero to seven is shown (not applicable's were coded as zero's) along with the number of companies responding.[5] The distribution of responses along the rating scale gives an indication of each variable's significance in promoting the use of licensing over direct investment and exporting.

It should be noted that the mean ranks of the variables listed under 'Direct Investment' in Table 11-3a cannot be compared with the mean ranks of the variables listed under 'Exporting', since the number of variables in each group is different. Because there are nine variables in the first group the mean ranks of these variables are, on average, higher than the mean ranks of the six variables listed in the second group.

So that all the variables could be compared with one another Table 11-3b was constructed using all fifteen of them. Thus, for each company, the variable with the highest rating was assigned a ranking of 15, and so on, until the lowest rank was assigned. The mean ranks reported in Table 11-3b are therefore higher than those reported in Table 11-3a.

It is clear from both tables that the Kendall coefficient of concordance is highly significant for the variables grouped under 'Direct Investment' and 'Exporting', and for all the variables grouped together. According to Siegel (1956) "a high or significant value of W may be interpreted as meaning that the observers or judges are applying essentially the same standard in ranking the N objects

TABLE 11-3a

RANK-ORDER OF VARIABLES RELATED TO DIRECT INVESTMENT AND EXPORTING WHICH PROMOTE THE USE OF LICENSING

RANK ORDER		PERCENTAGE OF COMPANIES RESPONDING								NUMBER OF COMPANIES RESPONDING	MEAN RANK
		NOT APPLICABLE	OF NO SIGNIFICANCE		OF SOME SIGNIFICANCE			VERY SIGNIFICANT			
		0	1	2	3	4	5	6	7		
	DIRECT INVESTMENT										
1	High political risk	15.6	5.6	4.2	18.3	11.3	12.7	19.7	22.5	71	6.24
2	Exchange controls on dividends	5.7	5.7	4.3	17.1	11.4	14.3	30.0	11.4	70	6.10
3	High currency risk	5.7	7.1	5.7	12.9	21.4	12.9	17.1	17.1	70	5.85
4	Small size of market	11.6	7.2	4.3	18.8	13.0	15.9	13.0	15.9	69	5.46
5	Scarcity of management personnel	11.3	11.3	11.3	15.5	16.9	12.7	16.9	4.2	71	4.81
6	Strong local competition	7.1	12.9	10.0	15.7	22.9	11.4	10.0	10.0	70	4.73
7	High level of taxation	7.1	12.9	12.9	21.4	17.1	11.4	14.3	2.9	70	4.46
8	Shortage of investment funds	12.7	19.7	11.3	7.0	21.1	11.3	14.1	2.8	71	4.35
9	High local labour costs	12.9	30.0	14.3	14.3	15.7	8.6	4.3	0.0	70	3.00
	EXPORTING										
1	Trade restrictions	5.8	1.4	2.9	10.1	17.4	18.8	24.6	18.8	69	4.62
2	High transport costs	13.0	11.6	2.9	15.9	11.6	8.7	18.8	17.4	69	3.86
3	Different local product standards	16.2	10.3	4.4	25.0	14.7	16.2	10.3	2.9	68	3.24
4	High production costs in UK	12.9	11.4	8.6	18.6	24.3	10.0	10.0	4.3	70	3.17
5	Different local preferences	19.1	8.8	8.8	17.6	17.6	13.2	11.8	2.9	68	3.12
6	Poor local distribution facilities	20.6	11.8	5.9	22.1	17.6	8.8	11.8	1.5	68	2.99

	KENDALL COEFFICIENT OF CONCORDANCE	DEGREES OF FREEDOM	SIGNIFICANCE	SAMPLE SIZE
DIRECT INVESTMENT	W = .1770	8	.0000	68
EXPORTING	W = .1488	5	.0000	67

under study" (p237). Although the values of W reported at the foot of the tables are fairly low, they are nevertheless highly significant, thereby allowing one to conclude that there exists a community of preference among the companies in the rankings which they have assigned to the variables. The Kendall coefficient of concordance is slightly higher for the variables grouped under 'Direct Investment' than for the variables grouped under 'Exporting', with the concordance coefficient for all the variables falling in between these two values.

It is apparent from Table 11-3b that the actions of host governments have a strong influence upon the decision to favour licensing over the other two methods of international business. The four top-ranked variables are all caused by the intervention (or threatened intervention) of governments in the marketplace.[6] The other two variables caused by government interference, 'high level of taxation' and 'different local product standards', are ranked ninth and eleventh respectively. Taken together, these five variables produce a statistically significant Kendall coefficient of concordance of 0.1796, which is higher than any of the coefficients reported in Tables 11-3a and 11-3b.

The variables representing the size of the host market (ranked 5th) and the level of transport costs (ranked 6th) appear to be moderately influential in promoting the use of licensing, judging from the fairly even distribution of responses across the rating scale for these two variables.

Of the two variables listed in Question 3 concerned with resource constraints, 'scarcity of management personnel' (ranked 7th) was of greater importance in making licensing the preferred option than 'shortage of investment funds' (ranked 10th). This is not a surprising finding, given that it is easier (and less time-consuming) for multinationals to acquire capital than it is for them to acquire managerial expertise of foreign operations.

TABLE 11-3b

RANK-ORDER OF VARIABLES RELATED TO DIRECT INVESTMENT AND EXPORTING WHICH PROMOTE THE USE OF LICENSING

RANK ORDER		PERCENTAGE OF COMPANIES RESPONDING								NUMBER OF COMPANIES RESPONDING	MEAN RANK
		NOT APPLICABLE	OF NO SIGNIFICANCE		OF SOME SIGNIFICANCE			VERY SIGNIFICANT			
		0	1	2	3	4	5	6	7		
1	Trade restrictions	5.8	1.4	2.9	10.1	17.4	18.8	24.6	18.8	69	10.70
2	High political risk	15.6	5.6	4.2	18.3	11.3	12.7	19.7	22.5	71	10.18
3	Exchange controls on dividends	5.7	5.7	4.3	17.1	11.4	14.3	30.0	11.4	70	9.75
4	High currency risk	5.7	7.1	5.7	12.9	21.4	12.9	17.1	17.1	70	9.54
5	Small size of market	11.6	7.2	4.3	18.8	13.0	15.9	13.0	15.9	69	9.05
6	High transport costs	13.0	11.6	2.9	15.9	11.6	8.7	18.8	17.4	69	8.56
7	Scarcity of management personnel	11.3	11.3	11.3	15.5	16.9	12.7	16.9	4.2	71	7.95
8	Strong local competition	7.1	12.9	10.0	15.7	22.9	11.4	10.0	10.0	70	7.62
9	High level of taxation	7.1	12.9	12.9	21.4	17.1	11.4	14.3	2.9	70	7.22
10	Shortage of investment funds	12.7	19.7	11.3	7.0	21.1	11.3	14.1	2.8	71	7.19
11	Different local product standards	16.2	10.3	4.4	25.0	14.7	16.2	10.3	2.9	68	7.18
12	High production costs in UK	12.9	11.4	8.6	18.6	24.3	10.0	10.0	4.3	70	6.97
13	Different local preferences	19.1	8.8	8.8	17.6	17.6	13.2	11.8	2.9	68	6.77
14	Poor local distribution facilities	20.6	11.8	5.9	22.1	17.6	8.8	11.8	1.5	68	6.38
15	High local labour costs	12.9	30.0	14.3	14.3	15.7	8.6	4.3	0.0	70	4.95

KENDALL COEFFICIENT OF CONCORDANCE	DEGREES OF FREEDOM	SIGNIFICANCE	SAMPLE SIZE
W = .1503	14	.0000	65

The variable 'strong local competition' occupies the middle position in Table 11-3b and has a reasonably symmetric distribution of responses across the rating scale, peaking at the mid-point of the scale. This suggests that the variable has a moderate degree of influence upon the licensing decision. The two variables concerned with the preference of local consumers and the quality of local distribution facilities occupy the penultimate two positions in the table. With the majority of responses clustered towards the middle of the rating scale, it would appear that these two variables also have a moderate degree of influence upon the licensing decision.

The most insignificant variable influencing the decision to adopt licensing is clearly the price of labour in local (ie foreign) markets, for this was ranked the lowest of the fifteen variables listed in Question 3. None of the companies thought it was 'Very Significant', while 30 per cent of them believed that it was 'Of no Significance'. The distance between this mean rank and the the next highest mean rank is larger than the distance between the mean rankings of all the other adjacent variables in the table.

The cost of production in the UK was ranked 12th by the companies, indicating that this variable was slightly more important in making licensing a preferred option over exporting than the existence of high foreign labour costs were in making licensing a preferred option over FDI.

11.3.3 Analysis of Licensing Variables

Having discovered the relative importance of variables associated with direct investment and exporting in the licensing decision, the next question aimed to find out the relative importance of a group of variables associated with licensing itself. It therefore asked the companies to rate six variables in terms of their relative significance in promoting the use of licensing rather than direct investment and exports. The results are shown in Table 11-4, which follows the same format as the previous two tables.[7]

TABLE 11-4

RANK-ORDER OF VARIABLES WHICH MAKE LICENSING MORE ATTRACTIVE THAN DIRECT INVESTMENT AND EXPORTS

RANK ORDER		PERCENTAGE OF COMPANIES RESPONDING								NUMBER OF COMPANIES RESPONDING	MEAN RANK
		NOT APPLICABLE	OF NO SIGNIFICANCE		OF SOME SIGNIFICANCE			VERY SIGNIFICANT			
		0	1	2	3	4	5	6	7		
1	Technologically competent local firms	0.0	1.4	2.8	7.0	19.7	14.1	33.8	21.1	71	5.16
2	Limited local market knowledge	5.6	5.6	8.5	18.3	25.4	15.5	15.5	5.6	71	3.86
3	Weaker exchange controls on royalties	4.3	17.1	5.7	21.4	21.4	12.9	14.3	2.9	70	3.54
4	Lower tax level on royalties than dividends	2.9	18.6	10.0	17.1	24.3	12.9	10.0	4.3	70	3.31
5	Weak patent protection legislation	10.0	27.1	18.6	17.1	10.0	10.0	2.9	4.3	70	2.71
6	Weak anti-trust legislation	12.9	31.4	18.6	11.4	8.6	14.3	0.0	2.9	70	2.41

KENDALL COEFFICIENT OF CONCORDANCE	DEGREES OF FREEDOM	SIGNIFICANCE	SAMPLE SIZE
W = .3344	5	.0000	70

It is clear from this table that the variable which has the most impact in making licensing more attractive than direct investment and exports is the availability of technologically competent local firms. A total of 54.9 per cent of responding companies gave this variable a rating of either '6' or '7' (the 'Very Significant' end of the scale) while only 4.2 per cent of the companies ticked either the first or the second boxes on the scale. The distance between the mean rank of this variable and the mean rank of the next most significant variable, 'Limited local market knowledge', is greater than the distances between the mean ranks of the other adjacent variables in the table.

The four variables which are due to government intervention are the lowest ranked variables in the table. The most important of these is the strength of exchange controls on royalties compared to those on dividends, followed by the comparative tax treatment of royalties and dividends. The two least important variables are those relating to patent protection legislation and anti-trust laws respectively.

It is evident from the table that the distribution of responses to the latter two variables are skewed towards the lower end of the rating scale. This suggests that the presence of weak patent protection legislation and weak anti-trust legislation in host countries are not significant influences upon the licensing decision.

11.3.4 Analysis of Direct Investment, Exporting and Licensing Variables

In order to compare the mean ranks of the variables listed in Table 11-4 with the mean ranks of the variables listed in the previous two tables, all of the variables from Questions 3 and 4 in the questionnaire were rank-ordered. The results are shown in Table 11-5, which lists all of the twenty one variables from these two questions, in order of relative importance. It also reports the mean rank and the number of responding companies for each variable, along with the (statistically significant) Kendall coefficient of concordance.

TABLE 11-5

OVERALL RANK-ORDER OF VARIABLES PROMOTING THE USE OF LICENSING

RANK ORDER		NUMBER OF COMPANIES RESPONDING	MEAN RANK
1	Technologically competent local firms	71	16.58
2	Trade restrictions	69	14.97
3	High political risk	71	14.04
4	Exchange controls on dividends	70	13.70
5	High currency risk	70	13.36
6	Small size of market	69	12.58
7	High transport costs	69	11.98
8	Limited local market knowledge	71	11.84
9	Scarcity of management personnel	71	11.00
10	Weaker exchange controls on royalties	70	10.58
11	Strong local competition	70	10.57
12	Lower tax level on royalties than dividends	70	10.36
13	High level of taxation	70	10.12
14	Shortage of investment funds	71	9.94
15	Different local product standards	68	9.83
16	High production costs in UK	70	9.72
17	Different local preferences	68	9.25
18	Poor local distribution facilities	68	8.92
19	Weak patent protection legislation	70	7.80
20	Weak anti-trust legislation	70	7.02
21	High local labour costs	70	6.83

KENDALL COEFFICIENT OF CONCORDANCE	DEGREES OF FREEDOM	SIGNIFICANCE	SAMPLE SIZE
W = .1927	20	.0000	65

Table 11-5 shows that the most significant variable affecting the decision to adopt licensing rather than any of the alternatives is the same variable that was ranked first in Table 11-4: the availablility of technologically competent candidate licensees. The next six variables listed in Table 11-5 are the same six variables listed at the top of Table 11-3b. The variable at the bottom of Table 11-5 is also positioned at the bottom of Table 11-3b, while the two variables ranked immediately above it occupy the bottom two positions in Table 11-4.

An interesting feature of the rankings in Table 11-5 is that greater importance is attached to the existence of exchange controls on dividends (ranked fourth) than the existence of weaker exchange controls on royalties (ranked tenth). It would thus appear that the sample of companies were less reliant upon royalties as a means of repatriating income from foreign licensees than they were upon dividends as a means of repatriating income from foreign subsidiaries.

This feature may be explained by the fact that royalties are only one means of obtaining remuneration from licensing agreements. Licensors may extract a return via lump-sum fees, reciprocal technology exchanges, margins on components supplied to the licensee, etc. The responses to Questions 8 and 18 in Section II of the questionnaire reveal that only 23 per cent of companies obtained all of their patent and know-how licensing income in the form of annual royalties based upon licensee sales.

11.4 FACTOR ANALYSIS OF THE INTERNATIONAL LICENSING DECISION

11.4.1 Introduction

The term 'factor analysis' encompasses a number of computational techniques that are used to identify a relatively small number of constructs (ie factors) that can be used to represent relationships among a larger number of inter-related variables. Factor analysis is thus a means whereby relationships among variables are represented as parsimoniously as possible. This reduction in the number of variables reveals the underlying factors that are being measured.

Factor analysis is based upon the premise that variables which are correlated with one another share common factors. A set of variables must therefore be sufficiently inter-correlated for common factors to be identified. It is assumed that each variable can be represented by a linear combination of these common factors, plus a unique factor to represent any part of the variable that cannot be explained by the common factors.

The mathematical model for what is termed 'classical' factor analysis is known as the 'common factor model'. It states that the ith variable, X_i , may be represented as a linear function of common and unique factors, as follows:

$$X_i = a_{i1}F_1 + a_{i2}F_2 + \dots + a_{ik}F_k + U_i$$

where the F's are the common factors, the U is the unique factor, and the a's are the coefficients used to combine the k factors. The unique factors are assumed to be uncorrelated with each other and with the common factors. A good factor solution is achieved when each variable possesses a large coefficient for just one of the common factors.

The technique which was used in this study is based upon the 'principal components model'. This can be regarded as a special case of the common factor model as it assumes that there are no unique factors. The model may therefore be expressed as follows:

$$X_i = a_{i1}F_1 + a_{i2}F_2 + \dots + a_{ik}F_k$$

The advantage of the principal components model over the common factor model is that it enables the factors to be expressed as unique linear functions of the original variables. The jth factor, F_j, may therefore be denoted as follows:

$$F_j = \sum_{i=1}^{p} W_{ji}X_i = W_{j1}X_1 + W_{j2}X_2 + \dots + W_{jp}X_p$$

where the W_i 's are regression-type coefficients called 'factor loadings', and p represents the number of variables.

The purpose of factor analysis based upon the principal components model is to explain as much of the total variance in a dataset as possible with as few factors (ie principal components) as possible. The first factor to be extracted is the weighted linear combination of variables that accounts for the largest amount of the total variance in the data. The second factor to be extracted is the weighted linear combination of variables that accounts for the maximum amount of the remaining variance not already accounted for by the first factor. In addition, this second factor is uncorrelated with the first factor.

This process of extracting mutually uncorrelated (ie orthogonal) factors from the data continues until all of the variance is accounted for. At this point, however, the number of factors generated equals the number of original variables, so nothing has been gained. However, since most of the variance in the data is usually accounted for by the first few factors, these are usually deemed to be adequate enough to represent the data. These factors are then retained for further examination and the other factors are dropped from the analysis.

The factor analysis of the questionnaire data reported in this chapter falls under the category of what is commonly termed 'R type analysis' (rather than 'Q type analysis') since the aim was to examine the relationships between variables rather than the relationships between companies.

11.4.3 Analysis of Direct Investment and Exporting Variables

Factor analysis generally proceeds in three steps. Firstly, the correlations between variables are examined to determine if the use of factor analysis is warranted. Assuming this is the case, factors are then extracted from the data to represent groupings of variables. Finally, the factors which account for the bulk of the variance in the data are transformed by means of rotation, in order to make them more interpretable.

Each of these steps is now described for the fifteen direct investment and exporting variables.

Step One: Examination of Correlation Matrices

The first step consisted of an examination of the simple correlations and partial correlations produced by the variables, to determine if they were suitable for factor analysis.

This began with an assessment of the strength of the simple correlations between the variables. The purpose of this was to determine if there were enough correlations of sufficient strength to suggest that the variables shared common factors. It can be seen from the correlation matrix in Appendix 11.1 that almost half (49 per cent) of the coefficients were greater than 0.3 in absolute value, which suggested that there were likely to be some common factors which could explain groupings of these variables.

Bartlett's test of sphericity was then applied to the data in the correlation matrix to determine if the matrix could be construed as an 'identity' matrix, ie a matrix in which all diagonal terms are one and all off-diagonal terms are zero. If this was found to be the case the use of factor analysis would have been inappropriate [Norusis (1985, p128)]. However, Bartlett's test statistic, which is based upon the chi-square transformation of the determinant of the correlation matrix, had a large value and a correspondingly small significance level (see the foot of the correlation matrix in Appendix 11.1). It was therefore concluded that the correlation matrix was not sufficiently close to an an identity matrix to rule out the use of factor analysis.

The strength of the relationship among variables was assessed using partial correlation coefficients. If variables share common factors the partial correlation coefficients between pairs of variables should be small when the linear effects of the other variables are removed. These partial correlations are then estimates of the correlations between the unique factors. If the assumptions of factor analysis are met they should be close to zero, since unique factors are assumed to be orthogonal.

To assess whether the partial correlation coefficients were sufficiently close to zero, the 'anti-image' correlation matrix produced by the variables was examined.[8] Anti-image correlations are simply negatives of partial correlation coefficients. If a high proportion of large coefficients was found, the use of the factor analysis model would have had to be reconsidered [Norusis (1985, p129)]. However, as no such pattern was evident in the anti-image correlation matrix (see Appendix 11.1) there were no grounds for questioning the use of a factor analytic model on the basis of this criterion.

Another method of assessing the suitability of the factor model to a set of variables is to compute a statistic known as the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. This is an index which compares the magnitudes of simple correlation coefficients with the magnitudes of partial correlation coefficients. The index ranges in value from zero to one. It is close to one when the sum of the squared partial correlation coefficients between all pairs of variables is small in comparison to the sum of the squared correlation coefficients.

If small values of the KMO index are obtained factor analysis may be inappropriate, since small values indicate that correlations between pairs of variables cannot be explained by other variables. A rule of thumb for determining when the value of a KMO statistic is sufficiently low to rule out the use of factor analysis has been provided by Kaiser (1974), who suggested that values below 0.5 are unacceptable.[9] As the value of the KMO statistic was calculated as 0.73, the use of factor analysis was deemed to be justifiable.

KMO statistics were also calculated for each individual variable to determine whether any of them ought to have been eliminated from the factor analysis. The method of calculating these individual statistics is similar to the method used for calculating the overall KMO statistic; rather than including all pairs of variables in the calculation, only calculations involving an individual variable are included. The KMO indices of sampling adequacy for each individual variable are printed on the diagonal of the anti-image correlation matrix in Appendix 11.1. As none of these indices fell below 0.5, no variables were removed from the factor model.

Step Two: Extraction of Factors

To begin with, factors (ie principal components) which accounted for all of the variance in the data were obtained. The results of this exercise are shown in the third table in Appendix 11.1. The first column of this table simply lists these initial factors, in descending order of importance. The number of factors (fifteen) corresponds to the number of variables, since the factors account for all of the variance in the data.

The second column of the table contains the 'eigenvalues' of each factor. These statistics measure the percentage of total variance which a factor accounts for. For simplicity, all variables and factors were expressed in standardized form, with a mean of zero and a standard deviation of one. Since there were fifteen variables and each was standardized to have a variance of one, the total variance explained by all of the factors was fifteen. The penultimate column contains the percentage of total variance attributable to each factor, while the final column reports the cumulative percentage.

Having established how much variance in the data was accounted for by each of the factors, the next step involved deciding how many of these factors to extract for further analysis. This decision was made using the rule of thumb known as 'Kaiser's criterion' [after Kaiser (1974)]. This states that only factors that account for variances greater than one (ie that possess eigenvalues greater than one) should be extracted. This criterion derives from the observation that factors with eigenvalues below one are no better than single variables, since each variable has a variance of one. Five factors satisfied the Kaiser criterion and were thus selected for further analysis.

The relative magnitudes of the eigenvalues possessed by all of the factors are represented in the 'scree' plot, depicted in Appendix 11.1. This plot was proposed by Cattell (1966) as a means of visually identifying the maximum number of factors to be extracted; his 'scree test' states that this number can be identified from the point at which the curve begins to level off. Beyond this point there exists what Cattell described as "factorial litter or scree" (after the geological term for the debris which collects on the lower parts of rocky slopes).

Examination of the scree plot in Appendix 11.1 reveals that the actual point at which the plot begins to level off is difficult to identify, since it apppears to be kinked in one or two places. For this reason the scree plot was not used to identify the number of factors to extract. It does, however, highlight the fact that the first factor accounts for the bulk of the variance in the data.

The initial 'factor matrix' which was derived from the five factors which satisfied the kaiser criterion is shown in Table 11-6.[10] It contains the regression-type coefficients known as 'factor loadings', which indicate the weight assigned to each of the five factors by the fifteen standardized variables. Because the factors are uncorrelated with one another, the factor loadings also represent the correlations between the factors and the variables.

TABLE 11-6

INITIAL FACTOR MATRIX: DIRECT INVESTMENT & EXPORTING VARIABLES

VARIABLE	FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V	h^2
RULFDI03	.73498	-.35301	.00363	.32883	.07386	.77840
RULEXP06	.70701	.17737	-.14829	-.49925	-.22454	.85299
RULFDI06	.70088	-.46239	-.08463	.10581	.14018	.74305
RULEXP04	.66022	.30293	.05530	-.02672	-.13736	.55030
RULFDI04	.63936	-.01114	.15877	-.33176	.21261	.58938
RULEXP05	.62845	.45394	-.16954	-.34915	-.33229	.86208
RULFDI05	.59675	-.39769	.17420	-.27172	.05234	.62118
RULFDI08	.58618	.14764	.22815	.14068	.35337	.56212
RULFDI09	.57904	-.38455	-.04181	.15765	-.45011	.71236
RULFDI02	.55419	.22055	.54890	.32397	-.06907	.76678
RULEXP03	.52419	-.48067	-.28853	.14854	-.27475	.68662
RULEXP02	.52001	.40696	-.46003	.25719	.16370	.74060
RULEXP01	.50645	.50886	-.26666	.44196	-.01079	.78199
RULFDI01	.42845	.14966	.69246	-.03228	-.00956	.68661
RULFDI07	.52066	-.09660	-.30504	-.24284	.57389	.76179
EIGENVALUES	5.36938	1.73163	1.41016	1.16824	1.01684	10.69625
% VARIANCE	35.8	11.5	9.4	7.8	6.8	71.3

The final column of the factor matrix headed by h^2, contains the 'communalities' of the variables. They were obtained by calculating the sum of the squared factor loadings for each variable over all the extracted factors. These statistics represent the proportions of the variances of the variables that can be accounted for by the five factors. A variable's communality is therefore a measure of its 'common variance', ie the variance that it shares in common with the other variables in the matrix. The proportion of the total variance that is not shared in common with the other variables ($1-h^2$) represents a variable's 'unique variance'.

Communalities range in value from zero (indicating that a variable possesses no variance in common with other variables) to one (indicating that all of the variance in a variable is common to the other variables). Communalities are useful for determining whether or not a variable is amenable to factor analysis. A low communality, indicating a high proportion of unique variance, suggests that a variable cannot be explained very well by the set of common factors that are extracted, and that it therefore shares little in common with the other variables being studied.

The cutoff level used in this study for rejecting variables for subsequent stages of factor analysis was a communality value of 0.3 [as suggested by Child (1970, p42)]. However, all of the variables had values well above this level, and so all were included for further analysis.

The penultimate row of Table 11-6 contains the eigenvalues of each of the initial factors. Since these are simply the sums of the squared loadings for each factor over all the variables, the sum of the eigenvalues is necessarily identical to the sum of the communalities for each variable. The final row of the table simply re-expresses the eigenvalues to indicate the amount of total variance accounted for by each factor.

It is apparent from the initial factor matrix that the variables and factors are not correlated in any interpretable pattern; most variables have moderate-size loadings with a number of factors. This matrix was therefore rotated to produce a matrix with a simpler structure, ie one in which the variables were correlated highly with only one factor, and each factor was highly correlated with a relatively small number of variables. This third step in the factor analysis process is now described.

Step Three: Rotation and Interpretation of Factors

The initial factor matrix was rotated using the 'varimax' method of rotation, proposed by Kaiser (1959). This method is so-named because it rotates factors in order to maximize the variance of their squared loadings.[11] It is one of a number of 'orthogonal' rotation methods, ie techniques which ensure that the rotated axes (ie factors) are kept in the same orientation to one another so that they remain at right angles after rotation. The factors therefore remain uncorrelated with one another.[12]

A desirable property of orthogonal rotation is that the amount of the total variance accounted for by the factors under consideration is unaffected by the rotation. The goodness of fit of a factor solution is therefore unaffected. The total variance is simply redistributed among the factors, so that the percentage of variance accounted for by each factor changes.[13]

The rotated factor matrix, obtained using Kaiser's varimax algorithm, is shown in Table 11-7. Factor loadings with a value greater than 0.3 are highlighted in bold print. This value is a fairly commonly used cutoff level for determining whether orthogonal factor loadings are significant for interpretive purposes [see eg Child (1970), (Comrey, 1973)]. The square of 0.3 gives 0.09, indicating that a variable with this factor loading has roughly 10 per cent of its variance in common with the factor.

To assist in interpreting the factors, the rotated factor matrix was sorted to identify those groups of variables whose highest loadings were on the same factor. Variables were then classified under one of the five factors on the basis of these highest loadings. The resulting groups of variables are highlighted by the rectangular blocks in Table 11-7. Four variables were not classified under any of the factors because they had very similar loadings on two or more factors; it could not therefore be confidently asserted that they belonged to only one factor.

TABLE 11-7

ROTATED FACTOR MATRIX: DIRECT INVESTMENT AND EXPORTING VARIABLES

VARIABLES		FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V
RULEXP03	Trade restrictions	.80102	.13640	-.10463	.09401	.08118
RULFDI09	Exchange controls on dividends	.79155	.23781	.14270	.03317	-.08825
RULFDI03	High political risk	.71103	-.03249	.31646	.25380	.32744
RULFDI06	High currency risk	.69238	.03657	.15866	.10235	.47610
RULFDI05	High level of taxation	.47178	.25938	.26251	-.24752	.44850
RULEXP05	Different local product standards	.07815	.86328	.12806	.30282	.05127
RULEXP06	Different local preferences	.22404	.84207	.09396	.09337	.27598
RULEXP04	Poor local distribution facilities	.18699	.49447	.38012	.33720	.11244
RULFDI02	Scarcity of management personnel	.18447	.08890	.81680	.23640	-.04239
RULFDI01	Shortage of investment funds	.01636	.18627	.79631	-.11075	.07264
RULFDI08	Small size of market	.09855	.04682	.52249	.30797	.42705
RULEXP01	High transport costs	.10496	.18359	.19126	.83691	-.01659
RULEXP02	High production costs in UK	.09650	.21837	-.02072	.79184	.23698
RULFDI07	Strong local competition	.12353	.14560	-.08330	.20580	.82222
RULFDI04	High local labour costs	.15956	.39090	.34377	-.02199	.54079
PER CENT OF VARIANCE EXPLAINED BY FACTORS		17.8%	14.3%	14.2%	12.6%	12.4%
INTERPRETATION OF FACTORS		Host country risk	Export marketing costs	Resource Constraints	Export production/ distribution costs	Host country level of industrial development

It can be seen from Table 11-7 that five variables had their highest loadings on the first factor. However, only the first four of these variables were classified as belonging to Factor I since the difference between the loadings of the fifth variable on Factors I and V was too small to confidently place it under only one of these factors. This variable ('high level of taxation') was therefore left unclassified.

Factor I has been interptreted as representing 'host country risk' since the variables classified under it are measurements, to varying degrees, of the risk involved in either investing in or trading with the host country. It accounts for the largest proportion of variance in the data (17.8%). The use of the term 'host country risk' in this context should not be confused with the more specific term "country risk", which is usually employed to denote the possibility of an unexpected event within a host country influencing the ability of a company or a government to repay an international bank loan.[14] The term is used here simply to denote the risks involved in exporting to or producing in a host country.

These risks, as represented by Factor I, are fourfold. Firstly, 'high political risk' (RULFDI03), which refers to the possibility that host government actions may adversely affect business operations within the host country. Secondly, 'trade restrictions' (RULEXP03) which denotes the use of barriers to trade such as tariffs and quotas, and which may be regarded as representing a form of "trading risk". This type of risk will also impact upon foreign production where companies possess internationally-integrated production processes which involve cross-border intermediate product flows.

Thirdly, 'high currency risk' (RULFDI06) which denotes the possibility that the home country value of the cash flows and profits earned in the host country will vary as a result of currency fluctuations. Fourthly, 'exchange controls on dividends' (RULFDI09) which refers to the possibility that a company may be unable to repatriate all of its income from the host country, and which may therefore be regarded as representing "repatriation risk". This latter category of risk may be viewed as a sub-category of political risk, since it stems from the action of the host government.

The variable with the highest loading on Factor I was 'trade restrictions', which also had the highest mean rank of all the direct investment and exporting variables when they were rank-ordered using the Kendall coefficient of concordance (see Table 11-3b). It would thus appear that government intervention in international product markets is the most significant form of government activity promoting the use of licensing.

The second factor in Table 11-7 accounts for a slightly smaller proportion of the variance in the data (14.3%). Although three variables had their highest loadings on this factor, only the first two variables were classified under Factor II. Both of them are concerned with attributes of the local (ie host) market which necessitate the modification of exported products in order to satisfy local product standards and local preferences, and which therefore increase the costs of marketing these products. This factor has therefore been labelled as an 'export marketing costs'.

The third factor, which is also comprised of two variables, accounts for 14.2% of the variance in the data. This factor has been labelled as 'resource constraints' since the variables are concerned with shortages of the managerial and financial capital necessary for direct investment. These resource constraints may be 'internal' in nature if there is insufficient management expertise or retained earnings within the company, or they may be 'external' if the company is unable to obtain the management skills or financial capital it requires from managerial labour and capital markets respectively.

The third variable which loaded highly on Factor III, 'small size of market', was not classified as belonging to this factor as it also had reasonably high loadings on Factors IV and V. Nevertheless, it is also a reason for direct investment being ruled out, and is likely to be closely related to the two variables which comprise Factor III (the smaller the size of a foreign market, the less chance there will be of a company's investment in managerial and financial resources being recouped).

The fourth factor is comprised of two variables and accounts for 12.6% of the variance in the data. Since the variables are concerned with two of the principal costs which affect the viability of the exporting option (domestic production and transport costs) this factor has been labelled simply as 'export production/transportation costs'. Transportation costs can be regarded in this context as the costs involved in the physical handling of a product (loading, shipment, warehousing etc) between the home and the overseas market.

These costs form only part of the overall costs involved in shifting a product from the home producer to the ultimate consumer in the overseas market. The remainder is comprised of the cost of distribution within the overseas market. These costs are captured by the variable RULEXP04, 'poor local distribution facilities', which has its highest loading on the 'export marketing costs' factor. This is not surprising, since distribution (or 'place') decisions are part of the four 'P's' of the traditional marketing mix.[15]

The fifth and final factor accounts for 12.4% of the variance in the data. It is comprised of only one variable, 'strong local competition', although 'high local labour costs' also loaded highly on it. This factor has been interpreted as reflecting the 'host country level of industrial development' since competitively strong firms and high wage economies tend to be associated with the more advanced industrial countries.

The fifteen direct investment and exporting variables which comprise the five factors in Table 11-7 correspond to either ownership, locational or internalisation advantages as defined by Dunning's eclectic paradigm of international production. Two of the variables, 'scarcity of management personnel' and 'shortage of investment funds', are measures of (the lack of) ownership advantages, while the remainder represent the lack of locational advantages associated with either the home or the host market. These in turn affect the advantages associated with internalising production in the home market (and therefore serving foreign markets by exports) and internalising production in the overseas market.

The five factors can also be reconciled with Dunning's eclectic paradigm. The four variables which comprise the first factor in Table 11-7 may be regarded as "government-induced market imperfections" since the risks which they represent are caused, directly or indirectly, by the intervention of governments. Factor I therefore falls into the category of market imperfection which Dunning's eclectic paradigm terms "structural market failure". Each of the variables comprising Factor I affect the locational and internalisation advantages associated with host markets; eg the existence of exchange controls on dividends in a host market lowers the locational advantage associated with that market and therefore lowers the advantage of internalising production within it.

The second and fourth factors affect the locational advantages associated with the overseas and home markets respectively, which in turn affect the incentive to internalise production. Factor II, 'export marketing costs', reflects characteristics of the overseas market which affect the cost of distributing a product within it and the cost of tailoring the product to take account of differing product standards and national tastes. Factor IV, 'export production/transportation costs' is comprised of domestic production costs, which depend to some extent upon factor endowments in the home market, and transport costs, which arise from a naturally-occurring, structural market imperfection (ie distance). These two categories of cost lower the locational advantage (and hence the internalization incentive) associated with the home market.

The third factor, 'resource constraints', corresponds to the lack of the complementary ownership advantages (management personnel and investment funds) which a firm must possess to enable it to exploit any advantages in technology via direct investment. These ownership advantages may be regarded as asset advantages rather than transaction advantages. It should be noted, however, that the possession of the latter in the form of arbitrage and leverage opportunities (which are generally a function of multinationality and size) will enhance a firm's fund-raising potential.

The fifth factor, 'host country level of industrial development', will also affect the locational and internalization advantages of the host country, and will reflect, to some extent, the factor endowments which it possesses.

11.4.3 Analysis of Licensing Variables

The six variables listed in Question 4 were also factor analysed to reveal the underlying dimensions which they were measuring.

Step One: Examination of Correlation Matrices

Both the simple correlation matrix and the anti-image correlation matrix suggested that the licensing variables were suitable for factor analysis (see Appendix 11.2). One third of the coefficients in the former matrix had values greater than 0.3, thus lending support to the proposition that the variables shared common factors. In addition, the value of Bartlett's test statistic was large and the associated significance level correspondingly small, enabling the hypothesis that the correlation matrix was an identity matrix to be rejected.

Examination of the anti-image correlation matrix revealed a low number of large coefficients, thus lending further support to the proposition that the variables shared common factors. In addition, both the overall and individual KMO measures of sampling adequacy were greater than 0.5.

Step Two: Extraction of Factors

The eigenvalues of the six principal components which accounted for all of the variance in the data are reported in the third table in Appendix 11.2. The first two factors were extracted for further analysis, as they both satisfied the Kaiser criterion (eigenvalues greater than one). The scree plot in Appendix 11.2 gives a visual impression of the relative importance of the eigenvalues associated with each factor.

The initial factor matrix derived from the two factors which satisfied the Kaiser criterion is shown in Table 11-8. All of the communalities reported in the final column of this matrix were above the cut-off level of 0.3 used in this study, except the variable measuring the availablity of technologically competent candidate licensees (FAVLIC03). This variable was therefore excluded from further analysis.

TABLE 11-8

INITIAL FACTOR MATRIX: LICENSING VARIABLES

VARIABLE	FACTOR I	FACTOR II	h^2
FAVLIC06	.75277	-.48927	.80604
FAVLIC02	.74989	.55374	.86897
FAVLIC05	.74303	-.56354	.86967
FAVLIC01	.66188	.66187	.87615
FAVLIC04	.54441	-.29974	.38622
FAVLIC03	.47133	.20557	.26441
EIGENVALUES	2.63770	1.43376	4.07146
% VARIANCE	44.0	23.9	67.9

As no interpretable pattern was obvious from the factor matrix in Table 11-8, it was rotated using the varimax method.

Step Three: Rotation and Interpretation of Factors

The rotated factor matrix, minus the excluded variable, is shown in Table 11-9. The format of this table is the same as that of Table 11-7, with factor loadings greater than 0.3 highlighted in bold and the variables classified under the two factors enclosed by rectangular blocks.[16]

The first factor is comprised of two variables which are concerned with the effect of host country legislation on the propensity to adopt licensing. This factor has therefore been interpreted as the host country legal environment, insofar as it affects the licensing decision.

The two aspects of host country legislation which were included in Question 4 were patent protection and anti-trust. The first aspect was dealt with by asking companies the extent to which weak patent protection legislation led them to favour licensing. The reasoning here was that weak protection will increase the likelihood of illegal patent use by local companies and therefore lead to an increase in licensing as a means of pre-empting this illegal use.

The second aspect of host country legislation, anti-trust, was dealt with by asking companies the extent to which the presence of weak legislation in this area was likely to increase their propensity to adopt licensing. The argument here was that the absence of strong anti-trust legislation will tend to induce a higher level of licensing, ceteris paribus, as companies will find licensing a more attractive option if they are able to include clauses in their licensing agreements which restrict the activities of their local licensees (eg preventing them from exporting to the licensor's home market).

The second factor which emerged from the rotated factor matrix has been interpreted as representing the host country's fiscal and repatriation policies. The two variables which loaded on this factor are concerned with the differential taxation of royalties and

TABLE 11-9

ROTATED FACTOR MATRIX: LICENSING VARIABLES

VARIABLES		FACTOR I	FACTOR II
FAVLIC01	Weak patent protection legislation in host countries	$\boxed{.94407}$	.06782
FAVLIC02	Weak anti-trust legislation in host countries	$\boxed{.93148}$	.16212
FAVLIC05	Lower tax rate on royalties than dividends	.04183	$\boxed{.81609}$
FAVLIC06	Weaker exchange controls on royalties	.08512	$\boxed{.79182}$
FAVLIC04	Limited knowledge of host country market	.35879	.47274
PER CENT OF VARIANCE EXPLAINED BY FACTORS		37.9%	30.9%
INTERPRETATION OF FACTORS		Host country legal environment	Host country fiscal/re patriation policy

dividends, and differences in the level of exchange controls applied to royalties and dividends.

Comparison of these two factors reveals that Factor I (the legal environment) accounts for more of the variance in the data than Factor II (fiscal/repatriation policies). It should be noted, however, that the two variables which comprise Factor I achieved the lowest mean rankings of all the variables in Question 4 (see Table 11-4). Thus, whereas these variables are highly correlated with the factor which best explains the data, individually they were not deemed to be highly influential by the responding companies.

The variable in Question 4 which had the highest mean ranking ('technologically competent local firms') had such a small amount of variance in common with the other variables that it was excluded from the rotation phase of the factor analysis. This should not be interpreted as meaning that it is not an important variable, merely that it was not amenable to factor analysis because of its uniqueness.

In terms of Dunning's OLI framework, Factors I and II can be labelled in more general terms as 'government-induced market imperfections', since all of their constituent variables are a measure of the extent of governmental influence in one form or another.

The two variables which comprise Factor I are locational attributes associated with the host market, both of which impact upon internalisation advantages. The presence of 'weak patent protection legislation in host countries' (FAVLIC01) lowers the advantage associated with the exploitation of patents through wholly-owned subsidiaries. Because patents are more likely to be infringed in countries where protection is weak, resulting in a loss of control over the rate of dissipation of the patented knowledge and potential competition from infringers, there is no benefit from internalisation in terms of controlling the use of the company's patents. The adoption of a licensing strategy, however, at least enables the company earn royalty income and to influence the use to which its patents are put by the licensee. It also enables the company to avoid the cost of patent litigation, and to use their licensees to police against the infringement of their patents by third parties.

The presence of 'weak anti-trust legislation in host countries' (FAVLIC02) will also lower the benefits associated with internalisation. If companies are able to impose conditions upon the actions of their licensees which limits their ability to compete directly against them, then there is less incentive to incur the heavier costs of direct investment to achieve the same purpose. However, where there is strong anti-trust legislation which prevents companies from controlling competition via licensing, then there will exist what Dunning refers to as "structural market failure". By internalising their knowledge advantage via direct investment, companies are able to overcome this failure of the arm's-length knowledge market through the control which they are able to exercise over their wholly-owned subsidiaries.

The two variables which comprise Factor II also reduce the benefits associated with internalisation, thereby increasing the attractiveness of externalisation (ie licensing). Thus, in situations where there is a 'lower tax rate on royalties than on dividends' (FAVLIC05) there is a disadvantage in obtaining dividend income from foreign subsidiaries compared to royalty income from independent foreign licensees. Similarly, where there are 'weaker exchange controls on royalties' (FAVLIC06) it will not benefit a company to rely on dividends as a means of repatriating foreign income at the expense of royalties.

The variable which loaded on both Factors I and II, 'limited knowledge of host country market' (FAVLIC04) is an ownership-specific attribute which reflects the ability of a company to operate effectively in an unfamiliar environment. Where there is a lack of familiarity with the host market, licensing is more likely to be adopted as a low-risk method of market penetration. This variable had fairly similar (and moderate) loadings on each of Factors I and

II, and so it was left unclassified. However, one can intuitively associate this variable with both of these factors, in the sense that companies may be more favourably disposed towards licensing if they have a limited knowledge of the legal set-up and of the fiscal and repatriation policies of the host country.

11.4.4 Analysis of Direct Investment, Exporting and Licensing Variables

Having factor-analysed the variables from Question 3 (direct investment and exporting) and Question 4 (licensing) in isolation, all of these variables were then grouped together and factor-analysed. The purpose here was to find out if the same factors would emerge after the merging of these two groups of variables.

Step One: Examination of Correlation Matrices

The simple correlation matrix and the anti-image correlation matrix both confirmed the suitability of these variables for factor analysis (see Appendix 11.3). This was not surprising, given that the matrices for the two smaller sub-groupings of the variables had indicated that they were amenable to factor analysis.

Step Two: Extraction of Factors

Since there were twenty one variables in total, twenty one principal components were used to account for all of the variance in the data. These are reported in the third table in Appendix 11.3 The first seven principal components were extracted for further analysis, as they each had eigenvalues greater than one. The relative importance of the eigenvalues possessed by each factor can be guaged from the scree plot in Appendix 11.3.

The initial factor matrix derived from the seven extracted factors is shown in Table 11-10. All of the communalities reported in the final column of this table were greater than 0.3, so no variables were excluded from the subsequent analysis.

TABLE 11-10

INITIAL FACTOR MATRIX: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES

VARIABLES	FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V	FACTOR VI	FACTOR VII	h^2
RULEXP06	.71246	.09027	-.03776	-.01429	.02753	.51284	-.28113	.86019
RULFDI06	.67376	-.46919	.03984	-.20217	-.07378	-.11759	.15081	.75856
RULEXP04	.67216	.26178	.14246	-.07688	.02886	-.14418	-.38418	.71575
FAVLIC02	.64371	.41732	-.04172	-.35040	-.28226	-.24487	-.12670	.86872
RULEXP05	.63560	.28656	-.08499	.13382	.27385	.47014	-.30469	.90009
RULFDI04	.63285	.00377	.10910	-.01484	-.25574	.08577	-.07128	.49047
RULFDI03	.62746	-.44504	.43098	-.12366	.20484	-.12491	.09017	.85850
RULFDI05	.61770	-.40434	-.18187	-.02530	-.42926	-.06241	-.05682	.77014
RULFDI08	.56490	.13950	.41324	.11922	-.00611	-.08983	.24783	.59308
RULFDI02	.54230	.08074	.27069	.49389	.05998	-.36142	-.06673	.75648
RULEXP01	.53777	.33777	-.18164	-.03677	.51535	-.35794	.07915	.83759
RULFDI09	.53102	-.49885	-.06089	-.00133	.14853	-.08298	-.28491	.64466
FAVLIC01	.53064	.49414	-.01366	-.44016	-.29854	-.13257	-.03739	.82778
RULFDI07	.51895	.01857	.13431	-.38962	-.07936	.31764	.46234	.76044
FAVLIC03	.46796	.09889	.31576	.10548	-.23908	.17518	.23349	.48196
RULEXP03	.43372	-.56339	.10820	-.20304	.31147	.16673	-.07068	.68826
FAVLIC06	.59162	-.15161	-.71530	.10783	-.09749	-.04002	.07308	.91273
FAVLIC05	.57294	-.14899	-.60141	.32087	-.12834	-.12210	.14889	.86866
RULFDI01	.38775	-.00810	.38319	.58853	-.14377	-.05209	-.07677	.67288
FAVLIC04	.41876	.25691	-.13595	.49453	.01069	.26247	.32610	.67975
RULEXP02	.51518	.21198	-.14209	-.15916	.56404	-.05698	.24584	.73769
EIGENVALUES	6.81921	2.03146	1.73222	1.59205	1.35911	1.14749	1.00285	15.68439
% VARIANCE	32.5	9.7	8.2	7.6	6.5	5.5	4.8	74.7

The factor matrix was then rotated using the varimax method in order to achieve a more interpretable set of factors.

Step Three: Rotation and Interpretation of Factors

The rotated factor matrix is shown in Table 11-11, which follows the same format as before. It is evident that the factors produced by this rotation are virtually the same as those produced by the smaller sub-groupings of direct investment and exporting variables (Table 11-7) and licensing variables (Table 11-9). Nevertheless, some of the individual variables have attached themselves to different factors, and there have been a few noticeable changes in the strength of some factor loadings.

The first factor to be extracted from the rotated matrix has been interpreted as representing 'host country risk' as it is comprised of the same four variables that made up the first factor to be extracted from the direct investment and exporting variables. The ordering of factor loadings of these four variables has nevertheless changed, with 'high political risk' now possessing the highest loading on Factor I. It is also noticeable that the variable 'high level of taxation' is now classified under Factor III (discussed below). Although its loading on Factor I is actually slightly greater than before, it now has its strongest loading on Factor III.

The second factor has been interpreted as representing the 'host country legal environment and infrastructure'. This factor is a combination of the two licensing variables concerned with anti-trust and patent protection legislation, and the exporting variable concerned with distribution facilties in the host country. A fourth variable, 'high local labour costs', had its highest loading on this factor but the strength of this loading was not deemed to be sufficiently greater than its loadings on other factors for it to be classified under Factor II.

The third factor, 'host country fiscal/repatriation policies', is comprised of the same two variables which emerged from the

TABLE 11-11

ROTATED FACTOR MATRIX: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES

VARIABLES		FACTOR I	FACTOR II	FACTOR III	FACTOR IV	FACTOR V	FACTOR VI	FACTOR VII
RULFDI03	High political risk	.79349	.08743	-.06540	.33237	-.01158	.18927	.26555
RULEXP03	Trade restrictions	.77461	-.11510	.02566	-.05724	.21737	.10584	.11229
RULFDI06	High currency risk	.70327	.21833	.32510	.11795	-.05842	.06202	.29907
RULFDI09	Exchange controls on dividends	.69400	.06255	.26972	.13154	.19144	.05243	-.17219
FAVLIC02	Weak anti-trust legislation	.04606	.87493	.17050	.10101	.10560	.17561	.14081
FAVLIC01	Weak patent protection legislation	-.05853	.84809	.07333	-.01461	.10399	.15168	.25630
RULEXP04	Poor local distribution facilities	.23653	.60309	.01051	.33296	.36054	.21928	-.08390
RULFDI04	High local labour costs	.26427	.39231	.20871	.28156	.26391	-.08061	.26028
FAVLIC06	Weaker exchange controls on royalties	.17119	.14964	.89137	-.05586	.17515	.17997	.01732
FAVLIC05	Lower tax rate on royalties	.11134	.05868	.88834	.17206	.08653	.16066	.02764
RULFDI05	High level of taxation	.48361	.31724	.57178	.14018	.03990	-.26203	.13707
FAVLIC04	Limited knowledge of host country market	-.24916	-.13553	.39759	.39137	.33202	.20865	.36645
RULFDI02	Scarcity of management personnel	.15121	.15360	.13506	.79454	.04003	.23015	-.07689
RULFDI01	Shortage of investment funds	.08083	-.01020	.06309	.78789	.15483	-.12244	.05037
RULFDI08	Small size of market	.17092	.22678	-.03819	.53843	.03788	.22093	.41330
RULEXP05	Different local product standards	.08137	.16031	.12393	.16809	.86349	.26919	.07797
RULEXP06	Different local preferences	.26154	.26437	.18268	.10621	.79298	.03136	.21778
RULEXP01	High transport costs	.07999	.27844	.17093	.16332	.09240	.82806	-.05950
RULEXP02	High production costs in UK	.17038	.10787	.11151	-.01397	.18933	.77899	.20427
RULFDI07	Strong local competition	.24910	.22995	.05697	-.10312	.13229	.13779	.77146
FAVLIC03	Availability of competent candidate licensees	.07401	.18389	.04375	.38943	.15114	-.06683	.51166
PER CENT OF VARIANCE EXPLAINED BY FACTORS		13.9%	12.2%	11.7%	11.1%	9.3%	8.8%	7.9%
INTERPRETATION OF FACTORS		Host country risk	Host country legal environment & infrastructure	Host country fiscal/repatriation policies	Resource constraints	Export marketing costs	Export production/ transportation costs	Host country level of industrial development

analysis of the licensing variables, namely 'weaker exchange controls on royalties' and 'lower tax rate on royalties'. Another two variables had their strongest loadings on this factor, but were not classified under it as they also had fairly similar loadings on other factors.

The first of these two variables, 'high level of taxation', also had moderate loadings on the first two factors. This is not a surprising result, since the taxation of companies' trading profits can be regarded as a government-induced market imperfection, which is enacted by legal statute. The second of these variables, 'limited knowledge of host country market', had similar-sized loadings on the fourth, fifth and seventh factors.

The fourth factor, 'resource constraints', is the same factor that emerged from the analysis of the direct investment and exporting variables. The only minor difference between this factor and the one that emerged previously is that the 'small size of market' variable has a higher loading on this factor than before and has therefore been classified under it instead of being left unclassified.

The fifth factor, 'export marketing costs', also emerged from the analysis of the direct investment and exporting variables, and is comprised of the same two variables. The only change to have occurred to this factor is that the variable measuring 'poor local distribution facilities', which previously had its highest loading on this factor, now has its highest loading on Factor II, under which it has been classified.

The sixth factor, 'export production/distribution costs', is once again the same factor which emerged from the analysis of the direct investment and exporting variables, and it is comprised of the same two variables.

Factor VII corresponds to the final factor which emerged from the analysis of the direct investment and exporting variables, ie the 'host country level of industrial development'. It is comprised of the variables representing 'strong local competition' and the 'availability of technologically competent candidate licensees'.

The variable representing 'high local labour costs', which previously had its highest loading on this factor, now loads more strongly on Factor II. Its displacement is due to the inclusion of the variable representing the presence of competent potential licensees. This variable (FAVLIC03) was excluded from the previous factor analysis of the licensing variables because it possessed a low communality. When the licensing variables were included with the direct investment and exporting variables, however, the communality of this variable increased above the critical level of 0.3, allowing it to be included in the analysis.

The final factor has been interpreted as representing the level of industrial development of the host country because this characteristic is likely to be closely correlated with the competitiveness of local firms and their level of technological competence.

11.5 NONPARAMETRIC ANALYSIS OF THE OBJECTIVES OF INTERNATIONAL LICENSING

Data on the objectives of international licensing were obtained from Question 5, which asked respondents to estimate the degree of significance attached by their companies to a number of possible objectives which licensing may seek to achieve. In addition to the respondents who answered Questions 3 and 4, this question was also answered by those respondents who answered Question 1 by indicating that licensing was 'Never' evaluated against alternative international business methods.

The data from Question 5 are reported in Table 11-12, which follows the same format as Tables 11-3a, 11-3b and 11-4.[17] It is apparent from this table that speed of entry into overseas markets was by far the most popular objective of licensing among the companies. By entering into licensing agreements with indigenous local firms, multinationals avoid the time-consuming business of either setting up their own manufacturing facilities, negotiating joint ventures with local firms, or creating networks of agents to distribute their exported products in foreign markets.

The next most important objective of licensing was 'to strengthen the company's position in a joint venture'. Although no single party has outright control over a joint venture, partners can sometimes increase their effective control by making the joint venture company dependent upon them as suppliers of technology, via licensing agreements.

The third highest ranking objective of licensing was the earning of extra income from obsolescent technology. Although this type of technology may no longer be of any use to the company which owns it, it may be of use to companies in countries where techniques of production are less advanced, thus providing an opportunity for some windfall revenue to be obtained from licensing. In addition, by licensing potential competitors with old technology, the licensor removes the threat of competition from the licensee.

TABLE 11-12

RANK-ORDER OF LICENSING OBJECTIVES

RANK ORDER		PERCENTAGE OF COMPANIES RESPONDING								NUMBER OF COMPANIES RESPONDING	MEAN RANK
		NOT AP-PLICABLE 0	OF NO SIGNIFICANCE 1	2	3	OF SOME SIGNIFICANCE 4	5	SIGNIFICANT 6	VERY SIGNIFICANT 7		
1	To enter a new market quickly	14.1	5.1	2.6	10.3	14.1	16.7	23.1	14.1	78	10.23
2	To strengthen the company's position in a joint venture	15.6	7.8	3.9	18.2	18.2	9.1	16.9	10.4	77	8.93
3	To earn extra income from technology which has outlived its usefuleness	13.0	5.2	18.2	11.7	19.5	15.6	7.8	9.1	77	8.83
4	To develop markets for components or other products made by the company	17.9	12.8	5.1	9.0	20.5	7.7	15.4	11.5	78	8.65
5	To build goodwill and acceptance for other company products and services	15.6	7.8	16.9	18.2	13.0	13.0	10.4	5.2	77	7.92
6	To diversify the form of company income as a means of reducing risk	12.8	14.1	20.5	15.4	12.8	12.8	9.0	2.6	78	7.89
7	To gain reciprocal access to the licensee's technology	19.2	5.1	20.5	21.8	10.3	9.0	7.7	6.4	78	7.81
8	To supplement the R & D budget with additional sources of income	20.5	16.7	11.5	14.1	7.7	11.5	5.1	12.8	78	7.50
9	To exploit 'spin-off' technology i.e. technology which does not suit the company's existing product range	21.8	9.0	14.1	21.8	14.1	5.1	9.0	5.1	78	7.35
10	To reduce currency risk	19.2	17.9	16.7	21.8	10.3	6.4	7.7	0.0	78	6.30
11	To pre-empt the infringement of patents by local firms	19.2	16.7	15.4	17.9	10.3	10.3	9.0	1.3	78	6.27
12	To test new markets before committing risk capital	21.8	15.4	16.7	23.1	11.5	6.4	2.6	2.6	78	6.14
13	To protect patents against compulsory licensing by host governments	24.4	25.6	15.4	11.5	6.4	6.4	9.0	1.3	78	5.59
14	To develop low-cost sources of raw materials, components or end products for other company operations	26.0	22.1	19.5	10.4	6.5	9.1	6.5	0.0	77	5.59

KENDALL COEFFICIENT OF CONCORDANCE	DEGREES OF FREEDOM	SIGNIFICANCE	SAMPLE SIZE
W = .1326	13	.0000	75

A related objective is the use of licensing for exploiting 'spin-off technology', ie technology which does not suit the company's existing product range. This objective was, however, only ranked ninth in the table. This lower ranking is in part attributable to the fact that a higher percentage of firms thought that this objective was not applicable to them (21.8 per cent compared to 13 per cent for the third objective in the table).

The development of auxiliary business was the objective ranked fourth highest by the responding companies. Although licensing agreements may not necessarily have clauses which specify that certain components or products should be purchased from the licensor, very often the licensee will buy them from the licensor in any case as the licensor's reputation is known to the licensee. This objective is similar in nature to the next highest objective ranked in Table 11-6: to build goodwill and acceptance for other company products and services.

The objective ranked sixth highest by the companies was that of diversifying the form of company income as a means of reducing risk. This was deemed to be more important than the other risk-reduction objective which the sample of companies were asked to rate, that of using licensing to reduce currency risk, which occupied tenth place in the rank-ordering. The objective of using licensing to gain reciprocal access to technology, which tends to be specific to certain industries, was ranked seventh, while that of adopting licensing to supplement the R&D budget was ranked immediately below it. The proximity of these two objectives is not surprising since the level of reciprocal licensing tends to be associated with R&D intensity.

The distribution of responses to the objective ranked eleventh in the table, that of using licensing to pre-empt the infringement of patents by local firms, are weighted towards the lower end of the rating scale. This distribution is similar to that accorded to the variable 'weak patent protection legislation' in Question 4, which asked companies to rate the significance of a number of variables favouring licensing. Both variables had very similar mean ratings: the objective of pre-empting patent infringement had a value of 2.564, while the variable 'weak patent protection legislation' had a value of 2.529. These two results are consistent with one another since the principal objective of pursuing licensing in a situation where there exists weak patent protection legislation would be to pre-empt patent infringement.

The left-skewed distribution of responses to the variable ranked twelfth in the table, that of testing new markets before committing risk capital, casts doubts upon the idea that licensing is used by UK companies as a part of a sequential internationalisation strategy. The responses to the two lowest-ranked objectives of the fourteen listed in the table are similarly weighted towards the lower end of the rating scale. Of these, the least popular was the development of low-cost sources of raw materials, components or end products for other company operations. Although this objective achieved the same mean ranking as the objective ranked immediately above it (to protect patents against compulsory licensing by host governments) it was ranked lower in the table as it acheived a lower mean rating.

11.6 FACTOR ANALYSIS OF THE OBJECTIVES OF INTERNATIONAL LICENSING

Following the rank-ordering of the objectives of international licensing, factor-analysis was employed to determine if a smaller group of objectives could be used to explain the behaviour of the companies.

Step One: Examination of the Correlation Matrices

The fourteen variables describing the objectives of international licensing all proved to be amenable to factor analysis. This can be confirmed by inspection of the simple correlation matrix and the anti-image correlation matrix in Appendix 11.4.

Step Two: Extraction of Factors

The fourteen principal components which accounted for all of the variance in the data are reported in Appendix 11.4. The scree plot indicates the relative importance of the eigenvalues possessed by the principal components. As the first four principal components had eigenvalues greater than one, they were extracted for further analysis.

The initial factor matrix produced from these four factors is shown in Table 11-13. As none of the objectives had communalities less than 0.3, they were all included in the subsequent rotation phase.

TABLE 11-13

INITIAL FACTOR MATRIX: OBJECTIVES OF LICENSING

VARIABLES	FACTOR I	FACTOR II	FACTOR III	FACTOR IV	h^2
OBJLIC10	.77526	-.06015	-.04917	-.24368	.66644
OBJLIC07	.69042	-.01168	-.44321	.18581	.70778
OBJLIC06	.68888	.00762	-.43890	.35264	.79160
OBJLIC14	.68439	-.35970	.09203	.18957	.64218
OBJLIC03	.66371	.56283	.14810	.03388	.78037
OBJLIC04	.66021	-.06586	.17318	-.25525	.53536
OBJLIC11	.62570	-.15321	.23991	.19614	.51100
OBJLIC09	.62317	.06460	-.25438	-.41291	.62771
OBJLIC12	.60921	-.39584	.27346	-.04740	.60486
OBJLIC05	.60353	.04553	-.45873	.04410	.57870
OBJLIC08	.57426	-.10286	.08982	-.54962	.65050
OBJLIC02	.55525	.45581	.27713	.33724	.70660
OBJLIC01	.41370	.64934	.32827	-.02449	.70115
OBJLIC13	.41994	-.54252	.35308	.26038	.66313
EIGENVALUES	5.39784	1.57503	1.17666	1.01785	9.16738
% VARIANCE	38.6	11.3	8.4	7.3	65.5

Step Three: Rotation and Interpretation of Factors

The rotated factor matrix, which follows the same format as before, is shown in Table 11-14. The first factor is comprised of three objectives. Two of these involve the licensing of patents, either to protect them against compulsory licensing or to pre-empt their infringement by local firms. The third objective involves the use of licensing as a means of reducing currency risk.

The feature which these three objectives have in common is the use of licensing as a means of protecting the company's competitive position. Licensing may thus be used to preserve patents that would otherwise be expropriated (OBJLIC06), or to sustain cash flows by securing royalties from potential infringers (OBJLIC07), or to reduce the volatility of foreign currency cash flows (OBJLIC05). Factor I has therefore been interpreted as representing the adoption of licensing as a 'defensive strategy'.

The second factor is comprised of four objectives. Two of these involve the use of licensing to service a new market, either for the purpose of establishing a presence quickly (OBJLIC14), or for testing the market's viabilty before committing risk capital (OBJLIC11). The other two objectives involve the use of licensing to strengthen the company's position in a joint venture (OBJLIC13), and to build goodwill and acceptance for the company's other products and services (OBJLIC12).

The characteristic which is common to these four objectives is their provisional nature. Although licensing may be used to speedily enter a new market, or to test its potential, there is no guarantee that licensing will be the market-servicing method used in the longer-term. Similarly, the use of licensing to strengthen a joint venture may be only a temporary move, perhaps as part of a strategy leading to eventual direct investment. In addition, the attraction of licensing as a means of building goodwill and acceptance for other company products and services is likely to reduce over time, as this goodwill is established. For these

TABLE 11-14

ROTATED FACTOR MATRIX: OBJECTIVES OF LICENSING

VARIABLES		FACTOR I	FACTOR II	FACTOR III	FACTOR IV
OBJLIC06	To protect patents against compulsory licensing by host governments	.83335	.24545	.06063	.18225
OBJLIC07	To pre-empt the infringement of patents by local firms	.78028	.19855	.20471	.13275
OBJLIC05	To reduce currency risk	.69779	.06287	.27686	.10579
OBJLIC13	To strengthen the company's position in a joint venture	.03502	.81191	.02703	-.04446
OBJLIC14	To enter a new market quickly	.36042	.67709	.21573	.08535
OBJLIC12	To build goodwill & acceptance for other company products & services	.09921	.66940	.37941	.05452
OBJLIC11	To test new markets before committing risk capital	.22325	.59366	.16624	.28477
OBJLIC08	To develop markets for components or other products made by the company	.05749	.20529	.77261	.09016
OBJLIC09	To diversify the form of company income as a means of reducing risk	.39796	.00328	.67384	.12359
OBJLIC10	To develop low-cost sources of raw materials etc for other company operations	.37907	.31636	.61500	.21079
OBJLIC04	To earn extra income from technology which has outlived its usefuleness	.14215	.36767	.56386	.24905
OBJLIC01	To supplement the R&D budget with additional sources of income	-.01363	-.04641	.19512	.81286
OBJLIC03	To exploit 'spin-off' technology	.27865	.06415	.28190	.78686
OBJLIC02	To gain reciprocal access to the licensee's technology	.22075	.24498	-.02736	.77272
PER CENT OF VARIANCE EXPLAINED BY FACTORS		17.4%	16.9%	15.8%	15.4%
INTERPRETATION OF FACTORS		Licensing as a defensive strategy	Licensing as an intermediary strategy	Licensing as a subordinate strategy	Licensing as a technology-driven strategy

reasons, Factor II has been interpreted as representing the use of licensing as an 'intermediary strategy'.

The third factor is also comprised of four objectives. What these objectives have in common is their concern with the positive side-effects of licensing on other aspects of the company's operations, or with the pursuit of overall corporate objectives, rather than with the use of licensing as a means of servicing foreign markets. Thus we have licensing used in order to develop markets for the company's components or other products (OBJLIC08) and to develop low-cost sources of raw materials (OBJLIC10). In addition licensing is employed as a means of diversifying corporate income to reduce risk (OBJLIC09), or as a means of earning extra income from technology which has outlived its usefuleness (OBJLIC04).

Factor III has therefore been interpreted as representing the use of licensing as a 'subordinate strategy', ie as a strategy in which the objective of penetrating particular foreign markets is subordinate to that of supporting the company's global operations or its overall corporate objectives.

The fourth factor is comprised of three variables, each of which is concerned with the use of licensing as a means of enhancing the technology available to a company, either directly through reciprocal licensing agreements (OBJLIC02), or indirectly via the use of licensing income to supplement the R&D budget (OBJLIC01) or as a means of exploiting spin-off technology (OBJLIC03). Factor IV has therefore been interpreted as representing the use of licensing as a 'technology-driven strategy'.

It is apparent from Table 11-14 that some of the individual objectives have moderate sized-loadings on more than one factor. This indicates that the four licensing strategies are not mutually exclusive, and that companies may pursue a number of them simultaneously. For example, the use of licensing to enter a new market quickly (OBJLIC14) loaded on Factor I as well as on Factor II (under which it is classified). This can be explained by the fact that the use of licensing to effect speedy entry into a market can be regarded as a 'defensive strategy' (Factor I) as well as an 'intermediary strategy' (Factor II).

Similarly the fact that the licensing objective which involves the building of goodwill and acceptance for other company products and services (OBJLIC12) also loads on Factor III as well as on Factor II (under which it is classified) can be explained by the fact that this objective may be regarded as part of a 'subordinate strategy' (Factor III) as well as an 'intermediary strategy' (Factor II).

Three of the licensing strategies derived from the rotated factor matrix bear some similarity to those identified by Ardisson and Bidault (1986). Their research suggested that licensing strategies could be grouped under three headings: 'technology', 'market' and 'production' strategies.

The first of these, the 'technology strategy', involves the use of licensing "to obtain the highest possible returns and to use them for further R&D" (op cit, p61). This strategy bears a close resemblance to that represented by Factor IV, the 'technology-driven strategy'. Under Ardisson and Bidault's 'market strategy', licensing is used essentially as a device to generate auxiliary business transactions with the licensee. This strategy has close similarities with Factor III, which represents the adoption of licensing as a 'subordinate strategy'.

The final strategy suggested by Ardisson and Bidault, the 'production strategy', entails the use of licensing as an alternative to FDI in situations where the licensor is faced with "capital constraints and/or local regulations" (op cit, p 61). This strategy overlaps to some extent with Factor II, the use of licensing as an 'intermediary strategy', insofar as the motivating factor is the desire to service overseas markets, even if licensing is only used as an intermediary phase of market penetration.

11.7 CONCLUSIONS

From the analysis of the data presented in this chapter the following conclusions can be drawn concerning the determinants of licensing activity among UK MNCs.

Firstly, licensing is viewed by the vast majority of companies as a 'strategic' decision, in the sense that it is predominantly evaluated against the alternatives of direct equity investment and exporting. Of the 84 companies which answered the question concerning the scope of the licensing decision, only 7 replied that they 'never' evaluated licensing against alternative market-servicing methods. This finding is consistent with the evidence from Telesio's (1979) survey of 66 (mainly) US MNCs which strongly supported the idea that licensing is viewed as a 'strategic' decision.[18]

Secondly, only a small proportion of those companies that did take a 'strategic' view of licensing chose it because the alternative options were prohibited by host-government controls. Only 6 out of 77 companies indicated that licensing was 'always' adopted for this reason.

Thirdly, of the twenty one variables whose influence upon the licensing decision were examined, the availability of technologically competent candidate licensees in potential host countries was rated as the most significant by the companies. The absorptive capacity of host economies would thus appear to be a crucial determinant of the licensing propensity of UK MNCs. This lends support to the findings of Contractor's (1981, 1985) studies of US firms which demonstrated a relationship between the extent of their adoption of licensing and the indigenous technical capacity of host countries.

Fourthly, it would appear that government-created market imperfections are a key determinant of licensing propensity among UK MNCs. The four variables which comprise the 'host country risk' factor were ranked as the next most significant determinants of licensing adoption by the companies. Of the government-created market imperfections which affect the level of remuneration received by the parent company, ie exchange controls and taxation, it is evident from the rankings that the former are regarded as more significant than the latter.

Fifthly, the variables representing high labour costs and weak patent and anti-trust legislation in host countries emerge very clearly as the least significant variables promoting the use of licensing by UK MNCs. The distribution of responses to these three variables were all highly skewed towards the lower end of the rating scale.

Sixthly, from the principal components analysis of the twenty one variables examined, it would appear that there are seven underlying factor constructs which may explain the licensing propensity of UK MNCs. The variables which comprise these factor constructs had sufficient in common to enable the factor constructs to be meaningfully defined. The constructs are, in order of relative importance: the risk associated with the host country, its legal environment and infrastructure, its fiscal and repatriation policies, the resource constraints faced by the companies, the costs they incur in export marketing, and in export production and transportation and, finally, the level of industrial development of the host country.

The way in which each of the individual variables which comprise these seven factors fit in to the "Mark 2" version of Dunning's OLI theory, the factor endowments/market failure paradigm, is summarised in Figure 11-1. The variables which correspond to locational and internalisation attributes have been re-classified to indicate whether they result from market failure or whether they are primarily a consequence of the distribution of factor endowments. The remaining variables correspond to the complementary ownership advantages required for international production.

FIGURE 11-1

THE FACTOR ENDOWMENT/MARKET FAILURE PARADIGM & DETERMINANTS OF THE LICENSING DECISION

FACTOR CONSTRUCTS	MARKET FAILURE	OWNERSHIP ADVANTAGE	FACTOR ENDOWMENTS
I: Host country risk	. Political risk . Trade restrictions . Currency risk . Exchange controls on dividend		
II: Host country legal environment & infrastructure	. Anti-trust legislation . Patent protection legislation		. Distribution facilities . Labour costs
III: Host country fiscal/ repatriation policies	. Exchange controls on royalties . Tax rate on royalties . Level of corporate taxation		
IV: Resource constraints		. Knowledge of host country market . Availability of management personnel . Availability of investment funds	
V: Export marketing costs			. Size of market . Complexity of product standards . Consumer preferences
VI: Export production/ transportation costs	. Transport costs		. Production costs
VII: Host country level of industrial development			. Level of competition . Availability of competent candidate licensees

Seventhly, of the fourteen licensing objectives which were examined, speed of market entry emerged very clearly as the most significant. The use of licensing to strengthen joint ventures and to develop markets for components and other company products also featured prominently among the highest-ranking objectives, while the use of licensing to test new markets did not attract much support. It would thus appear that licensing is used more to support the existing global configuration of assets possessed by UK MNCs rather than as a means of testing the potential for international expansion in particular foreign markets.

The objective which proved to be least important was that of using licensing to develop low-cost sources of raw materials, components or end products for other company operations. It would therefore appear that licensing is used much more by UK MNCs to develop markets for their components and other products, than it is to develop the upstream end of their value-added chains.

Finally, the principal components analysis of the fourteen licensing objectives revealed four underlying strategies that UK MNCs appear to be pursuing via their licensing operations. These are, in order of importance: the use of licensing as a 'defensive strategy', as an 'intermediary strategy', as a 'subordinate strategy', and as a 'technology-driven strategy'. The response of UK MNCs to any particular set of OLI parameters will therefore be influenced by the extent to which they are following one, or more, of these particular strategies.

CHAPTER ELEVEN

NOTES

1. Dunning (1981) employed a technique analagous to factor analysis, correspondence analysis, in order to identify sets of OLI variables which best explained the direct investment flows of 67 countries. Using a number of economic indicators as proxies for OLI characteristcs he identified three distinct clusters of countries whose direct investment flows were related to similar OLI characteristics. The factor analysis employed in this chapter differs from Dunning's research in that it aims to identify sub-sets of variables which may explain the licensing propensity of the responding companies, rather than identify clusters of companies with similar attitudes towards OLI variables.

2. The word importance is used interchangeably with the word significance throughout the chapter when reference is made to the rating scale used in the questionnaire. It should be noted that the use of the term significance in this context does not imply the existence of any statistical significance.

3. The median could have been calculated by interpolation. However, the fact that SPSS^{X} does not calculate the median using the interpolation method ruled out this option.

4. A description of the formula for calculating this correction factor, and its effect upon the Kendall coefficient of concordance, can be found in Siegel (1956, pp233-234)

5. Table 11-3a does not include any entries for those companies which provided additional factors under the two 'other' categories in Question 3 because the number which did so was too small to enable any meaningful conclusions to be derived. Among the factors related to direct investment which were mentioned were the following: (a) political desire to establish indigenous activity, (b) lack of indigenous raw materials and (c) limited patent cover. The factors related to exporting which were mentioned included the following: (a) lack of suitable agents, (b) limitation on production capacity, (c) danger of unlicensed local production and (d) to meet offset requirements.

6. Of these variables, the interpretation of 'high currency risk' as a consequence of government intervention may be questioned on the grounds that currency volatility is caused by a number of economic factors, not solely by the influence of governments. However, currency risk may be associated with government intervention on the grounds that the stability of a currency is determined in the long run by the performance of the economy, which in turn is heavily influenced by government economic policy, even if this influence is indirect.

7. The additional factors making licensing the favoured option which were provided by companies under the 'other' category in Question 4 included: (a) the presence of good licensee marketing skills and sales force, (b) financial incentives and (c) licensee's lack of export-orientation.

8. The Factor Analysis procedure on $SPSS^X$ does not print partial correlation coefficients.

9. Kaiser (1974) also described values of the KMO index falling in the 0.5's as miserable, values in the 0.6's as mediocre, values in the 0.7's as middling, values in the 0.8's as meritorious, and values in the 0.9's as marvellous.

10. It is common practice to denote factors by Roman numerals.

11. The two alternative methods available on $SPSS^X$ were the quartimax and equimax methods. The former maximizes the variance of the squared loadings for each variable, rather than for each factor; the latter is a combination of the varimax and quartimax methods. The varimax method was chosen for this study as it tends to give a clearer separation of factors [Kim and Mueller (1978, p36)]. In addition, Kaiser's (1958) experiment showed that the factor pattern obtained by the varimax method tends to be more invariant than that obtained by the quartimax method when different subsets of variables are factor-analysed.

12. When the rotated factors are correlated, an 'oblique' solution is achieved.

13. The percentages of variance accounted for by the rotated factors were calculated by hand as they were not available from $SPSS^X$. They were obtained by dividing the sum of the squared factor loadings for each variable by the number of variables (since each variable was standardised to have a variance of one) and multiplying by 100.

14. See, for example, Eiteman and Stonehill's definition of country risk (1986, pp475-476).

15. The other three 'P's' which make up the traditional marketing mix are product, pricing and promotion decisions. Rugman et al (1985, chapter 15) provide a useful summary of the additional complications affecting the marketing mix in an international context.

16. It should be noted that the figures reported in Table 11-9 for the percentages of variance explained by the two factors differ slightly from those given for the initial factor statistics in Table 11-8 because of the excluded variable.

17. The factors provided by companies under the 'other' category in Question 5 included the following: (a) to reduce competition/stop a competitor and (b) to ensure the development of products/technology when sufficent resources are not available within the company.

18. Ten of Telesio's sample of 66 MNCs were based in the UK.

REFERENCES

ARDISSON, J.M. & BIDAULT, F, 'Technology Transfer Strategies as a Means to Build International Networks', Industrial Marketing and Purchasing, Vol 1, No 1, 1986, pp 59-71.

ARROW, K.J., Essays in the Theory of Risk-Bearing, Chicago: Markham, 1971.

CATTELL, R.B., 'The Meaning and Strategic Use of Factor Analysis', in Cattell, R.B. (ed), Handbook of Multivariate Experimental Psychology, Chicago: Rand McNally, 1966.

CHILD, D.C., The Essentials of Factor Analysis, London: Holt, Rinehart and Winston, 1970.

COMREY, A.L., A First Course in Factor Analysis, New York: Academic Press, 1973.

CONTRACTOR, F.J., International Technology Licensing: Compensation, Costs and Negotiation, Lexington, Mass.: Lexington Books, 1981.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.:Quorum Books, 1985.

DUNNING, J.H., 'Explaining The International Direct Investment Position of Countries: Towards a Dynamic or a Developmental Approach', Weltwirtschaftliches Archiv, Vol 117, No 1, 1981: pp 30-64.

DUNNING, J.H., 'The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions', Journal of International Business Studies, Vol 19, No 1, Spring 1988: pp 1-31.

EITEMAN, D.K. & STONEHILL, A.I., Multinational Business Finance, 4th ed, Reading, Mass.: Addison-Wesley 1986.

KAISER, H.F., 'The Varimax Criterion for Analytic Rotation in Factor Analysis', Psychometrika, Vol 23, 1958, pp 187-200.

KAISER, H.F., 'Computer Program for Varimax Rotation in Factor Analysis', Educational And Psychological Measurement, Vol 19, 1959, pp 413-420.

KAISER, H.F., 'An Index of Factorial Simplicity', Psychometrika, Vol 39, 1974, pp 31-36.

KENDALL, M.G., Rank Correlation Methods, London: Griffin, 1948.

KIM, J.O. & MUELLER, C.W., Introduction to Factor Analysis: What it is and how to do it, London: Sage Publications Ltd, 1978.

MASCARENHAS, B., 'The Coordination of Manufacturing Interdependence in Multinational Companies', Journal of International Business Studies, Vol 37, No 3, Winter 1984, pp 91-106.

NEWTON, D.J., Transnational Joint Ventures and Acquisitions in the EEC, paper presented at the annual conference UK Chapter of the Academy of International Business, University of Bradford Management Centre, April 1984.

NORUSIS, M.J., $SPSS^X$ Advanced Statistics Guide, Chicago: SPSS Inc, 1985.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

RUGMAN, A., LECRAW, D.J. & BOOTH, L.D., International Business: Firm and Environment, New York: McGraw-Hill, 1985.

SIEGEL, S., Nonparametric Statistics for the Behavioural Sciences, New york: McGraw-Hill, 1956.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York: Praeger, 1979.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

YUNKER, P.J., Transfer pricing and Performance Evaluation in Multinational Corporations: A Survey Study, New York: Praeger, 1982.

APPENDIX 11.1 FACTOR ANALYSIS STATISTICS: DIRECT INVESTMENT AND EXPORTING VARIABLES

CORRELATION MATRIX: DIRECT INVESIMENT & EXPORTING VARIABLES

	RULFDIO1	RULFDIO2	RULFDIO3	RULFDIO4	RULFDIO5	RULFDIO6	RULFDIO7	RULFDIO8	RULFDIO9	RULEXPO1	RULEXPO2	RULEXPO3	RULEXPO4	RULEXPO5	RULEXPO6
RULFDIO1	1.00000														
RULFDIO2	.56240	1.00000													
RULFDIO3	.27105	.39952	1.00000												
RULFDIO4	.32498	.29830	.31986	1.00000											
RULFDIO5	.32774	.21199	.36888	.43762	1.00000										
RULFDIO6	.10537	.27014	.72395	.43679	.56227	1.00000									
RULFDIO7	.07227	.08474	.37020	.36421	.33098	.36225	1.00000								
RULFDIO8	.29267	.38147	.45797	.33554	.25223	.32614	.33899	1.00000							
RULFDIO9	.14031	.24279	.49450	.29825	.42629	.45897	.12607	.21016	1.00000						
RULEXPO1	.11123	.33006	.27476	.15665	.09538	.18164	.17549	.32093	.25112	1.00000					
RULEXPO2	.10307	.20196	.27835	.27687	.08138	.27400	.34604	.19312	.10699	.64392	1.00000				
RULEXPO3	.05693	.14525	.55103	.17852	.32340	.45538	.28190	.11528	.51145	.07978	.24636	1.00000			
RULEXPO4	.17360	.44095	.35407	.44303	.26338	.35015	.16977	.43049	.26361	.39241	.31256	.19508	1.00000		
RULEXPO5	.24537	.26552	.21469	.32360	.20173	.16739	.25523	.32347	.27465	.39784	.40727	.21430	.50539	1.00000	
RULEXPO6	.26159	.23434	.35763	.44540	.39136	.37565	.39585	.26182	.30943	.26210	.31251	.29943	.48856	.77858	1.00000

BARTLETT TEST OF SPHERICITY = 579.86372, SIGNIFICANCE = .00000

ANTI-IMAGE CORRELATION MATRIX: DIRECT INVESTMENT AND EXPORTING VARIABLES

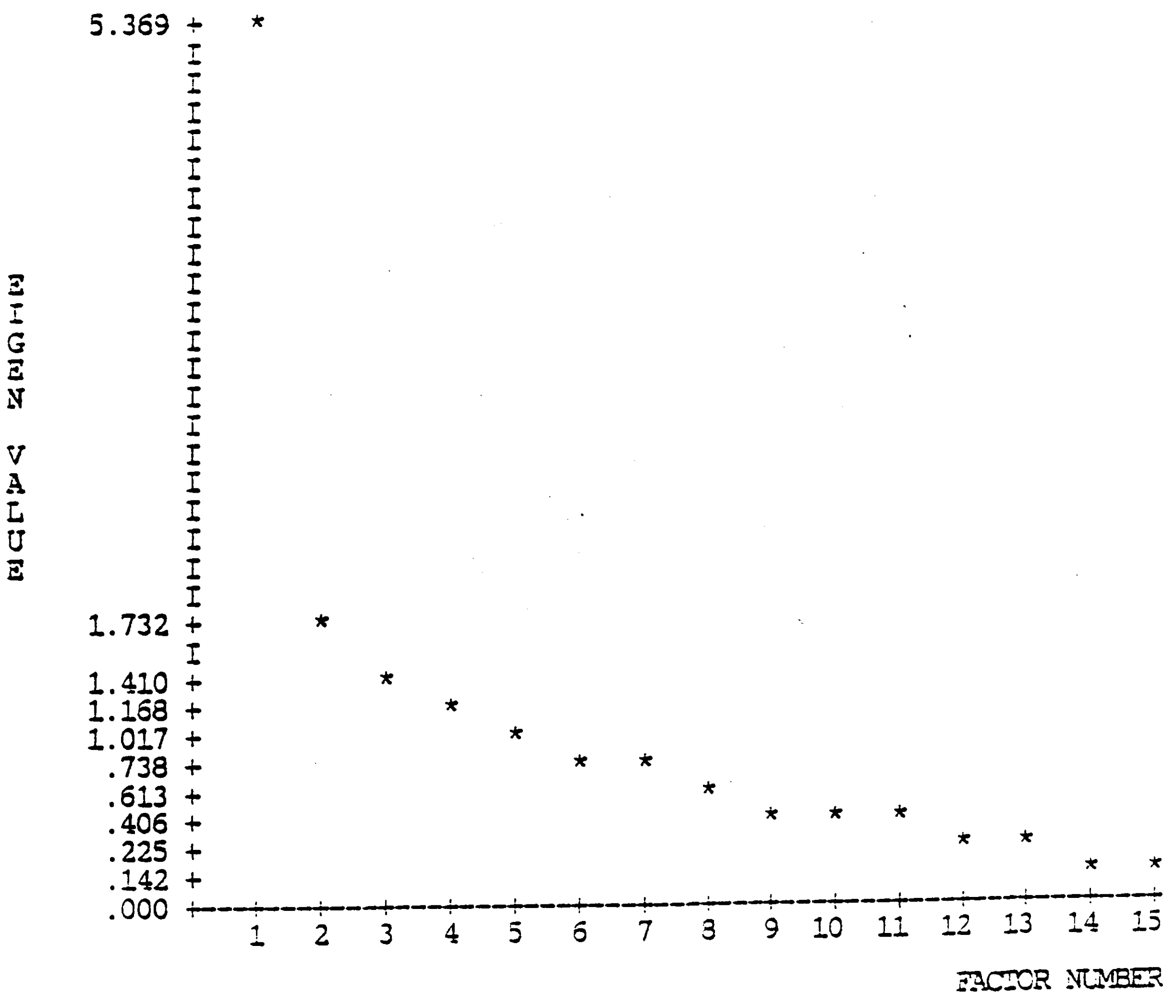
	RULFDI01	RULFDI02	RULFDI03	RULFDI04	RULFDI05	RULFDI06	RULFDI07	RULFDI08	RULFDI09	RULEXP01	RULEXP02	RULEXP03	RULEXP04	RULEXP05	RULEXP06
RULFDI01	.54881														
RULFDI02	-.51481	.76387													
RULFDI03	-.24820	-.07023	.75300												
RULFDI04	-.19434	-.00159	.14021	.83394											
RULFDI05	-.35015	.12157	.27084	-.07643	.73170										
RULFDI06	.32530	-.09765	-.56781	-.16996	-.43618	.73876									
RULFDI07	.17042	.02062	-.13988	-.17628	-.18422	.06968	.75834								
RULFDI08	-.09317	-.03757	-.26756	-.08695	-.03064	.00024	-.25521	.78931							
RULFDI09	.07481	-.02261	-.16384	-.17755	-.19779	-.05493	.15962	.05658	.76720						
RULEXP01	.13982	-.17658	-.11391	.17220	-.09338	.14459	.05057	-.13934	-.27196	.64029					
RULEXP02	-.10903	.08359	.05216	-.18252	.17622	-.20670	-.21930	.17035	.25873	-.62753	.62021				
RULEXP03	.10750	-.02225	-.34016	.12168	-.11705	.06297	-.08515	.13799	-.35105	.27802	-.25655	.73496			
RULEXP04	.24130	-.29027	-.03393	-.25338	-.05324	-.02474	.19144	-.19998	.08051	-.12095	.00751	-.03164	.83810		
RULEXP05	-.05802	-.01222	.15523	.08447	.10243	.14130	.08035	-.22899	-.16374	-.06415	-.20699	-.05424	-.14560	.70867	
RULEXP06	-.08338	.09202	-.10908	-.12771	-.12264	-.12083	-.22574	.23207	.06797	.01912	.12692	-.00585	-.13233	-.72740	.74384

OVERALL KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY = .73328
INDIVIDUAL MEASURES OF SAMPLING ADEQUACY (MSA) ARE PRINTED ON THE DIAGONAL.

INITIAL FACTOR STATISTICS: DIRECT INVESTMENT & EXPORTING VARIABLES

FACTOR NUMBER	EIGENVALUE	PCT OF VAR	CUM PCT
1	5.36938	35.8	35.8
2	1.73163	11.5	47.3
3	1.41016	9.4	56.7
4	1.16824	7.8	64.5
5	1.01684	6.8	71.3
6	.80888	5.4	76.7
7	.73780	4.9	81.6
8	.61314	4.1	85.7
9	.51503	3.4	89.1
10	.43647	2.9	92.1
11	.40580	2.7	94.8
12	.27548	1.8	96.6
13	.22528	1.5	98.1
14	.14412	1.0	99.1
15	.14175	.9	100.0

SCREE PLOT: DIRECT INVESTMENT AND EXPORTING VARIABLES



APPENDIX 11.2 FACTOR ANALYSIS STATISTICS: LICENSING VARIABLES

CORRELATION MATRIX: LICENSING VARIABLES

	FAVLIC01	FAVLIC02	FAVLIC03	FAVLIC04	FAVLIC05	FAVLIC06
FAVLIC01	1.00000					
FAVLIC02	.82412	1.00000				
FAVLIC03	.26224	.29603	1.00000			
FAVLIC04	.17229	.16088	.24556	1.00000		
FAVLIC05	.12369	.27087	.21093	.39551	1.00000	
FAVLIC06	.20811	.33776	.11416	.32850	.81981	1.00000

BARTLETT TEST OF SPHERICITY = 228.21468, SIGNIFICANCE = .00000

ANTI-IMAGE CORRELATION MATRIX: LICENSING VARIABLES

	FAVLIC01	FAVLIC02	FAVLIC03	FAVLIC04	FAVLIC05	FAVLIC06
FAVLIC01	.54246					
FAVLIC02	-.80871	.58146				
FAVLIC03	-.04148	-.12979	.71870			
FAVLIC04	-.14296	.11026	-.16485	.78074		
FAVLIC05	.16747	-.09330	-.18063	-.21593	.56876	
FAVLIC06	-.03332	-.11744	.17018	-.01953	-.78304	.59113

OVERALL KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY = .59273
INDIVIDUAL MEASURES OF SAMPLING ADEQUACY (MSA) ARE PRINTED ON THE DIAGONAL.

INITIAL FACTOR STATISTICS: LICENSING VARIABLES

FACTOR NUMBER	EIGENVALUE	PCT OF VAR	CUM PCT
1	2.63770	44.0	44.0
2	1.43376	23.9	67.9
3	.92419	15.4	83.3
4	.68049	11.3	94.6
5	.17030	2.8	97.4
6	.15355	2.6	100.0

SCREE PLOT: LICENSING VARIABLES

```
E    2.638 +    *
I          I
G          I
E          I
N          I
           I
V    1.434 +         *
A          I
L     .924 +              *
U     .680 +                   *
E          I
           I
      .000 +----+----+----+----*----*
                1    2    3    4    5    6

                   FACTOR NUMBER
```

APPENDIX 11.3 FACTOR ANALYSIS STATISTICS: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES

CORRELATION MATRIX: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES

	HIFAI01	HIFAI02	HIFAI03	HIFAI04	HIFAI05	HIFAI06	HIFAI07	HIFAI08	HIFAI09	HIFEX01	HIFEX02	HIFEX03	HIFEX04	HIFEX05	HIFEX06	FAM.LI01	FAM.LI02	FAM.LI03	FAM.LI04	FAM.LI05	FAM.LI06
HIFAI01	1.0000																				
HIFAI02	.5910	1.0000																			
HIFAI03	.2715	.3912	1.0000																		
HIFAI04	.3148	.2830	.3135	1.0000																	
HIFAI05	.3274	.2199	.3018	.4362	1.0000																
HIFAI06	.1637	.2014	.7235	.4819	.5227	1.0000															
HIFAI07	.0727	.0814	.3410	.3921	.3318	.3825	1.0000														
HIFAI08	.2987	.3947	.4597	.3351	.2523	.3514	.3399	1.0000													
HIFAI09	.4031	.2279	.4980	.2985	.4269	.1837	.1367	.2106	1.0000												
HIFEX01	.1123	.3106	.2476	.1665	.0658	.1801	.1798	.3093	.2512	1.0000											
HIFEX02	.1037	.2015	.2785	.2704	.0813	.2740	.3601	.1932	.1069	.8132	1.0000										
HIFEX03	.1693	.4625	.5103	.1782	.3210	.4658	.2890	.1658	.5146	.0978	.2635	1.0000									
HIFEX04	.1730	.4105	.3974	.4138	.2638	.3105	.1697	.4310	.2636	.3041	.3125	.1938	1.0000								
HIFEX05	.2637	.2112	.2469	.3260	.2073	.1879	.2123	.3311	.2415	.3701	.4021	.2430	.9530	1.0000							
HIFEX06	.2619	.2131	.3578	.4030	.3015	.3755	.3185	.2582	.3078	.2820	.3125	.2978	.4015	.7088	1.0000						
FAM.LI01	.0918	.1013	.0755	.3038	.2001	.2087	.4251	.2518	.0740	.3118	.2013	.0990	.4655	.2820	.3115	1.0000					
FAM.LI02	.0839	.2913	.2105	.3337	.3105	.3095	.3205	.3129	.1651	.4215	.2916	.0572	.5010	.3285	.4137	.8412	1.0000				
FAM.LI03	.3018	.2462	.3112	.2290	.2655	.2705	.2477	.3935	.1127	.0660	.1100	.1079	.3103	.2818	.3097	.2824	.2503	1.0000			
FAM.LI04	.2890	.3737	.0356	.2523	.0321	.1201	.1874	.3669	.1059	.2106	.1413	.0546	.4012	.4100	.2910	.1729	.1618	.2115	1.0000		
FAM.LI05	.1785	.2915	.1553	.2731	.5253	.3115	.1112	.1910	.3185	.3074	.2318	.1121	.2918	.2623	.3109	.1260	.2487	.2013	.3151	1.0000	
FAM.LI06	.0530	.1818	.1258	.2630	.5091	.4407	.2015	.0418	.3013	.3365	.2915	.1638	.2013	.3123	.3012	.2811	.3376	.1416	.3410	.8190	1.0000

BARTLETT TEST OF SPHERICITY = 1113.965, SIGNIFICANCE = .0000

ANTI-IMAGE CORRELATION MATRIX: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES

	HIRI01	HIRI02	HIRI03	HIRI04	HIRI05	HIRI06	HIRI07	HIRI08	HIRI09	HIEX01	HIEX02
HIRI01	.6081										
HIRI02	-.5172	.7461									
HIRI03	-.0634	-.2039	.6961								
HIRI04	-.1760	.0074	.1610	.8761							
HIRI05	-.3017	.0958	.0879	-.1428	.7691						
HIRI06	.1018	.0613	-.0654	-.1391	-.2115	.7072					
HIRI07	.1135	.0546	-.2380	-.1244	-.1638	.1640	.7448				
HIRI08	-.0122	.0556	-.1941	-.0179	-.2809	-.0239	-.2055	.7563			
HIRI09	.0626	-.0163	-.1832	-.1965	-.0613	.0168	.1425	-.0180	.8115		
HIEX01	-.0110	-.0380	-.2544	.1544	.0805	.2372	.1303	-.1400	-.2109	.7237	
HIEX02	-.0818	.0128	.0839	-.2511	.2635	-.1121	-.2688	.0161	.2310	-.5861	.6381
HIEX03	.1227	.0534	-.3830	.1714	-.1872	.0622	-.0840	.1782	-.3612	.2306	-.2082
HIEX04	.2302	-.3106	.0971	-.2168	.0503	-.1431	.1702	-.1915	.0317	-.0827	.0236
HIEX05	-.1017	.0839	-.0108	.1183	.0817	.2573	.1163	-.1015	-.1168	.0114	-.2092
HIEX06	-.0818	.0737	-.0378	-.1294	-.0831	-.1178	-.2377	.2350	.0534	.0381	.1246
FAMI01	.0170	-.0903	.2115	.1012	-.1219	-.2239	-.2304	.1313	.0749	-.1172	-.0318
FAMI02	.0378	-.0130	-.1669	-.0798	.0278	.1640	.0809	-.1238	.0621	-.1082	.1180
FAMI03	-.2015	.2011	-.1845	.1373	.1896	.1242	-.0614	-.1234	-.0115	.1831	-.0630
FAMI04	.0096	-.3072	.2505	-.2123	.3180	-.1675	-.1363	-.2948	.0169	-.0916	.2532
FAMI05	-.0233	-.0187	-.0372	.0776	-.2049	.1093	.2610	-.0303	.0347	.0877	-.1016
FAMI06	.2169	-.0504	.2532	.0330	-.2392	-.3170	-.1794	.2231	-.2126	-.1825	.0176

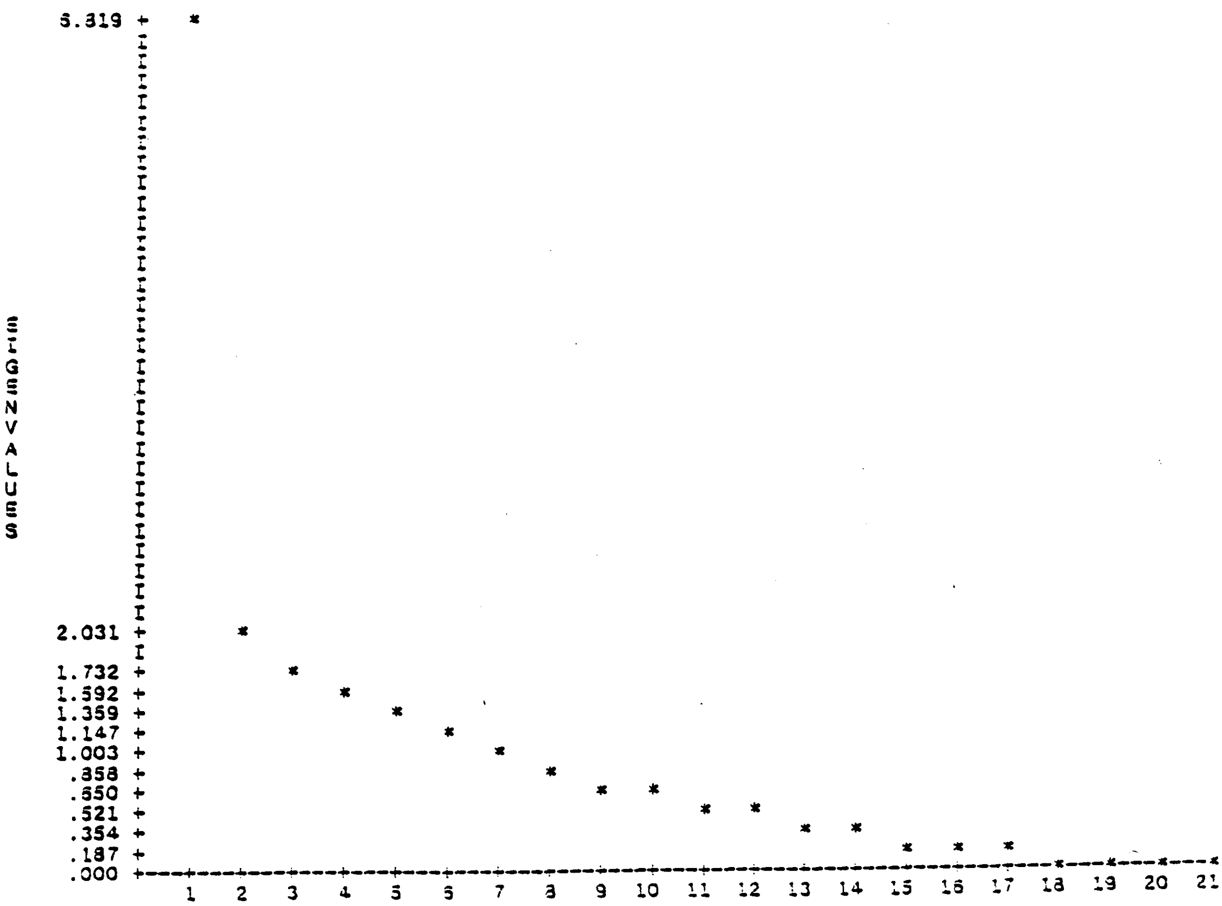
	HIEX03	HIEX04	HIEX05	HIEX06	FAMI01	FAMI02	FAMI03	FAMI04	FAMI05	FAMI06
HIEX03	.7161									
HIEX04	-.1298	.8074								
HIEX05	-.0153	-.2610	.7673							
HIEX06	-.0382	-.0375	-.6780	.8176						
FAMI01	-.0374	.0110	-.1172	.1103	.0352					
FAMI02	.0796	-.2017	.1633	-.1690	-.7032	.7621				
FAMI03	.0993	-.1726	.1578	-.1343	-.1162	-.0130	.7821			
FAMI04	-.1361	.2712	-.2784	.0416	-.0993	.1123	-.1526	.5713		
FAMI05	-.0370	-.1940	.2013	-.0613	.1103	-.0993	-.1210	-.3016	.7016	
FAMI06	.1085	.1534	-.2309	.0379	.1748	-.1882	.0270	-.0618	-.6124	.6993

KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY = .7311
INDIVIDUAL MEASURES OF SAMPLING ADEQUACY (MSA) ARE PRINTED ON THE DIAGONAL.

INITIAL FACTOR STATISTICS: DIRECT
INVESTMENT EXPORTING & LICENSING VARIABLES

FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
1	6.31921	32.5	32.5
2	2.03146	9.7	42.1
3	1.73222	8.2	50.4
4	1.59205	7.6	58.0
5	1.35911	6.5	64.1
6	1.14749	5.5	69.9
7	1.00285	4.8	74.7
8	.85787	4.1	78.8
9	.77200	3.7	82.4
10	.65024	3.1	85.5
11	.60429	2.9	88.4
12	.52134	2.5	90.9
13	.43817	2.1	93.0
14	.35413	1.7	94.7
15	.23472	1.1	95.8
16	.21613	1.0	96.8
17	.18717	.9	97.7
18	.14275	.7	98.4
19	.13205	.6	99.0
20	.12571	.6	99.6
21	.07904	.4	100.0

SCREE PLOT: DIRECT INVESTMENT, EXPORTING AND LICENSING VARIABLES



APPENDIX 11.4 FACTOR ANALYSIS STATISTICS: OBJECTIVES OF LICENSING

CORRELATION MATRIX: OBJECTIVES OF LICENSING

	OBJLIC01	OBJLIC02	OBJLIC03	OBJLIC04	OBJLIC05	OBJLIC06	OBJLIC07	OBJLIC08	OBJLIC09	OBJLIC10	OBJLIC11	OBJLIC12	OBJLIC13	OBJLIC14
OBJLIC01	1.00000													
OBJLIC02	.42353	1.00000												
OBJLIC03	.55823	.62530	1.00000											
OBJLIC04	.26325	.25559	.40068	1.00000										
OBJLIC05	.14899	.29082	.31015	.29005	1.00000									
OBJLIC06	.17092	.36609	.42351	.25373	.51971	1.00000								
OBJLIC07	.17913	.25981	.37636	.38530	.37923	.71348	1.00000							
OBJLIC08	.19900	.18468	.32819	.34468	.14811	.30132	.33325	1.00000						
OBJLIC09	.19678	.23463	.37195	.41609	.47923	.33022	.41207	.41983	1.00000					
OBJLIC10	.22755	.33613	.45068	.54092	.55117	.41350	.42771	.47813	.50005	1.00000				
OBJLIC11	.23276	.31812	.31217	.38192	.26925	.27737	.37889	.19976	.34009	.45231	1.00000			
OBJLIC12	.12082	.22423	.24527	.35063	.30091	.35975	.25705	.48906	.21617	.42728	.37381	1.00000		
OBJLIC13	-.06954	.24850	.03550	.28241	.15011	.23691	.11392	.15347	.20418	.29664	.33738	.44301	1.00000	
OBJLIC14	.15374	.17970	.30413	.47214	.27489	.45173	.54384	.36311	.21499	.44648	.52249	.49213	.39277	1.00000

BARTLETT TEST OF SPHERICITY = 502.68482, SIGNIFICANCE = .00000

ANTI-IMAGE CORRELATION MATRIX: OBJECTIVES OF LICENSING

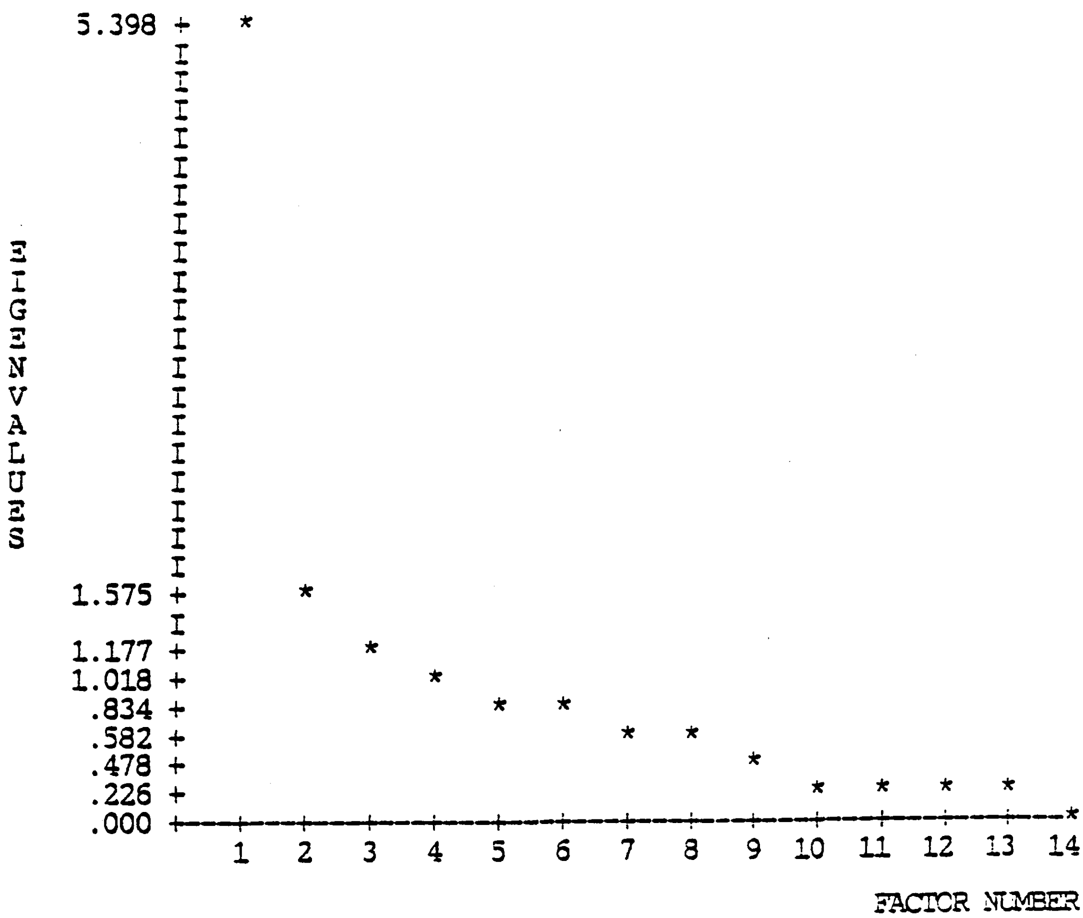
	OBJLIC01	OBJLIC02	OBJLIC03	OBJLIC04	OBJLIC05	OBJLIC06	OBJLIC07	OBJLIC08	OBJLIC09	OBJLIC10	OBJLIC11	OBJLIC12	OBJLIC13	OBJLIC14
OBJLIC01	.82418													
OBJLIC02	-.15939	.74867												
OBJLIC03	-.33026	-.48121	.78200											
OBJLIC04	-.08787	.03048	-.13036	.89130										
OBJLIC05	-.00467	-.10958	.11429	.02530	.69539									
OBJLIC06	.04039	-.06858	-.18963	.18051	-.35416	.75310								
OBJLIC07	.03351	-.03253	.07486	-.13998	.12704	-.61291	.75242							
OBJLIC08	-.05002	-.02489	-.00076	.02881	.33937	-.06552	-.01427	.69506						
OBJLIC09	.00377	.13436	-.16731	-.15120	-.37543	.11905	-.22521	-.35454	.72842					
OBJLIC10	.05403	.01645	-.15028	-.24052	-.40060	.05953	-.04249	-.30717	-.00861	.86338				
OBJLIC11	-.09974	-.14944	.03537	.02591	.07569	.12034	-.11285	.20774	-.18885	-.18382	.84047			
OBJLIC12	-.00234	.03714	-.02289	-.06398	-.18165	-.10467	.12676	-.40656	.17725	.01217	-.14932	.80604		
OBJLIC13	.15910	-.31269	.27040	-.11012	.19535	-.19928	.25614	.16549	-.22661	-.11505	-.06415	-.27483	.59181	
OBJLIC14	-.01308	.20889	-.12048	-.19053	-.06277	-.01693	-.31608	-.13657	.27198	.00140	-.30566	-.14017	-.25990	.80856

OVERALL KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY = .77339
INDIVIDUAL MEASURES OF SAMPLING ADEQUACY (MSA) ARE PRINTED ON THE DIAGONAL.

INITIAL FACTOR STATISTICS: OBJECTIVES OF LICENSING

FACTOR NUMBER	EIGENVALUE	PCT OF VAR	CUM PCT
1	5.39784	38.6	38.6
2	1.57503	11.3	49.8
3	1.17666	8.4	58.2
4	1.01785	7.3	65.5
5	.93252	6.7	72.1
6	.83425	6.0	78.1
7	.62182	4.4	82.5
8	.58206	4.2	86.7
9	.47763	3.4	90.1
10	.37936	2.7	92.8
11	.32968	2.4	95.2
12	.28879	2.1	97.2
13	.22591	1.6	98.9
14	.16059	1.1	100.0

SCREE PLOT: OBJECTIVES OF LICENSING



CHAPTER TWELVE - MODELS OF INTERNATIONAL LICENSING ACTIVITY

CHAPTER TWELVE - MODELS OF INTERNATIONAL LICENSING ACTIVITY

12.1 INTRODUCTION

The objective of the data analysis presented in this chapter is the testing of a number of hypotheses which relate certain corporate characteristics to involvement in international licensing. The basic research question which is asked is thus: how are the characteristics of UK MNCs related to their level of involvement in international licensing activity? The question is answered using multiple regression models which are built with data obtained from the questionnaire survey and from secondary sources.

In these models the dependent variable, the relative incidence of licensing, is determined as a function of nine corporate characteristics: size, internationalization of production, research intensity, ownership of patented knowledge, extent of international patent registration, product diversification, geographical diversification, codifiablility of know-how and organizational structure.

To determine the appropriate statistical techniques for modelling these variables, we must consider the level at which they are measured. Table 12-1 specifies the measurement level for each variable:

TABLE 12-1

VARIABLE SPECIFICATION

VARIABLES	LEVEL OF MEASUREMENT
DEPENDENT	
Incidence of licensing	Ordinal
INDEPENDENT	
Size	Ratio
Degree of internationalization	Ratio
Research intensity	Ordinal
Level of patent ownership	Ordinal
Level of international patent registration	Ordinal
Product diversification	Ratio
Geographical diversification	Ratio
Codifiability of know-how	Ordinal
Organizational structure	Nominal

It can be seen from Table 12-1 that the variables are measured at three different levels: nominal, ordinal and ratio. The data for most of the ratio-level variables were obtained from secondary sources (Annual Reports and Accounts, and the Dun and Bradstreet publication Key British Enterprises 1984), while the data for the nominal and ordinal-level variables were obtained from questionnaire responses.

The dependent variable, incidence of licensing, and four of the independent variables (research intensity, level of patent ownership, level of international patent registration and codifiability of know-how) are measured at the ordinal level. As Norusis (1985, p341) has pointed out, ordinal variables may result from the grouping of values for interval variables, or they may arise when the ordering, but not the distance, between categories can be established. All of the ordinal variables, apart from the codifiability of know-how, result from the grouping of values for interval variables.

In each case, the underlying variable which is being measured is an interval variable, but the data was generated at an ordinal level because the scales which were used in the questionnaire to measure these variables grouped interval values into ordered categories. For example, licensing income was measured by a scale containing six mutually exclusive categories. Questionnaire respondents had simply to indicate into which of the categories on the scale the underlying interval measure would fall. Thus, although the distance between categories is known, there is no way of determining the distance between the values which fall within each category.

It should be noted that these ordinal variables differ from the ordinal variables obtained from 'attitudinal' questions in other parts of the questionnaire. Where Likert-type scales were used, and thus where one respondent's perception of the value associated with a particular point on a scale may differ from another respondent's perception, it is not possible to establish either the distance between categories or, by logical extension, the distance between the values grouped within each category.

Because the dependent variable and four of the independent variables are measured at the non-metric level, the method used to model all the variables must take this measurement constraint into account.[1] For reasons explained in Chapter Eight, nominal and ordinal variables are not generally amenable to parametric modelling techniques, such as regression analysis.

Despite the methodological weakness of using regression analysis on non-metric data, previous attempts to model licensing behaviour have actually used the technique of linear multiple regression [Telesio (1979), Contractor (1983, 1985) and Adam (1985)]. These authors developed their models using data derived, at least in part, from questionnaire surveys. As a result, some of their variables were measured at the nominal or ordinal level. These authors are therefore open to criticism on the grounds that they used a technique which is inappropriate for the type of data they had available; the use of regression procedures is only warranted for nominal or ordinal variables if their values are dichotomous, or if they can be recoded to make them dichotomous. Although all three authors did make use of such 'dummy' variables in their models, they also utilised polytomous variables which cannot be regarded as interval variables.

Both Telesio and Contractor did, however, acknowledge the methodological limitations of their approach. Contractor, for example, stated that "the objective of the regression analysis is not econometric predictive ability. Indeed, with much of the data available only in categories, it is not very meaningful" (1985, p100). He then went on to define three objectives for the regression analysis:

(1) identification of a subset of independent variables that most powerfully explain most of the variance;
(2) determination of the relative importance of independent variables by use of stepwise loading;
(3) finding out if the direction of the relationship between variables was as expected.

It can be argued, therefore, that the use of regression analysis is justified if its limitations are acknowledged and the objectives are suitably modest. In this chapter, linear multiple regression models are developed from the available data. The results from these models are then compared with those derived from the Telesio, Contractor and Adam studies, and an earlier study by Zenoff (1970).[2]

12.2 HYPOTHESES

12.2.1 Introduction

The hypotheses described below are derived from the review of the licensing literature in Chapter Six, where more detailed arguments supporting each hypothesis can be found.

12.2.2 Size

Existing studies suggest that larger MNCs will be less likely to adopt licensing than smaller ones. Small MNCs do not have access to the same level of financial, managerial and foreign marketing resources as large MNCs and are therefore more likely to need the resources which licensees can offer.

This reasoning gives rise to the following hypothesis:

> "The level of licensing activity will be negatively correlated with MNC size."

12.2.3 Degree of Internationalization

Firms which are highly internationalized, ie which produce a high proportion of their output outside their home market, will have greater experience of operating in foreign markets than firms which produce a high proportion of their output inside their home market.

Possession of this experience will enable firms to more easily expand their operations into other foreign markets; firms with a low degree of internationalization, on the other hand, will be more likely to expand abroad via the licensing route as this will enable them to utilise the experience of local licensees.

This reasoning suggests the following hypothesis:

> "The level of licensing activity will be negatively correlated with a MNC's degree of internationalization."

12.2.4 Research Intensity

Firms which devote more of their resources to R&D activities than others are more likely to produce new products and processes. These firms will, as a result, possess more intellectual property than less research-oriented firms. Since the possession of a supply of intellectual property is a necessary condition for any licensing activity, it can be argued that firms with a high research intensity will, ceteris paribus, be more likely to adopt licensing.

This reasoning produces the following hypothesis:

> "The level of licensing activity will be positively correlated with a MNC's level of research intensity."

12.2.5 Level of Patent Ownership

Rather than estimate a firm's capacity to generate intellectual property via its research intensity, this asset can be proxied by the number of patents which it owns. Firms with more patents to their name than others are more likely to adopt licensing, ceteris paribus, since they have more 'licensable' assets.

This reasoning gives rise to the following hypothesis:

> **"The level of licensing activity will be positively correlated with a MNC's level of patent ownership."**

12.2.6 Level of International Patent Registration

Before a firm can enter into a licensing agreement involving patents with a foreign firm, it must have its patents registered in the country of the foreign firm. The extent of international patent registration is therefore likely to be a more accurate indicator of the abililty of a firm to engage in foreign licensing than simply the possession of patents.

The following hypothesis is therefore suggested:

> **"The level of licensing activity will be positively correlated with a MNC's level of international patent registration."**

12.2.7 Product Diversification

It has been argued that the larger the product range which a MNC possesses, the more difficult it is to spread resources evenly over all product lines [Telesio (1979)]. As a result, highly diversified MNCs find it difficult to manufacture their products inside all those foreign markets in which they may wish to operate.

By engaging in licensing, MNCs incur lower costs because they are able to supplement their limited resources with those of the licensee. The licensee, for example, is able to offer the over-stretched MNC its own marketing expertise, having already sunk costs into acquiring knowledge of its own market. In manufacturing, the licensee can provide production facilities by expanding capacity to accomodate the licensed product. If a MNC is unable to send managers with experience of a particular product line to an overseas market where it wishes to operate, a licensee can provide local managers and technical personnel trained at its own expense.

In addition to these considerations, the cost of losing some degree of control by opting for licensing should be of less concern to highly diversified MNCs because each product line will only account for a small share of earnings.

The above arguments suggest the following hypothesis:

> "The level of licensing activity will be positively correlated with a MNC's level of product diversification."

12.2.8 Geographical Diversification

It is reasonable to assume that firms with a high degree of geographical diversification will have gained a high level of experience about operating conditions in different foreign environments.

This experience can be regarded as an asset which the MNC will seek to exploit. MNCs with only a few overseas operations will not have the same experience as highly geographically diversified MNCs and will therefore be more likely to consider the licensing option because it allows them to utilise the experience of the licensee. In addition, MNCs that are highly geographically diversified are more likely to rely on internal transfer of their intellectual property because of the sunk costs they have made in establishing subsidiaries in numerous countries.

These arguments give rise to the following hypothesis:

> "The level of licensing activity will be negatively correlated with a MNC's level of geographical diversification."

12.2.9 Codifiability of Know-how

Codification is an exercise in abstraction which entails the transformation of experience and information into a symbolic form. The cost of licensing know-how will vary according to the ease with which it can be codified.

Codified know-how such as formulae for chemical compounds, blueprints, and computer programmes can be transmitted quicker, and at lower cost, than know-how which has a high tacit content and cannot, therefore, be codified. This type of know-how can only be transferred by means of inter-personal contact. It therefore requires the transfer of skilled personnel, who may need organizational back-up.

Licensing agreements involving the transfer of uncodified know-how are more likely to give rise to dissatisfaction than those which involve the transfer of codified know-how. Unforseen contingencies are more likely to arise as a result of the greater ambiguity involved. It is therefore to be expected that this type of know-how is more likely to be transferred within, rather than between, firms.

This reasoning gives rise to the following hypothesis:

> "The level of licensing activity will be positively correlated with the extent to which MNCs possess know-how which is codifiable."

12.2.10 Organizational Structure

It has been argued that firms with differing organizational structures will transfer resources to their overseas subsidiaries with differing levels of efficiency [Davidson (1983)]. It follows that firms with organizational structures which possess a low level of internal transfer efficiency will be more likely to adopt licensing than those firms whose organizational structures operate with a high level of internal transfer efficiency.

Resource transfer efficiency is believed to be higher in those firms which centralize experience and therefore benefit from the cumulative learning curve phenomenon. Corporate structures which divisionalize transfer mechanisms are believed to perform at lesser efficiency as there is a tendency for each division to operate on its own learning curve. As a result the marginal cost of transferring resources is greater.

Divisionalisation will also increase the fixed costs of resource transfer, both at headquarters and subsidiary level. At headquarters level the creation of duplicate personnel and administrative systems for each division raises the costs of potential FDI projects. At the subsidiary level, the divisional format reduces the ability of the MNC to share facilities, personnel, and information across divisions.

The above reasoning gives rise to the following general hypothesis:

> "MNCs with organizational structures which centralize experience of foreign operations (ie global matrix and international division structures) will be less likely to adopt licensing than MNCs with organizational structures which fragment experience of foreign operations (ie global product, global geographic, global functional and holding company structures)."

Within this general hypothesis it is possible to construct more specific hypotheses based upon the extent to which different organizational structures are believed to centralize experience of foreign operations For example, it could be hypothesised that the global matrix structure will exhibit the lowest level of licensing as it fosters the highest centralization of this experience, while the holding company structure is likely to be associated with the highest level of licensing as it entails the lowest level of centralization.

12.3 LINEAR MULTIPLE REGRESSION MODELS

12.3.1 Introduction

Two categories of regression models were constructed: one for patent licensing and one for know-how licensing. This reflects the fact that the factors which affect patent licensing differ to some extent from the factors which affect know-how licensing. As a result, the patent licensing models contain two variables which are not contained in the know-how licensing models, namely the 'level of patent ownership', and the 'level of international patent registration'. Similarly, the know-how licensing models contain one variable, 'codifiability of know-how', which is not present in the patent licensing models.

12.3.2 Variable Definition and Measurement

Table 12-2 gives details of the underlying concepts being measured by each of the variables, how these concepts were operationalized, and the labels attached to the variables for coding purposes. The table also reports the number of cases (ie companies) which were available for each of the variable measures, and specifies the expected signs of the partial regression coefficients, in accordance with the hypotheses outlined in Section 12.2.

TABLE 12-2

VARIABLES AND HYPOTHESES

CONCEPT	OPERATIONALIZATION	VARIABLE LABEL	NO. OF CASES	EXPECTED SIGN
Incidence of licensing	Patent Licensee Sales Index	PLSI	36	N.A.
	Patent Licensor Income Index	PLII	43	N.A.
	Know-how Licensee Sales Index	KHLSI	47	N.A.
	Know-how Licensor Income Index	KHLII	57	N.A.
Size	Global turnover	GLTURNOV	85	-
Degree of internationalization	Overseas production index	OVPRODN	43	-
	Proportion of R&D expenditure incurred by overseas subsidiaries	RD4	56	-
Research intensity	Level of R&D expenditure	RD1	78	+
	R&D expenditure as a percentage of turnover	RD3	71	+
	Number of employees engaged in R&D activities	RD5	73	+
Level of patent ownership	Number of UK patents held	UKPATS	72	+
Level of international patent registration	Number of countries in which the company registers its patents	REGISPAT	72	+
	Annual expenditure on filing patents in overseas countries	EXPPATS	37	+
Product diversification	Number of industries in which company operates	PRODVER1	85	+
	Herfindhal index based on the above	PRODVER2	85	+
Geographical diversification	Number of countries in which the company has overseas subsidiaries	OVSUBS	85	-
	Herfindhal index based upon the proportion of turnover generated in overseas markets	GRDIV	57	-
Codifiability of know-how	Know-how codifiability index	CODIFKH	65	+
Organizational structure	Dummy variable for each type of organizational structure	GLOBPROD	14	+
		GLOBGEOG	12	+
		GLOBFUNC	1	+
		INTDIV	10	-
		GEODIV	12	+
		MATRIX	7	-
		HOLDING	24	+
	Dummy variable for the degree to which organizational structures either centralize (ORGSTR=1) or fragment (ORGSTR=0) experience of foreign operations	ORGSTR	80	-

N.A. = Not Applicable, since 'Incidence of Licensing' is the dependent variable.

It can be seen from Table 12-2 that some of the concepts being measured were operationalized using a number of different methods. These different methods were employed for two reasons.

The first reason was to reduce the likelihood of multicollinearity between independent variables. The more measurements that could be made for each independent variable, the greater was the chance of obtaining a measure that was not collinear with any of the other independent variables. The existence of potential collinearity between pairs of independent variables was detected by inspection of the matrix of intercorrelations between the variables.[3] These intercorrelations were measured using Spearman rank-order coefficients because of the ordinality of most of the variables.[4]

There exist a number of different viewpoints concerning the degree of correlation that must exist between independent variables before multicollinearity is considered a problem. A rule of thumb suggested by Pindyck and Rubinfeld (1981, p89), for example, is that the correlation coefficient between two independent variables must be larger than the correlation of either or both with the dependent variable. This rule was not used in this study, however, as it is only reliable for models which have two independent variables.

Another rule of thumb, reported by Cass (1980, p169) to be "fairly widely" used is the existence of a correlation coefficient between independent variables of greater than 0.7. This rule was adopted for the present study, although it was adapted slightly to take account of the relatively small number of cases available and the ordinality of most of the variables. This adaption involved the use of a more conservative correlation coefficient of 0.5 to identify potential collinear effects. In situations where any two independent variables were found to have correlation coefficients of greater than 0.5, the correlations between each independent variable and the dependent variable were also examined to determine which was the smaller, and therefore which variable was eligible for exclusion.

The second reason for having a number of measures for some of the variables was to enhance the prospects of obtaining a sufficient number of cases for each variable, so that statistically significant regression models could be produced. It was recognised at the questionnaire construction stage of the research that 'missing values' arising from unanswered questions would create problems at the multivariate data analysis stage; although any particular MNC might provide data for all of the variables, the extent to which they could be utilised in multivariate analysis would depend upon the number of missing values produced by other respondents.

The regression models constructed in this chapter utilise all four measures of the dependent variable, but only one measure for each of the independent variables. The sources of all the variable measurements will now be described, along with the criteria employed to select the measures which were chosen for each independent variable.

Where references are made in the following discussion to the correlation coefficients between variable measures, the reader should consult Appendix 12-1, which contains two matrices of Spearman rank-order intercorrelations; the first shows the intercorrelations between all of the measures of the independent variables, while the second shows the intercorrelations between all of the measures of each variable (both dependent and independent). Those intercorrelations between independent variable measures that are greater than 0.5 are highlighted.

The segment of the second matrix which is of importance for detecting collinearity between independent variable measures is the lower right-hand triangle. The rectangular segment of the matrix contains the intercorrelations between the dependent and independent variable measures, while the upper left-hand triangle of the matrix contains the intercorrelations between the dependent variable measures.

CHAPTER 12

The Incidence of Licensing

This variable, the dependent variable, was operationalized using two different measures, the Licensee Sales Index (LSI) and the Licensor Income Index (LII).

Both of these measures are concerned with the relative, rather than the absolute, level of licensing activity. Licensing is measured as a proportion of the other two principal forms of market-servicing, exporting and FDI. The analysis therefore parallels to some extent the studies conducted by Telesio (1979), Contractor (1985) and Adam (1985) which all used variables measuring the relative significance of licensing.[5]

Both the LSI and the LII utilise data derived from a number of questionnaire responses, combined with information obtained from Annual Reports and Accounts. Both indices were developed along the lines of those used by Telesio (1979).[6] The former focuses upon the sales of the licensee, while the latter is based upon the income derived from the licensee by the licensor.

In order to calculate licensee sales it was necessary to know the royalty rate charged by the licensor. As royalty rates are normally based upon the sales of the licensee, the latter can be calculated by dividing the licensor's royalty income by the percentage royalty rate.

Two problems had to be overcome in calculating licensee sales. The first is that royalty rates may vary from agreement to agreement. The questions in the questionnaire concerning royalty rates were therefore phrased to take this into account: they asked companies to indicate into which of six categories their royalty rates "usually" fell. The categories chosen can therefore be viewed as the average categories over all agreements.

The second problem arises from the fact that licensing revenues are not always based upon royalty rates: revenues sometimes take the form of lump-sum payments, or of shares in the licensee. Sometimes licensing is undertaken for reciprocal access to technology, so that royalty payments do not reflect the total benefits to the licensor. To take account of this second measurement problem questions were included in the questionnaire which asked companies to indicate the proportions of their licensing revenues which came from annual royalties.

Licensee sales was therefore calculated by multiplying licensor income by the proportion of this income which came from annual royalties, and dividing the product by the royalty rate. The LSI was then calculated by expressing licensee sales as a proportion of total overseas sales (ie export sales plus sales by overseas subsidiaries plus licensee sales). Licensee sales was thus expressed as a proportion of the sales derived from all three principal market-servicing strategies: exporting, FDI and licensing. (The data on overseas sales accounted for by exports and foreign subsidiaries were obtained by extracting the figures for overseas turnover directly from Annual Reports and Accounts).

One drawback of the LSI is that it takes no account of the relative monetary importance of licensing. For example, two firms might have the same level of licensee sales and total overseas sales, and therefore have the same LSI. However, one of the firms could be receiving a higher return from its licensee because it is able to demand a higher royalty rate. The higher the royalty rate, ceteris paribus, the higher will be the licensor's income.

To overcome this drawback, the Licensor Income Index (LII) was computed. This index expresses licensing income as a proportion of total overseas sales. It therefore provides a measure of the relative monetary importance of licensing viz-a-viz the turnover generated by exports and direct investment.

Table 12-3 summarises the way in which both of these indices were constructed:

TABLE 12-3

INDICES MEASURING THE RELATIVE INCIDENCE OF LICENSING

Licensee Sales Index = S_L / S_O

Licensor Income Index = I_L / S_O

Where:

S_L = Licensee Sales

S_O = Total Overseas Sales (ie export sales plus overseas subsidiary sales plus licensee sales)

I_L = Licensor's Income

Size

This variable was measured by extracting the figure for global turnover from the Annual Reports and Accounts of the companies in the sample.

Degree of internationalization

This variable, which is concerned with the extent to which production is internationalized, was measured by two methods. One involved the computation of an overseas production index. This was obtained by firstly subtracting the exports of the companies from their overseas sales to derive the level of overseas production, and then expressing this as a proportion of global turnover.

The alternative method involved the use of responses to Question 2, Part (b), in Section IV of the questionnaire, which asked companies to reveal the proportion of their R&D expenditures which were incurred by overseas subsidiaries. Research has indicated that the amount of R&D undertaken by foreign subsidiaries is highly correlated with the proportion of total sales accounted for by foreign subsidiaries [Mansfield and Romeo (1979)]. Because these two variables are highly related, the proportion of total R&D spending accounted for by overseas subsidiaries can be used as a proxy for the degree to which production is internationalized.

It was decided to use the proportion of R&D incurred abroad in the regression analyses, rather than the overseas production index, because the latter had a correlation coefficient greater than 0.5 with another independent variable measure. The proportion of overseas R&D also had a correlation of greater than 0.5 with a different independent variable measure, but this was smaller than the correlation reported for the overseas production index.

The decision to use the proportion of overseas R&D was reinforced by the fact that there were 13 more cases available for this measure than for the overseas production index.

<u>Research Intensity</u>

This variable was measured in three ways, all derived directly from responses to Question 2, Parts (a) and (c), in Section IV of the questionnaire. The first measure is simply the amount of R&D expenditure, classified into six categories. (Although respondents were asked to provide a figure for the absolute level of R&D expenditure, only 26 did so, and therefore this ratio-level measure was not used in the analysis). The second is R&D expenditure expressed as a percentage of total turnover, while the third is the number of employees engaged in R&D activities.

Although more cases were available for both the first and the third of these measures, it was decided to use the second measure: R&D expenditure expressed as a percentage of turnover. This arose from the fact that the other two measures had correlation coefficients with other independent variable measures greater than 0.5. The first measure had three such intercorrelations, while the third had two. The second measure had no such correlations.

Level of Patent Ownership

This variable was measured by using the responses to Question 3, Part (a), in Section IV of the questionnaire, which asked for the number of UK patents held by each company, classified into six categories.

Level of International Patent Registration

This variable was measured in two ways, both obtained from responses to Question 3, Parts (b) and (c) respectively, in Section IV of the questionnaire. The first measure simply recorded the number of countries in which companies registered their patents, classified into six categories, while the second recorded the absolute amount of expenditure incurred annually in filing patents in overseas countries.

This second measure was not used in the regression analyses because it had correlation coefficients of greater than 0.5 with four other independent variable measures, and a much smaller number of cases than the first.

Product Diversification

This variable was measured in two ways, both of which involved the use of information obtained from a secondary source, Dun & Bradstreets's Key British Enterprises 1984, which listed the product groups in which UK companies and their domestic subsidiaries were active.[7] These product groups were based upon the 1980 version of the Standard Industrial Classification [SIC(80)], which classifies industrial sectors into a number of Divisions, which are then further broken down into a number of Classes.

The first measure of product diversification is simply the number of SIC(80) Divisions in which the companies were involved.

The second measure involved creating a Herfindhal index, based upon the number of Classes which were listed under each of the Divisions in which the companies were represented.

The way in which the Herfindhal index was constructed is shown below:

$$\text{Herfindhal index of product diversification} = 1 - \frac{\sum_{i=1}^{n} X_i^2}{\sum_{i=1}^{n} (X_i)^2}$$

Where: X_i = number of Classes within Divisions i to n of SIC(80)

This index takes account not only of the number of product groups in which the companies were active, but also the distribution of their activities among those groups. Thus a company which was listed under several product groups, but whose output was highly concentrated in only one of them, was classified as having a low degree of diversification according to this index. A company whose output was equally divided among several product groups was classified as more highly diversified.

Neither of the two measures of product diversification had correlation coefficients of greater than 0.5 with any of the other independent variable measures, and both had the same number of cases. It was therefore decided to use the second measure in the regression analyses, because of the merits of the Herfindhal index as described in the previous paragraph.

<u>Geographical Diversification</u>

This variable was measured in a similar way to the previous variable. Two measures were constructed, the first of which simply involved using Annual Reports and Accounts to identify the number of countries in which the companies had overseas subsidiaries.

The second involved the creation of a Herfindhal index, based upon data derived from the first question in Section IV of the questionnaire which asked companies to reveal the percentage of their global turnover that was generated in each of seven overseas markets: Europe (exluding the UK), North America, Latin America, Asia, Africa, the Middle East and Australasia. The Herfindhal index was constructed in exactly the same manner as the index for product diversification, except that X_i represented turnover in each of the seven overseas markets.

Although more cases were available for the first of these two measures, it was decided to use the second measure in the regression analyses. This was due to the fact that the first measure had a correlation coefficient of greater than 0.5 with one of the independent variable measures, whereas the second had no such correlation. The use of this second measure was also deemed to be desirable to maintain consistency, as the Herfindhal index had been chosen as the basis for measuring product diversification.

Codifiability of Know-how

This variable was measured from data derived from Question 14 in Section II of the questionnaire, which asked the companies to reveal the form in which their know-how was generally licensed to unrelated overseas companies. Four categories of know how were identified in the question: documented information, manufacturing process equipment, organizational back-up and the training of licensee personnel. Respondents were asked to indicate the extent to which their licensed know-how fell into each of these four categories, by ranking each category on a scale of 1 to 4 (where 1=never and 4=always).

A measure of codifiability was derived from the resulting data by deducting the sum of the rankings attributed to the last two categories of know-how from the sum of the rankings attributed to the first two categories. This particular formula was used because the first two categories of know-how (documented information and manufacturing process equipment) entail a high degree of codification, while the other two categories (organizational back-up and the training of licensee personnel) involve a low degree of codification.

Organizational Structure

This variable was measured from data derived from Question 4 in Section IV of the questionnaire, which asked respondents to classify their company's worldwide organizational structure into one of the following seven categories:

(a) Organized globally by product divisions

(b) Organized globally by geographic divisions

(c) Organized globally by functional divisions (marketing, finance, etc)

(d) Organized domestically by product or functional divisions, with an international division for overseas operations

(e) Organized domestically by product or functional divisions, with geographic divisions for overseas operations

(f) Matrix or grid structure, ie organized globally by some combination of product and/or geographic and/or functional divisions, involving a sharing of responsibility across divisions

(g) Holding company structure, ie organized by individual subsidiaries, each largely autonomous

Since the 'organizational structure' variable was measured at the nominal level, it was necessary to create dummy variables for each of these seven categories. The effect of creating these dummies, however, was to split the 80 cases which were available for the question as a whole among the seven dummy variables, thereby reducing the likelihood of any statistical validity being obtained for any of these variables.

A single dummy was therefore created for use in the regression models. This distinguished between those organizational structures that were deemed to centralize experience of overseas operations [categories (d) and (f)] and those that were believed to fragment this experience [categories (a) to (c) plus (e) and (g)]. The former were recoded as 1, the latter as 0.

12.3.3 Variable Recodings

In developing the linear multiple regression models it was decided to keep the values of all five ordinal variables polytomous, rather than group them into dichotomies, because the creation of dummy variables necessarily involves a loss of information. It was, however, necessary to recode three of the independent variables since their values correspond to class intervals.[8] These variables were 'research intensity', 'level of patent ownership' and 'level of international patent registration'. It was assumed, in accordance with the suggestion of Blalock (1972, p84), that the values for each of these variables fell on the midpoint of a class interval.

The uppermost class intervals of these variables posed a problem because they are bounded by infinity and therefore had no natural 'mid-points' to which the values falling into them could be recoded. An arbitrary midpoint was therefore assumed for each of the uppermost class intervals. Since only a small proportion of respondents ticked the uppermost category for each of these three variables, it is unlikely that the adoption of arbitrary midpoints will have introduced any serious bias into the results.[9]

The way in which the values of these three independent variables were recoded is illustrated in Table 12-4.[10]

TABLE 12-4

INDEPENDENT ORDINAL VARIABLE RECODINGS

VARIABLE LABEL	QUESTIONNAIRE CATEGORIES	INITIAL CODING	RECODED VARIABLE LABEL	RECODED VALUES
RD3	< 1.0 %	1	RD3R	0.5 %
	1.0-2.5 %	2		1.75 %
	2.5-5.0 %	3		3.75 %
	5.0-7.5 %	4		6.25 %
	7.5-10.0 %	5		8.75 %
	> 10.0 %	6		20.0 %
UKPATS	< 10	1	UKPATSR	5
	10-50	2		30
	50-100	3		75
	100-500	4		300
	500-1,000	5		750
	> 1,000	6		2,000
REGISPAT	< 10	1	REGSPT	5
	11-20	2		15
	21-30	3		25
	31-40	4		35
	41-50	5		45
	> 50	6		60

The dependent variable was measured by an index of relative licensing intensity, of which licensing income was a constituent element. Since licensing income was measured in terms of class intervals, the values for each case were recoded to the mid-points of class intervals. The fact that the uppermost class intervals are open-ended did not pose a problem, however. In the case of know-how licensing, no values fell into the uppermost category. In the case of patent licensing only one value fell into the uppermost category, and the precise figure for this was obtained because the respondent answered the follow-up part of Question 6 in Section II of the questionnaire which asked for an exact figure (£24 million in this case).

The manner in which the dependent variable was measured, for both patent and know-how licensing, is depicted in Table 12-5.

TABLE 12-5

DERIVATION OF THE DEPENDENT VARIABLE MEASURES

RELATIVE PATENT LICENSING INTENSITY

Patent Licensee Sales Index (PLSI)
Patent Licensor Income Index (PLII)

Where: PLSI = Patent licensee sales index = PLS/OVTURNOV + PLS
PLS = Patent licensee sales = PATY1R x PATLCRYR/PATLCRRR
PLII = Patent licensor income index = PATY1R/OVTURNOV + PLS

OVTURNOV = Overseas turnover
PATY1R = Patent licensing income
PATLCRYR = Proportion of patent licensing income derived from royalties
PATLCRRR = Average patent licensing royalty rate

RELATIVE KNOW-HOW LICENSING INTENSITY

Know-how Licensee Sales Index (KHLSI)
Know-how Licensor Income Index (KHLII)

Where: KHLSI = Know-how licensee sales index = KHLS/OVTURNOV + KHLS
KHLS = Know-how licensee sales = KHLCY1R x KHLICRYR/KHLICRRR
KHLII = Know-how licensor income index = KHLCY1R/OVTURNOV + KHLS

OVTURNOV = Overseas turnover
KHLCY1R = Know-how licensing income
KHLICRYR = Proportion of know-how licensing income derived from royalties
KHLICRRR = Average know-how licensing royalty rate

The way in which the values of the constituent parts of the dependent variable were recoded is shown in Table 12-6. The uppermost categories of three of these component variables (the average patent and know-how licensing royalty rates, as well as know-how licensing income) had no values falling into them. As a result there was no need to assign an arbitrary midpoint to their recoded values. This is reflected in the nil entries in the final column of Table 12-6, opposite the relevant categories.

TABLE 12-6

RECODINGS OF DEPENDENT VARIABLE CONSTITUENTS

VARIABLE LABEL	QUESTIONNAIRE CATEGORIES	INITIAL CODING	RECODED VARIABLE LABEL	RECODED VALUES
RELATIVE PATENT LICENSING INTENSITY				
Patent licensing income				
PATLICY1	< 0.1 m	1	PATY1R	0.05 m
	0.1-1.0 m	2		0.55 m
	3-5 m	3		3.00 m
	5-10 m	4		7.50 m
	10-20 m	5		15.00 m
	> 20 m	6		24.00 m
Proportion of patent licensing income derived from royalties				
PATLICRY	100 %	1	PATLCRYR	100 %
	90-100 %	2		95 %
	50-90 %	3		70 %
	20-50 %	4		35 %
	10-20 %	5		15 %
	< 10 %	6		5 %
Average patent licensing royalty rate				
PATLICRR	< 1 %	1	PATLCRYR	0.5 %
	1-2.5 %	2		1.75 %
	2.5-5 %	3		3.75 %
	5-7.5 %	4		6.25 %
	7.5-10 %	5		8.75 %
	> 10 %	6		
RELATIVE KNOW-HOW LICENSING INTENSITY				
Know-how licensing income				
KHLICY1	< 0.1 m	1	KHLCY1R	0.05 m
	0.1-1.0 m	2		0.55 m
	3-5 m	3		3.00 m
	5-10 m	4		7.50 m
	10-20 m	5		15.00 m
	> 20 m	6		
Proportion of know-how licensing income derived from royalties				
KHLICRY	100 %	1	KHLICRYR	100 %
	90-100 %	2		95 %
	50-90 %	3		70 %
	20-50 %	4		35 %
	10-20 %	5		15 %
	< 10 %	6		5 %
Average know-how licensing royalty rate				
KHLICRR	< 1 %	1	KHLICRRR	0.5 %
	1-2.5 %	2		1.75 %
	2.5-5 %	3		3.75 %
	5-7.5 %	4		6.25 %
	7.5-10 %	5		8.75 %
	> 10 %	6		

12.3.4 Variable Transformations

In addition to the recoding of certain variables, each variable was examined to determine whether a transformation of its scale of measurement was appropriate.

Standardized scatterplots of each variable against the dependent variable were produced. The effects of a number of transformations upon the strength of the linear fit between these variables were then ascertained. This was achieved by producing standardized scatterplots for each of the transformed variables against the dependent variable and comparing the adjusted R^2 statistic for the transformed relationships with their original values.[11] The effect of transforming the dependent variables was also examined as part of this process.

Five commonly-used transformations were employed: the logit, square root, natural log, negative reciprocal and square transformations.[12]

The logit transformation was found to be the most effective transformation for the dependent variable.[13] This was attributable to the fact that the values of the dependent variable took the form of proportions and are therefore delimited by the values of 0 and 1. Regression curves are unlikely to be linear where dependent variables are measured in terms of proportions since changes in predictor variables at the extreme ends of their scales are unlikely to produce much change in the proportion. For most proportions a 'sigmoid' regression curve is likely to be found.

Three transformations are commonly used for proportions: the arcsine, probit and logit transformations [Armitage (1971, p355)]. These have the effect of extending the ends of the scale more than the middle and thus increasing the likelihood of a linear fit being obtained with other variables. Since these transformations all have very similar effects the logit transformation was used for the dependent variable. A logit is simply a folded natural (ie napierian) logarithm, which takes the following form for a variable, y:[14]

$$\text{Logit}(y) = \log_e \frac{y}{1-y} = \log_e y - \log_e (1-y)$$

The logit transformation was also carried out on two of the independent variables, product diversification and geographical diversification, since these were also measured in terms of proportions. However, the distribution of values for these two variables was not as highly skewed as the distribution of values for the dependent variable; as a result the impact of this transformation was found to be less powerful than some of the other transformations which were applied.

These other transformations (the square root, natural log, negative reciprocal and square transformations) fall along what Mosteller and Tukey (1977, p79) called a "ladder of re-expressions". On this ladder each re-expression represents a different power to which a variable may be raised. The powers corresponding to these four transformations are included in Table 12-7, which also contains additional powers at either end of the ladder.

TABLE 12-7

POWER TRANSFORMATIONS

Power (p)	$-n$	...	-2	-1	$-1/2$	#	$1/2$	1	2	...	n
Transformation (x^p)	$1/x^n$	...	$1/x^2$	$1/x$	$1/\sqrt{x}$	$\ln x$	$\sqrt{x}$	x	x^2	...	x^n

There is no entry for zero in this table because the values for any variable x elevated to the power zero simply become constants, which are of no use for data transformation purposes. The "#" entry in the table can be regarded as a "pseudo zero". The transformation which corresponds to this entry is the natural log of x (ie $\log_e x$ or $\ln x$). This is obtained when p=0 by assuming that x takes the form $\int x^{p-1}\,dx$ [Mosteller and Tukey (1977, p80)].

The power transformations where $p>0$ have the property that they are all monotonic in the same direction, ie as x increases x^p also increases. Where $p<0$, however, the transformation is monotonic decreasing. Therefore in order to maintain the same ordering of original and transformed data negative values of x are used when $p<0$. For example, where $p=-1$ the appropriate transformation according to Table 12-7 is the reciprocal $(1/x)$. This causes the scale of measurement to reverse itself since large values of x give small values of $1/x$ and small values of x give large values of $1/x$. When the negative reciprocal $(-1/x)$ is used instead the scale of measurement does not reverse itself since small values of x give small values of $-1/x$ and so on.

The particular transformations which improve the goodness of fit between any two variables depend upon the characteristics of the curvature between those variables. If a curve slopes continuously downwards (ie is monotonically decreasing) as the independent (ie x) variable increases, then transformations with values of $p<1$ on the x variable are appropriate.[15] The strength of the power transformation necessary to achieve the closest approximation to linearity will depend upon the degree of curvature. The greater the curvature the greater will be the absolute value of p necessary to induce linearity.[16] The three transformations with values of $p<1$ which were employed were thus ordered in terms of their strength: the weakest was the square root transformation, the log transformation was stronger, while the negative reciprocal transformation was the strongest.

These transformations have the effect of correcting what Erickson and Nosanchuck (1977, p104) refer to as "upward straggle" in the x variable. This describes the situation in which small values of the variable are clumped relatively close together, while the larger values trail off. Transforming the variable with a power transformation of $p<1$ has the effect of pulling in the upper values of the variable into the main body of the data and spreading out the smaller values.

In situations where the curve between two variables increases monotonically with increases in the x variable, power transformations with values of p>1 are appropriate for the x variable.[17] Once again the strength of the transformation will increase, the higher the absolute value of p. The square transformation (p=2) which was employed on the data had the effect of correcting what Erickson and Nosanchuck (op cit) call "downward straggle" in the x variable. This refers to the situation in which the high values are bunched and the lower ones are more spread out. The use of the square transformation stretches the larger values out more than the smaller ones thus producung a more even distribution.

A particular problem was faced when the natural log and negative reciprocal transformations were applied to the 'degree of internationalization' variable (RD4) and the 'product diversification' variable (PRODVER2). This arose from the fact that these two variables had 18 and 10 cases respectively which took on values of zero. Since the natural log and negative reciprocal of zero are both undefined, these two transformations would have had the effect of rendering these cases as missing values, thus reducing the potential number of degrees of freedom in the multiple regression equations.

In order to overcome this problem a device suggested by Mosteller and Tukey (1977, p112) was employed; this involved "starting" the data by adding a small fraction to the zero values so that their transformed values would not become defined as missing. The "start" used for RD4 was the "popular" value of 0.25; a smaller value of 0.0025 was used for PRODVER2 to take account of the lower values obtained for this variable.

Another of the independent variables, the codifiability of know-how (CODIFKH), was also problematic in that 11 negative values, as well as 24 values of zero, were recorded. This problem was more simply overcome by a re-scaling of the data. This involved adding the value 5 to each case, which had the effect of shifting the original scale of '-4 to 3' to a new scale of '1 to 8'.

Negative and zero values were thus eliminated. Because the underlying variable which was being measured is an inherently ordinal variable this re-scaling does not distort the relationship between the values recorded and the phenomenon being measured.

The transformations applied to the independent variables which were found to produce the best fits with each of the four versions of the dependent variable are shown in Table 12-8.

TABLE 12-8

INDEPENDENT VARIABLE TRANSFORMATIONS

INDEPENDENT VARIABLES	DEPENDENT VARIABLE MEASURES PLSI	PLII	KHLSI	KHLII
GLTURNOV	Log	Log	Log	Log
RD4	Square	Square	NR	NR
RD3	Log	NR	NR	NR
UKPATS	NR	NR	N.A.	N.A.
REGISPAT	SR	SR	N.A.	N.A.
PRODVER2	Square	Square	Square	Square
GRDIV	NR	Square	NR	NR
ORGSTR	-	-	-	-
CODIFKH	N.A.	N.A.	NR	NR

Where: Log = Natural log
SR = Square Root
NR = Negative Reciprocal
N.A. = Not Applicable
\- = No Transformation

It can be seen from Table 12-8 that the best transformation for the 'size' variable (GLTURNOV) was the log transformation. This transformation reduced the upward straggle that was apparent from the frequency distribution of this variable. [The log transformation of company size is a very commonly used procedure in business research, eg Miller & Droge (1986), Cohen & Pfeffer (1986)].

The frequency distribution of the 'product diversification' variable (PRODVER2), on the other hand, exhibited downward straggle, which was reduced by means of the square transformation. The variables measuring the level of UK patent registration (UKPATS) and the codifiability of know-how (CODIFKH) were both transformed by means of the negative reciprocal transformation, while the variable measuring the level of international patent registration (REGISPAT) was transformed by means of the less powerful square root transformation. The transformations used for the remaining variables varied in accordance with the particular measure used for the dependent variable. The organizational structure variable was entered into the regression equations in its original state because it was constructed as a dichotomous (dummy) variable; transformations would therefore have had no impact upon the strength of its fit with the dependent variable measures.

12.3.5 Patent and Know-how Licensing Models

The variables specified for inclusion in each of the four multiple regression models which were developed are listed in Table 12-9. The models were developed using the regression procedure on SPSS^{X}.

The method of model construction employed was the 'stepwise' method. As a result, not all of the specified variables were entered into each equation. The stepwise method is essentially a combination of two alternative methods of variable selection, namely 'forward' and 'backward' selection. Under the stepwise method variables are considered for entry into the regression equation one at a time, based upon the absolute strength of their partial correlation coefficients with the dependent variable. In order for a variable to qualify for entry the probability associated with its F value had to be less than an established criterion known as the 'probability of F-to-enter' (PIN) which was set at 0.125.

TABLE 12-9

MULTIPLE REGRESSION MODELS

PATENT LICENSING MODELS

$$LNPLSI_i = b_0 + b_1\ GLTURNOV_{1i} + b_2\ RD4_{2i} + b_3\ RD3_{3i} + b_4\ UKPATS_{4i} + b_5\ REGISPAT_{5i} + b_6\ PRODVER2_{6i} + b_7\ GRDIV_{7i} + b_8\ ORGSTR_{8i} + e_i$$

$$LNPLII_i = b_0 + b_1\ GLTURNOV_{1i} + b_2\ RD4_{2i} + b_3\ RD3_{3i} + b_4\ UKPATS_{4i} + b_5\ REGISPAT_{5i} + b_6\ PRODVER2_{6i} + b_7\ GRDIV_{7i} + b_8\ ORGSTR_{8i} + e_i$$

KNOW-HOW LICENSING MODELS

$$LNKHLSI_i = b_0 + b_1\ GLTURNOV_{1i} + b_2\ RD4_{2i} + b_3\ RD3_{3i} + b_4\ PRODVER2_{4i} + b_5\ GRDIV_{5i} + b_6\ CODIFKH_{6i} + b_7\ ORGSTR_{7i} + e_i$$

$$LNKHLII_i = b_0 + b_1\ GLTURNOV_{1i} + b_2\ RD4_{2i} + b_3\ RD3_{3i} + b_4\ PRODVER2_{4i} + b_5\ GRDIV_{5i} + b_6\ CODIFKH_{6i} + b_7\ ORGSTR_{7i} + e_i$$

Since the addition of new variables has the effect of altering the F values of variables already entered, each variable in the equation was re-examined when a new variable was entered to determine whether the probability associated with its F value wasless than an established criterion known as the 'probability of F-to-remove' (POUT) which was set at 0.15. If the probability was greater than this criterion the variable was eliminated from the equation. To prevent the same variable from being repeatedly entered and removed, the value of PIN must be less than the value of POUT. The selection of variables terminated when no more variables met the entry or removal criteria.[18]

In constructing the regression models, missing values were dealt with using the 'pairwise' treatment available on $SPSS^x$. This method involved the calculation of partial correlation coefficients between any pair of variables based on all cases which had complete information for the two variables, regardless of whether these cases had missing values for any other variables. The alternative method of dealing with missing values, the 'listwise' treatment, would have involved the elimination of all cases which had missing values on any single variable, and would thus have resulted in a much smaller sample size.

It should be recognised, however, that there is a trade-off between the larger number of cases made available under the pairwise procedure and the degree of confidence which can be placed in the statistics which result. Significance levels, for example, must be viewed with caution if the pairwise command is used. For more details, see Norusis (1985, p37).

The four models produced by the stepwise regression procedure, with pairwise treatment of missing values, are shown in Table 12-10. This table reports the partial regression coefficients associated with the independent variables entered in each model, their t values, and the order in which they were included under the stepwise procedure. The degrees of freedom for each model are also reported, along with their overall F values, and the coefficients of determination, measured by the adjusted R^2 statistic.

A fuller set of regression statistics are contained in Appendix 12-2, which also lists the Pearson product moment correlation coefficients between the various pairings of dependent and independent variables. Examination of these correlation matrices reveals that two of the variables in the PLSI model (the REGISPSAT and GRDIV variables) had a correlation coefficient with each other greater than 0.5, thus signalling a potential multicollinearity problem. As the GRDIV variable had a smaller correlation with the dependent variable than the REGISPAT variable, it was the candidate for removal from the model.

TABLE 12-10

MULTIPLE REGRESSION MODELS OF PATENT AND KNOW-HOW LICENSING ACTIVITY

DEPENDENT VARIABLE	CONSTANT	INDEPENDENT VARIABLES: GLTURNOV	RD4	RD3	UKPATS	REGISPAT	PRODVER2	GRDIV	CODIFKH	ORGSTR	DF	F Value	R_a^2
PLSI	23.33	-1.24 (-6.11)*** [1]	-0.0007 (-2.67)** [4]	--- ---	4.44 (4.26)*** [3]	-0.68 (-3.54)*** [6]	--- ---	-0.65 (-3.87)*** [5]	N.A. N.A.	2.07 (4.02)*** [2]	24	12.02***	0.74
PLII	8.34	-0.73 (-3.70)*** [1]	-0.0005 (-1.93)* [4]	--- ---	7.40 (1.98)* [3]	--- ---	--- ---	--- ---	N.A. N.A.	1.24 (2.40)** [2]	24	5.39***	0.43
KHLSI	9.15	-0.74 (-2.87)*** [1]	--- ---	--- ---	N.A. N.A.	N.A. N.A.	-3.45 (-2.16)** [4]	-0.53 (-3.00)*** [2]	-7.40 (-2.57)** [3]	1.17 (1.83)* [5]	32	7.83***	0.52
KHLII	8.19	-0.76 (-4.40)*** [1]	--- ---	0.67 (2.10)** [2]	N.A. N.A.	N.A. N.A.	--- ---	-0.31 (-2.35)** [3]	--- ---	1.00 (2.16)** [4]	32	8.42***	0.49

NOTES:
- *** Significance level better than 1%
- ** Significance level better than 5%
- * Significance level better than 10%
- --- Variable not included in the equation
- [ ] Order of inclusion in stepwise regression
- N.A. Variable not applicable to model

However, as the other three models did not possess any variables with troublesome intercorrelations, the GRDIV variable was retained in the PLSI model, thereby ensuring an accurate comparison between all four models. Nevertheless, any alterations to the conclusions regarding the nine hypotheses which would have occurred as a result of deleting the GRDIV variable are reported in Section 12.5.

It can be seen from Table 12-10 that 24 cases were used to produce the patent licensing models, while 32 cases were used to create the know-how licensing models. The model which produced the best fit for the available data was the PLSI model; 74 per cent of the total variation of the dependent variable was accounted for by the six variables that were entered into the model. It should be noted, however, that the effect of deleting the GRDIV variable (for the reasons outlined above) would have been to reduce the model's R_a^2 to 0.57. Nevertheless, this value would still have represented a fit which was better than those produced by any of the other three models.

The KHLSI model produced the next best fit, with an R_a^2 of 0.52 obtained from the entry of five of the independent variables.[19] The remaining two models were both constructed from four independent variables. Of these the KHLII model produced the better fit, with an R_a^2 of 0.49, compared to a value of 0.43 produced by the PLII model.

Although the values of the partial regression coefficients associated with the independent variables are reported in Table 12-10, it is the sign attributed to these values which is of importance rather than the values themselves, since the aim of the regression analysis was hypothesis-testing rather than forecasting. The inferences that can be drawn from the regression results are discussed in Section 12.5. Before any conclusions were drawn, however, the validity of the four models was analysed using conventional diagnostic techniques, the results of which are reported in the next section.

12.4 REGRESSION DIAGNOSTICS

12.4.1 Introduction

The term 'regression diagnostics' is commonly used to describe a set of statistical techniques which are employed to check the assumptions of multiple regression analysis and the validity of the statistics which are produced. These techniques involve the analysis of residuals, both to check the assumptions of regression analysis and to assess the influence of outliers, and the analysis of the correlation between independent variables in order to detect the presence of collinearity. As the collinearity problem has already been dealt with, the remainder of this section will focus on the analysis of residuals.

The residuals derived from the four models were analysed, firstly, to detect any violation of the assumptions underlying regression analysis. The three major assumptions of regression analysis can be described under the following headings: normality, homoscedasticity, and independence of error [Berenson and Levine (1983, p517)]. Each of these are now considered.

12.4.2 Normality

This assumption requires that the value of the dependent variable be normally distributed for all values of the independent variables. It was checked by visual inspection of normal probability plots of standardized residuals (see Appendix 3). Standardized residuals (ie residuals divided by estimates of their standard deviations) were used since they make it easier to judge the relative magnitude of residuals; they are expressed in standard deviation units above or below the mean.

The y-axes of the normal probability plots contain the cumulative distributions of observed standardized residuals, while the x-axes contain the cumulative distributions of standardized residuals that would be expected in normal distributions with the same mean and variance as the residuals. If the two distributions are identical a straight (45^{O}) line would result.

Inspection of the four plots in Appendix 3 reveals that the normality assumption holds well for the third regression equation (KHLSI) but less well for the other three. The cumulative probability plots of the PLII and KHLII residuals are very similar; at either end of both axes the observed points cluster around the 45^{O} line, whereas they fall below the 45^{O} line between the values of 0.25 and 0.75, reflecting the fact that the observed cumulative proportion is smaller than the expected cumulative proportion over these values (the middle range of the probability distributions).

The shape of the cumulative probability plot of the PLSI residuals conforms least well to the normality assumption. Initially the observed residuals are all above the 45^{O} line, indicating that there are more negative residuals than expected. At the half-way point on both axes the pattern reverses itself, with the observed residuals all lying below the 45^{O} line, indicating that there are fewer positive residuals than expected.

In interpreting these plots it should be borne in mind that one should not expect the observed standardized residuals to be exactly normal, since some deviation is to be expected because of sampling variation [Norusis (1985, p28)]. In addition, it should be noted that the usual tests of hypotheses and confidence intervals used in regression analysis are 'robust' against departures from the normality assumption; theoretical and experimental evidence indicates that only extreme departures of the distribution of the dependent variable from normality can yield spurious results [Kleinbaum, Kupper and Muller (1988, p108)].

Thus, whereas there may be some doubt about the normality assumption holding for the PLSI variable, there is nothing to suggest that the divergence between the observed and expected pattern of standardized residuals for this variable can be regarded as 'extreme', and therefore no reason to call the regression results for the first equation into question on the basis of this criterion.

12.4.3 Homoscedasticity

This assumption requires that the variation around the regression line be constant for all values of the independent variables. Thus, the variation of the dependent variable must be the same when the independent variables have low values as when they have high values.

The assumption was evaluated by visual inspection of standardized partial regression plots for each of the independent variables (see Appendix 3). The y-axes of these plots contain the standardized residuals for the dependent variable when it is predicted from all the independent variables excluding the ith independent variable; the x-axes contain the standardized residuals for the ith independent variable when it is predicted from all of the other independent variables. This method of plotting residuals has the effect of removing the linear effect of the other independent variables from both variables under investigation (ie the ith independent variable and the dependent variable).

If the homoscedasticity assumption holds for each of the independent variables we would expect to find no observable pattern in the partial regression plots; the standardized residuals should be randomly distributed in a band about the horizontal straight line through zero. However, if the assumption does not hold for any of the independent variables we would expect to observe a "fanning effect" in the pattern of standardized residuals, ie an increasing or decreasing spread of these residuals along the x-axis; this would be evidence of heterogeneity in the variances of the dependent variable at each level of the independent variable.

Of the 19 plots contained in Appendix 3 (one for each of the independent variables entered in each of the four regression equations) none exhibits an obvious "fanning" pattern consistent with heteroscedasticity. It should be acknowledged, however, that the number of data points in these plots (particularly those relating to patent licensing) make it difficult to reach absolutely firm conclusions for a number of the independent variables. The plot for UKPATS against PLII, for example, might be construed as exhibiting an increasing spread of standardized residuals.

Nevertheless, even if the homogeneity of variance assumption were to be called into question for this variable, there would need to be very clear evidence of violation before the regression result concerned could be called into question because studies have shown that mild departures from variance homogeneity do not have too adverse an effect upon results. It is only when data show very obvious and significant departures from homogeneity that this assumption can be deemed to have been violated [Kleinbaum, Kupper and Muller (1988, p108)]. It can therefore be concluded that there are no grounds for questioning the results of the regression analyses on the basis of the homoscedasticity criterion.

12.4.4 Independence of Error

This assumption requires that the error terms (ie the residual differences between observed and predicted values of the dependent variable) should be independent for all values of the independent variables. It is usually checked for data that are collected over a period of time in order to ensure that there is no 'autocorrelation' effect among successive variables, ie there is no correlation between a particular observation and the values that preceed and succeed it.

Although the regression analysis can be described as a cross-sectional study, in the sense that all the data were collected for a single time period (1984), this assumption was nevertheless checked in order to ensure that there was no autocorrelation between variables within the time period when the sample data were collected. This assumption was therefore evaluated by plotting the standardized residuals in the order in which the data were obtained (see Appendix 3).

As no discernable pattern is apparent in the casewise plots of the standardized residuals produced by each of the four models, it can be assumed that the error terms are independent of one another. This conclusion was checked by applying the Durbin-Watson test to the residuals produced by each of the four models. The Durbin-Watson statistic (d) is defined in terms of the observed residuals (e_i and e_{i-1}) as follows:

$$d = \frac{\sum_{i=2}^{n} (e_i - e_{i-1})^2}{\sum_{i=1}^{n} e_i^2}$$

An approximate test suggested by Kendall (1976, p164) is to ascertain whether d is close to the value zero or to the value two. If d is close to zero it would indicate that successive residuals are highly positively correlated; if, however, they are uncorrelated we would expect to find a value of d near to 2. The values of d produced by the four models are shown in Table 12-11. They are, to varying degrees, all close to value 2, thus suggesting that successive residuals are uncorrelated.

A more exact test for detecting serial correlation is to compare the computed value of d with the upper and lower bounds of the critical values of d (ie d_U and d_L). A value of d greater than d_U indicates the lack of any significant positive serial correlation, whereas a value of d less than d_L indicates the existence of significant positive serial correlation. For any value of d falling between d_U and d_L the test is inconclusive. The same comparisons with d_U and d_L can be made to test for the presence of any negative serial correlation, except that d is then replaced by the statistic 4-d.

This more exact (2-tailed) test was applied by comparing the values of both d and 4-d against the appropriate critical values of d_U and d_L. These values were obtained from the tables contained in Durbin and Watson (1951, pp173-175) which list critical values for various numbers of observations, predictor variables and confidence intervals.[20] The results of this comparison, at the 2 per cent significance level, are shown in Table 12-11.

TABLE 12-11

DURBIN-WATSON TEST STATISTICS

Dependent Variable	d	4-d	d_U	d_L
PLSI	1.78	2.22	1.80	0.64
PLII	1.47	2.53	1.53	0.80
KHLSI	1.85	2.15	1.60	0.92
KHLII	2.08	1.92	1.51	0.98

It can be seen from the table that the test conclusively rejects the presence of any serial correlation among the residuals produced by the two know-how licensing models (d and 4-d are both greater than d_U) but is inconclusive for the two patent licensing models (d is less than d_U but greater than d_L in both cases).

Despite the inconclusive nature of the tests for the patent licensing models, the Durbin-Watson statistics do not produce any evidence which supports the existence of serial correlation. There is therefore no reason to believe that there was any significant autocorrelation between the predictor variables within the time period when the sample data were collected, and therefore no grounds for calling the regression results into question on the basis of this criterion.

12.4.5 Detection of Outliers

Following the analysis of the residuals to check the validity of the assumptions underlying the regression models, the residuals were examined further in order to detect the presence of any outliers. An outlier among a set of residuals is one that is much larger than the rest in absolute value. Detection of outliers is important because their presence can significantly affect the least-squares fitting of a model.

The common method of dealing with outliers is to delete the observations (ie cases) which produce them. However, Kleinbaum, Kupper and Muller (1988, p201) warn against the temptation to "data snoop" by discarding troublesome data points simply in order to polish the fit of a model. They point out that the presence of an outlier may simply indicate special circumstances which warrant further investigation, and they recommend that observations are not immediately discarded unless they are found to result from a mistake (eg an error in data recording or some other cause independent of the process under study). Their approach, which is also recommended by Draper and Smith (1981, pp152-153), is followed here. Each company identified as an outlier was therefore examined to detect any obvious characteristics which would explain its status. None of the characteristics which were identified were deemed to be deviant enough to justify the deletion of any companies from the regression models.

The presence of outliers was detected by three statistics that are commonly-used for this purpose: standardized residuals, leverages and Cook's distance. The values for these statistics are listed in Appendix 3, alongside the casewise plots of the standardized residuals.

Standardized residuals provide a measurement of the relative magnitude of residuals around the regression line. Observations that lie more than three standard deviations above or below the mean of the residuals are commonly deemed to be outliers. It can be seen from Appendix 3 that only one of the four regression models possessed a case with a standardized residual greater than three. This was case 6 in the PLSI model. The company concerned is involved in patent licensing only and operates in the motor components industry. It possesses no obvious characteristics which would account for its outlier status.

The other two statistics used to identify outliers, leverages and Cook's distance, measure the 'extremeness' of an observation and the 'influence' of an observation respectively. In Appendix 3 fewer values are reported for Cook's D than are reported for the leverage statistics. This is because the latter were calculated from the values of the independent variables (for which more data were available) whereas Cook's D was calculated from the available values of independent and dependent variables. In addition the number of cases used to compute the statistics varies from model to model; this is a consequence of the pairwise missing-value treatment which was used to develop the regression models.

Leverage assesses the distance of the ith predictor point derived from the set of independent variables (X_{i1}, X_{i2}, .., X_{ik}) from the set of independent variable means ($\overline{X}_1$, $\overline{X}_2$, .., $\overline{X}_k$). The leverage value, h, for the ith observation is derived as follows:

$$h_i = \frac{(X_i - \overline{X})^2}{(n - 1)\, S^2{}_X}$$

where S_X represents the standard deviation of the set of X-values and n represents the minimum number of pairwise observations (ie cases). The distance of cases from the average values of the independent variables can also be measured in terms of an alternative statistic known as Mahalanobis' distance. This is obtained by simply multiplying the leverage value by (n-1).

Interpretation of the size of h_i is simplified by the fact that it is bounded as follows:

$$-1/n \leqslant h_i \leqslant (n - 1)/n$$

Hoaglin and Welsch (1978) recommend examining more closely any observation which has a leverage greater than twice the average leverage value, ie

$$h_i > 2(k + 1)/n$$

where k is the number of independent variables in the model. This is the method which was employed here. The statistics corresponding to twice the average leverage values for each of the four models (and the equivalent statistics for Mahalanobis' distance) are listed under the 'Outlying Value' columns at the foot of the casewise plots.

Examination of the statistics in Appendix 3 reveals that five cases were identified as outliers by the leverage/Mahanalobis' distance criterion. Of these, case 3 was identified as an outlier in all four models. The company concerned operates in the clothing industry, and is involved in know-how licensing only.[21] Its status as an outlier can perhaps be explained by the fact that its main licensing activities are concerned with trademarks rather than know-how; these trademarks are usually registered in more than fifty countries.

Case 20 was classified as an outlier in the KHLSI model. The company concerned operates in the office equipment sector and is involved solely in know-how licensing. Its income from independent licensees amounted to 27.2 per cent of its net profit for the year in question; this relatively high proportion may help to explain the company's outlier status.

Case 32 was identified as an outlier in the PLSI and KHLII models. The company concerned licenses both patents and know-how and is active in the motor distribution industry. The fact that it is involved in what is essentially a service activity may help to explain its outlier status.

Case 42 was deemed to be an outlying observation in the PLSI model and in both of the know-how licensing models. Its status as an outlier may be attributable to the fact that the company concerned has only one subsidiary which is active in licensing. This subsidiary licenses both patents and know-how and makes its own decisions concerning licensing.

Case 61 was categorised as an outlier in both of the patent licensing models. The company concerned is similar to the company identified in case 42 insofar as it has only one subsidiary involved in licensing. This subsidiary also manages its licensing activities (both patent and know-how) independently of the group.

The statistic referred to as Cook's distance (D_i) measures the influence of an observation (i) by detecting the extent to which all of the (n) residuals are changed when the observation is deleted. It is calculated as follows,

$$D_i = \frac{\sum_{j=1}^{n} (\hat{Y}_j(i) - \hat{Y}_j)^2}{(k + 1)\, S^2}$$

where $\hat{Y}_j(i)$ is the predicted value adjusted for the deletion of the ith case, and $\hat{Y}_j$ is the predicted value with all cases included. The number of independent variables is represented by k, while S represents the estimate of the standard deviation of $\hat{Y}_j$.

The value of D_i must be greater than or equal to zero, and may be arbitrarily large. It has been suggested by Cook and Weisberg (1982) that values which satisfy the following condition,

$$D_i > 1$$

deserve closer scrutiny. This is a simple approximation of a D_i value that keeps the regression coefficients based on deleting the ith observation within a 50% confidence region of the original estimates. This is the method which was adopted for determining influential observations.

Inspection of the Cook's D statistics reported in Appendix 3 reveals that there were two cases which had values greater than one: cases 3 and 61. The former was categorised as an outlier in both of the know-how licensing models, while the latter was deemed to be an outlier in the PLSI model. The characteristics of these cases have already been referred to as they were identified as outliers by the leverage/Mahalanobis' distance criterion.

12.5 CONCLUSIONS

Having ascertained that the assumptions underlying regression analysis did not appear to have been seriously violated, inferences were then drawn concerning each of the nine hypotheses described in Section 12.2. The hypotheses are discussed below, and the conclusions are compared, where appropriate, with those obtained by Telesio (1979), Contractor (1985), Adam (1985) and Zenoff (1970).

Size

The four models all produced strong evidence in support of the hypothesis that the relative level of licensing activity falls off as MNC size increases. In each model the GLTURNOV variable was both negative and significant at the 1% level. The variable was also entered first in all of the models, indicating that it had the strongest association with the dependent variable.

This result is consistent with Telesio's finding that smaller firms are likely to license relatively more. However, it should be noted that Telesio used a relative measure of size, ie a company's total turnover relative to the turnover of the largest company in its industry. The result reported here is based on an absolute measure of size.

The only study prior to Telesio's which tested this hypothesis using an absolute measure of size [Zenoff (1970)] did not produce a statistically significant result.[22] Since then, however, Contractor (1985) found that absolute size (measured by turnover) was positively correlated with licensing activity (measured in both relative and absolute terms). Contractor's results therefore conflict with the findings of this study. This conflict may be attributable to the fact that Contractor's study was based on data derived from US companies, whereas this study was based on UK company data.

Adam (1985) used the same measure of relative size as Telesio had used for his study, but found that this measure was positively related to licensing activity (measured in relative terms). Leaving aside the question of how size is measured, this result contradicts the findings of the present study. As Adam's results were derived from a survey of UK companies, the nationality of the sample base cannot explain the difference. However, the fact that Adam's survey was not confined to MNCs, but obtained data from UK firms with no foreign operations as well as MNCs, is likely to have had a significant impact upon his results. Adam (1985, p109) classified half of his sample as "small firms" (ie firms with total sales under 25% of the sales of the largest company in their industry).

Degree of Internationalization

Both patent licensing models produced evidence in support of the hypothesis that the relative use of licensing will fall as firms internationalize their production. The RD4 variable was entered in each of these two models and had a negative sign (as predicted). It was ranked fourth in importance among the independent variables entered in each model.

The PLSI model appears to provide stronger support for the hypothesis than the PLII model, as the RD4 variable entered in the former had a larger and more significant t statistic. However, if the GRDIV variable had been deleted from the PLSI model (because of the multicollinearity problem described in Section 12.3) this would have had the effect of reducing the significance of this variable's t statistic to the same level as that attained by the GRDIV variable in the PLII model (ie better than 10%).

Despite being entered in both of the patent licensing models, the RD4 variable was not entered in either of the know-how licensing models. This suggests that the relative use of know-how licensing is not related to the extent of a firm's internationalization.

The results from the two patent licensing models are consistent with those of Telesio and Contractor, who both found a negative association between the extent of a firm's international involvement (measured by the percentage of its total sales manufactured by overseas subsidiaries) and its use of licensing. To the extent that the internationalization of production reflects a firm's experience of operating internationally, we can conclude that firms with little accumulated experience of foreign operations are more likely to adopt licensing.

Research Intensity

The measure for this variable (R&D expenditure as a proportion of turnover) was entered in only one of the models, the KHLII model. Nevertheless its sign was positive, as predicted, indicating support for the hypothesis that the relative use of licensing increases with research intensity. It was also entered second among the four independent variables in this model, and its t statistic was significant at the 5% level.

This result is consistent with those produced by Zenoff, Telesio, and Adam, who all found significant and positive associations between R&D expenditure and licensing intensity.

Level of Patent Ownership

The hypothesis concerning patent ownership was supported by both of the patent licensing models. The UKPATS variable had a positive sign, as predicted, indicating that the level of licensing intensity is greater for firms which own more patents. The variable was entered third among the independent variables in each of the two models.

The PLSI model provided stronger support for the hypothesis, as the UKPATS variable in this model had a larger t statistic than that entered in the PLII model, and was also statistically more significant (at the 1% level, compared to a 10% level for the PLII model).

Level of International Patent Registration

The measure which was employed for this variable, REGISPAT, was only entered in the PLSI model. Its sign was negative, contrary to that which was expected, indicating rejection of the hypothesis that licensing activity increases with the extent of international patent registration. Although only entered sixth among the independent variables from which the PLSI model was constructed, the t statistic for this variable was nevertheless significant at the 1% level.

Deletion of the GRDIV variable in this model, however, would have had the effect of decreasing the significance of the REGISPAT variable beyond the 10% level (to 11.45%). The result reported in Table 12-10 could therefore be attributable to the multicollinearity between these two variables.

Nevertheless, if we accept that the sign of the partial regression coefficient for this variable is valid, the result may be explained if companies are registering their patents on an international basis in order to allow their own foreign subsidiaries to utilise them, rather than to license them to independent overseas concerns. The extent of a company's international registration of its patents may therefore simply be a reflection of its involvement in international production. The high spearman rank correlation coefficient between the REGISPAT variable and the measure of corporate internationalization which was not entered into any of the regression equations (OVPRODN) lends support to this explanation. The coefficient between these two variables was measured at 0.58, which was significant at the 1% level.

Product Diversification

This variable was only entered into the KHLSI model. Its negative sign was contrary to that which was expected, indicating rejection of the hypothesis that licensing activity increases in line with a company's level of product diversification. The variable was entered into the model in fourth position, and had a t statistic which was significant at the 5% level.

This result contradicts the findings of Telesio and Adam, who both found that highly diversified companies licensed abroad more than less diversified companies. This contradiction may be attributable to the different methods that were used to calculate product diversification. Whereas a herfindhal index was used in this study, producing a unique value for each company in the sample, Telesio and Adam both used a method of measuring product diversification which classified companies into one of three categories (high, medium or low).

Nevertheless, the result reported here would appear to indicate that product diversification does not stretch corporate resources to the extent that licensing is made more appealing as a means of servicing foreign markets.

Geographical Diversification

This variable (GRDIV) was entered into the two know-how licensing models, and had a negative sign in each of them (as predicted). It was also entered into the PLSI model, although its inclusion in this model is open to question because of its collinearity with the REGISPAT variable. Even allowing for this doubt concerning its inclusion in the PLSI model, there is still sufficient support for the hypothesis that licensing is less likely to be adopted as MNCs increase the geographical spread of their operations.

Insofar as geographical diversification provides a measure of a firm's experience of foreign operations, this result provides additional support for the idea that firms which have little experience of foreign operations are more likely to adopt licensing.

Codifiability of Know-how

This variable was entered in the KHLSI model only, and had a negative sign, contrary to expectations. The variable was entered in third place in this model and had a t statistic which was significant at the 5% level.

It would thus appear that uncodified information is more likely to be licensed than information which is codified. Re-phrasing this conclusion in terms of the components which were used to measure codifiability, it may be stated that licensing is more likely to occur if know-how generally requires organizational back-up and the training of licensee personnel. If it consists more of documented information and manufacturing process equipment, on the other hand, it is less likely to be licensed.

One possible explanation for this apparently counter-intuitive result is that licensors may aim to provide organizational back-up and training for licensee personnel wherever possible, as a means of enhancing the income-generating potential of their know-how licensing agreements. It is thus feasible that the level of back-up services provided does not accurately reflect the nature of the know-how being licensed.

Organizational Structure

This variable was entered in all four of the models and had a positive sign in each of them. There is thus strong support for rejecting the hypothesis that the relative use of licensing is greater for those companies whose organizational structures are de-centralized. The two patent licensing models provided the strongest rejection of the hypothesis; the organizational structure variable was entered in second place in both models, achieving a significance level of 1% in the PLSI model and 5% in the PLII model.

To the extent that the organizational structures classified as 'centralized' accurately capture those MNCs which centralize experience of foreign operations, it may be inferred that these MNCs do not possess a level of internal transfer efficiency which is any greater than those MNCs which de-centralize this experience, since the latter group appear to license relatively more.

The conclusions concerning each of the nine hypotheses reported above must be tempered by the fact that the regression models were based upon samples of 24 MNCs for the patent licensing models and 32 MNCs for the know-how licensing models. Given these relatively small sample sizes one should be wary of placing too much reliance upon the results reported in this chapter. In particular, the results concerning the 'research intensity', 'level of international patent registration', 'product diversification' and 'codifiability of know-how' variables need to be interpreted with particular caution, given that these variables were not entered in all of the models for which they were available.

One should also be wary of the possibility of bias in the data arising from the fact that all of the MNCs which participated in the study were engaged in licensing. The results reported here only describe the characteristics of MNCs that are relatively more involved in licensing than others, not the distinguishing characteristics of MNCs that do and do not license their patents and know-how.

Bearing in mind the above qualifications, it may be concluded that MNCs which possess the following characteristics are likely to license more of their intellectual property than other MNCs:

- a relatively small size, in terms of turnover;
- a relatively low level of international production and a narrow geographical spread of operations;
- a relatively high level of expenditure on R&D;
- a relatively high number of patents registered in the UK, but a relatively small number of patents registered in other countries;
- a relatively low level of product diversification;
- possession of know-how which has a majority component of uncodified knowledge;
- a relatively centralized organizational structure.

CHAPTER TWELVE

NOTES

1. Non-metric is a term commonly applied to data measured at the nominal and ordinal levels. Metric data involves interval or ratio level measurement.

2. An alternative method to multiple regression analysis which could have been used to test the hypotheses is the nonparametric technique of log-linear analysis. However, because the statistical output from log-linear models differs from that obtained from regression models their use would have prevented a meaningful comparison of the results of the present study with those from previous studies.

3. It should be noted that multicollinearity could still remain after the elimination of independent variables exhibiting high correlations with other independent variables because of the joint interaction of three or more of the remaining independent variables. For example, it is possible that three independent variables which have low correlation coefficients with one another may interact in a fashion which produces collinearity.

4. It should be noted that the SPSS^{X} regression procedure which was used to analyse the data utilises Pearson (ie parametric) correlation coefficients rather than Spearman (ie nonparametric) correlation coefficients. Had the former been used as the basis for eliminating potential collinear effects between independent variable measures, the choice of measures would have been almost the same as those obtained using Spearman coefficients. The only exception would have been the level of geographical diversification (GRDIV) which had a Pearson coefficient of greater than 0.5 with the level of international patent registration (REGISPAT). This collinearity problem is discussed further in section 12.3 of the chapter.

5. Contractor (1985) also used dependent variables in his regression models which measured the absolute level of licensing.

6. The Licensee Sales Index is similar to Telesio's index of the same name, the difference being that the denominator consists of total overseas sales (ie foreign subsidiary sales plus export sales plus licensee sales) rather than just foreign subsidiary sales plus licensee sales. The Licensor Income Index is derived from Telesio's Royalty Index, the differences being that the numerator consists of total licensing income rather than just royalty income, and the denominator consists of total overseas sales rather than just foreign subsidiary sales. The differences in the construction of these indices stem from the fact that Telesio was concerned with licensing as an alternative to FDI and therefore used foreign subsidiary sales as the basis for his comparisons. In this study, we are concerned with licensing as an alternative to both FDI and exporting and we therefore use total overseas sales as the basis for making comparisons.

7. As no SIC(80) codes were given for overseas subsidiaries it was assumed that the product range produced abroad was the same as that produced in the UK.

8. The independent variable which was not recoded was the codifiability of know-how, because the values for this variable correspond to unique integers rather than class intervals.

9. Only three of the seventy one respondents who reported their company's R&D expenditure as a percentage of turnover ticked the uppermost (open-ended) category. Of the seventy two respondents reporting both the number of UK patents held by their companies and the number of countries in which these patents were usually registered, only two ticked the uppermost categories in each case.

10. The recoded variable labels reported in Tables 12-4, 12-5 and 12-6 are not subsequently used in the chapter. Where possible, the original variable labels have been used in order to ensure continuity of expression. It should be noted, however, that the transformations referred to in Section 12.3.4 were carried out on the recoded values of the variables, not their original values.

11. The adjusted R^2 statistic (R_a^2) was reported rather than the R^2 statistic, since the latter tends to be an optimistic estimate of how well a model fits a population; models tend not to fit populations as well as the samples from which they are derived. The adjusted R^2 statistic attempts to correct R^2 to more closely reflect the goodness of fit of a model to a population.

12. The natural log (base e) was used rather than the common log (base 10) since, as Tukey (1977, p93) pointed out, logarithms to different bases differ only by multiplicative constants, so "any base is almost (usually exactly) as good as any other".

13. Although the logit transformation did not produce the best fit for every combination of dependent and independent variable, it did achieve the greatest number of these and was therefore employed since only one transformation could be used for the dependent variable.

14. The logit transformation is sometimes referred to as the "log odds" transformation since it is the natural logarithm of the "odds ratio" (ie y/1-y). This ratio can be regarded as the proportion of successes to the proportion of failures in a binomial trial [see Draper and Smith (1981, p238)].

15. Transformations with $p>1$ are also appropriate for the dependent (ie y) variable, but only if the slope is negative. For a positively inclined slope, a transformation with $p<1$ is necessary to move towards linearity [see Tukey (1977, p198) for more details]. However, since the dependent variable had already been transformed to its logit form, no further transformations were employed.

16. It should be noted that power transformations can only straighten out curves which have only one bend and which continuously increase or decrease; they are not much use for curves which look like a U or a J, for example.

17. If the y variable is subject to transformation rather than the x variable, values of $p>1$ are appropriate for a negative slope, while values of $p<1$ are appropriate for a positive slope.

18. The values chosen for PIN and POUT, 0.125 and 0.15 respectively, are less stringent than the default values employed by $SPSS^{X}$ of 0.05 and 0.1.

19. There was a suspicion that the KHLSI model may have been affected by multicollinearity since it's t statistics were generally lower than those produced by the KHLII model, yet its R_a^2 was higher. To test for the presence of multicollinearity the PRODVER2 variable was dropped from the model as it had the highest pearson correlation with another independent variable (GLTURNOV) but a lower correlation with the dependent variable (see Appendix 12.2). As the resulting partial regression coefficients from the new KHLSI model were little different from those reported in Table 12-10, it was concluded that any multicollinearity present in the original model was negligible.

20. The critical values for the PLSI model could not be obtained directly from the tables in Durbin and Watson (1951) since this model contains six predictor variables and the tables only give values of d_U and d_L for up to five predictor variables. The appropriate values were therefore calculated from the values contained in the tables by means of interpolation.

21. This company was identified as an outlier in the two patent licensing models, even though it has no involvement in patent licensing, because the Leverage and Mahalanobis' distance statistics measure the extremeness of an observation among the set of independent variables. The possession of the full set of independent variables will therefore allow these statistics to be computed, even if there is no data for the dependent variable. The same reason accounts for the classification of case 42 as an outlier in the two know-how licensing models, even though it has no involvement in this form of licensing.

22. Zenoff (1970) produced a vary basic model which attempted to explain both relative and absolute licensing activity on the basis of only two independent variables: size and R&D expenditure.

CHAPTER 12

REFERENCES

ADAM, Y. A., The Costs and Benefits of Licensing Activity: An Empirical Investigation of UK Companies Involved in Such Operations, Unpublished PhD Thesis, University of Manchester, 1985.

ARMITAGE, P., Statistical Methods in Medical Research, 2nd edn., Oxford: Blackwell Scientific Publications, 1971.

BERENSON, M.L. & LEVINE, D.M., Basic Business Statistics: Concepts and Application, 2nd edn., Englewood Cliffs, N.J.: Prentice-Hall, 1983.

BLALOCK, H. M., Social Statistics, 2nd edn., Tokyo: McGraw-Hill, 1972.

CASS, T., Statistical Methods in Management 2, London: Cassell, 1980.

COHEN, Y. & PFEFFER, J., 'Organizational Hiring Standards', Administrative Science Quarterly, Vol 31, March 1986, pp 1-24.

CONTRACTOR, F. J., 'Technology Licensing Practice In US Companies: Corporate And Public Policy Implications', Columbia Journal of World Business, Fall 1983, pp 80-88.

CONTRACTOR, F. J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.: Quorum Books, 1985.

COOK, R.D. & WEISBERG, S., Residuals and Influence in Regression, New York: Chapman and Hall, 1982.

DAVIDSON, W.H., 'Structure and Performance in International Technology Transfer', Journal of Management Studies, Vol 20, No 4, 1983, pp 453-465.

DRAPER, N. & SMITH, H., Applied Regression Analysis, 2nd edn, New York: John Wiley, 1981.

DUN & BRADSTREET, Key British Enterprises 1984 - Britains's Top 20,000 Companies, London: Dun & Bradstreet Ltd., 1984.

DURBIN, J. & WATSON, G.S., 'Testing for Serial Correlation in Least Squares Regression II', Biometrika, Vol 38, 1951, pp 159-178.

ERICKSON, B.H. & NOSANCHUCK, T.A., Understanding Data, Toronto: McGraw-Hill, 1977.

HOAGLIN, D.C. & WELSCH, R.E., 'The Hat Matrix in Regression and ANOVA', American Statistician,, Vol 32, 1978, pp 17-22.

KENDALL, M.G., Time-Series, 2nd edn, London: Charles Griffin & Co., 1976.

KLEINBAUM, D.G., KUPPER, L.L. & MULLER, K.E., Applied Regression Analysis and Other Multivariable Methods, Boston, Mass.: PWS-Kent, 1988.

MANSFIELD, E. & ROMEO, A., 'Overseas Research and Development by US-Based Firms', Economica, Vol 46, May 1979, pp 187-196.

MILLER, D. & DROGE, C., 'Psychological and Traditional Determinants of Structure', Administrative Science Quarterly, Vol 31, December 1986, pp 539-560.

MOSTELLER, F.M. & TUKEY J.W., Data Analysis and Regression: A Second Course in Statistics, Reading, Mass.: Addison-Wesley, 1977.

NORUSIS, M. J., SPSS^{X} Advanced Statistics Guide, Chicago: SPSS Inc, 1985.

PINDYCK, R.S. & RUBINFELD, D.L., Econometric Models and Economic Forecasts, 2nd edn, London: McGraw-Hill, 1981.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York: Praeger, 1979.

TUKEY, J.W., Exploratory Data Analysis, Reading, Mass.: Addison-Wesley, 1977.

ZENOFF, D.B., 'Licensing as a Means of Penetrating Foreign Markets', The Patent, Trademark and Copyright Journal of Research and Education, Vol 14, No 2, Summer 1970, 292-308.

APPENDIX 12.1 SPEARMAN RANK-ORDER CORRELATION MATRICES OF INDEPENDENT VARIABLE MEASURES

SPEARMAN CORRELATION COEFFICIENTS BETWEEN INDEPENDENT VARIABLE MEASURES

	GLTURNOV	OVPRODN	RD4	RD1	RD3	RD5	UKPATS	REGISPAT	EXPPATS	PRODVER1	PRODVER2	OVSUBS	GRDIV	CODIFKH
OVPRODN	.1759 N(43) SIG .130													
RD4	.1412 N(55) SIG .152	.0979 N(25) SIG .321												
RD1	5039 N(77) SIG .000	-.0242 N(39) SIG .442	.3644 N(56) SIG .003											
RD3	-.0151 N(70) SIG .451	.1134 N(35) SIG .258	-.2284 N(53) SIG .050	.4432 N(71) SIG .000										
RD5	.4874 N(72) SIG .000	.0465 N(36) SIG .394	.2587 N(56) SIG .027	.6470 N(72) SIG .000	.4022 N(65) SIG .000									
UKPATS	.4160 N(71) SIG .000	-.0774 N(36) SIG .327	.3196 N(52) SIG .010	.6786 N(69) SIG .000	.1926 N(62) SIG .067	.6014 N(67) SIG .000								
REGISPAT	.1758 N(71) SIG .071	.5820 N(37) SIG .000	.2551 N(52) SIG .034	.1211 N(70) SIG .159	.0978 N(63) SIG .223	.1948 N(68) SIG .056	.1117 N(71) SIG .177							
EXPPATS	.5558 N(36) SIG .000	.1305 N(15) SIG .322	.4247 N(29) SIG .011	.7497 N(37) SIG .000	.3150 N(34) SIG .035	.6586 N(35) SIG .000	.7969 N(37) SIG .000	.1162 N(37) SIG .247						
PRODVER1	.3964 N(85) SIG .000	.0090 N(43) SIG .477	.1075 N(55) SIG .217	.0817 N(77) SIG .240	-.1576 N(70) SIG .096	.2260 N(72) SIG .028	.2782 N(71) SIG .009	.1998 N(71) SIG .047	.2538 N(36) SIG .068					
PRODVER2	.3308 N(85) SIG .001	.1604 N(43) SIG .152	.0658 N(55) SIG .317	-.0225 N(77) SIG .423	-.2010 N(70) SIG .048	.1375 N(72) SIG .125	.2111 N(71) SIG .039	.2785 N(71) SIG .009	.1601 N(36) SIG .175	.8872 N(85) SIG .000				
OVSUBS	.4467 N(85) SIG .000	.3544 N(43) SIG .010	.5067 N(55) SIG .000	.3377 N(77) SIG .001	-.0399 N(70) SIG .372	.3499 N(72) SIG .001	.2680 N(71) SIG .012	.2284 N(71) SIG .028	.3151 N(36) SIG .031	.3142 N(85) SIG .002	.3186 N(85) SIG .001			
GRDIV	.1820 N(56) SIG .090	.1474 N(26) SIG .236	.0558 N(42) SIG .363	.2058 N(52) SIG .072	.0977 N(47) SIG .257	.1805 N(52) SIG .100	.2483 N(49) SIG .043	-.3008 N(50) SIG .017	.1952 N(29) SIG .155	.1557 N(56) SIG .126	.1104 N(56) SIG .209	.2351 N(56) SIG .041		
CODIFKH	.0793 N(65) SIG .265	-.1845 N(31) SIG .160	-.1969 N(44) SIG .100	.1537 N(59) SIG .123	.0713 N(54) SIG .304	.1634 N(55) SIG .117	.1831 N(55) SIG .090	-.0918 N(54) SIG .254	.2820 N(28) SIG .073	.0908 N(65) SIG .236	-.0266 N(65) SIG .417	.0046 N(65) SIG .486	-.1721 N(44) SIG .132	
ORGSTR	.0914 N(79) SIG .212	.2285 N(41) SIG .075	-.0572 N(51) SIG .345	.1126 N(72) SIG .173	.0331 N(66) SIG .396	.0727 N(67) SIG .279	-.1457 N(66) SIG .121	-.1890 N(66) SIG .064	-.0028 N(35) SIG .494	-.1241 N(79) SIG .138	-.0520 N(79) SIG .325	.2492 N(79) SIG .013	.1961 N(56) SIG .074	.0048 N(61) SIG .485

SPEARMAN CORRELATION COEFFICIENTS BETWEEN ALL VARIABLE MEASURES

	PLSI	PLII	POLSI	POLII	QLTRNOV	QVATCON	FD4	FD1	FD3	FD5	UKPATS	REGISPAT	EXPATS	PRIMER1	PRIMER2	OVSUBS	GODIV	CODIFKH
PLII	.8510 N(36) SIG .000																	
POLSI	.8204 N(28) SIG .000	.6901 N(26) SIG .000																
POLII	.7197 N(26) SIG .000	.7305 N(26) SIG .000	.8212 N(47) SIG .000															
QLTRNOV	-.5632 N(36) SIG .000	-.4891 N(36) SIG .001	-.5193 N(47) SIG .000	-.5423 N(47) SIG .000														
QVATCON	-.3808 N(22) SIG .038	-.4806 N(22) SIG .010	-.3083 N(27) SIG .059	-.3059 N(27) SIG .060	.1750 N(43) SIG .130													
FD4	-.1790 N(30) SIG .172	-.1038 N(31) SIG .293	-.1272 N(36) SIG .233	-.1103 N(36) SIG .264	.1412 N(56) SIG .152	.0879 N(25) SIG .321												
FD1	-.0229 N(35) SIG .448	.1453 N(35) SIG .202	-.0318 N(43) SIG .420	.0520 N(43) SIG .370	.5039 N(77) SIG .000	-.0242 N(38) SIG .442	.3644 N(56) SIG .003											
FD3	.0807 N(31) SIG .356	.1612 N(31) SIG .193	.2324 N(40) SIG .074	.2980 N(40) SIG .030	-.0151 N(70) SIG .451	.1134 N(36) SIG .258	-.2284 N(53) SIG .050	.4432 N(71) SIG .000										
FD5	.1486 N(34) SIG .201	.2649 N(34) SIG .065	-.0662 N(40) SIG .342	-.0486 N(40) SIG .383	.4874 N(72) SIG .000	.0465 N(36) SIG .394	.2587 N(56) SIG .027	.6470 N(72) SIG .000	.4022 N(65) SIG .000									
UKPATS	.0475 N(35) SIG .393	.1909 N(35) SIG .129	-.1362 N(40) SIG .203	-.0523 N(40) SIG .374	.4160 N(71) SIG .000	-.0774 N(36) SIG .327	.3196 N(52) SIG .010	.6786 N(69) SIG .000	.1926 N(62) SIG .067	.6014 N(67) SIG .000								
REGISPAT	-.4030 N(35) SIG .008	-.2081 N(35) SIG .080	-.3141 N(40) SIG .024	-.3316 N(40) SIG .018	.1758 N(71) SIG .071	.5820 N(37) SIG .000	.2551 N(52) SIG .034	.1211 N(70) SIG .159	.0978 N(63) SIG .223	.1948 N(68) SIG .056	.1117 N(71) SIG .177							
EXPATS	-.0192 N(16) SIG .472	.0943 N(16) SIG .364	-.3033 N(20) SIG .097	-.1942 N(20) SIG .206	.5558 N(36) SIG .000	.1305 N(15) SIG .322	.4247 N(29) SIG .011	.7497 N(37) SIG .000	.3150 N(34) SIG .035	.6506 N(35) SIG .000	.7909 N(37) SIG .000	.1162 N(37) SIG .247						
PRIMER1	-.3743 N(36) SIG .012	-.3137 N(36) SIG .031	-.5403 N(47) SIG .000	-.4623 N(47) SIG .001	.3564 N(85) SIG .000	.0090 N(43) SIG .477	.1075 N(55) SIG .217	.0817 N(77) SIG .240	-.1576 N(70) SIG .096	.2260 N(72) SIG .028	.2702 N(71) SIG .011	.1918 N(71) SIG .047	.2538 N(36) SIG .070					
PRIMER2	-.2816 N(36) SIG .046	-.2246 N(36) SIG .094	-.4757 N(47) SIG .000	-.3750 N(47) SIG .005	.3318 N(85) SIG .001	.1604 N(43) SIG .152	.0658 N(56) SIG .317	-.0225 N(77) SIG .423	-.2010 N(70) SIG .048	.1375 N(72) SIG .125	.2111 N(71) SIG .039	.2705 N(71) SIG .019	.1601 N(36) SIG .175	.8372 N(85) SIG .000				
OVSUBS	-.4104 N(36) SIG .006	-.3247 N(36) SIG .025	-.4540 N(47) SIG .001	-.3464 N(47) SIG .009	.4467 N(85) SIG .000	.3544 N(43) SIG .010	.5067 N(55) SIG .000	.3377 N(77) SIG .001	-.0389 N(70) SIG .372	.3499 N(72) SIG .001	.2600 N(71) SIG .012	.2284 N(71) SIG .028	.3151 N(36) SIG .031	.3142 N(85) SIG .002	.3186 N(85) SIG .001			
GODIV	-.0765 N(24) SIG .361	-.0183 N(24) SIG .466	-.2387 N(32) SIG .093	-.1504 N(32) SIG .193	.1820 N(56) SIG .090	.1474 N(26) SIG .236	.0550 N(42) SIG .363	.2058 N(52) SIG .072	.0977 N(47) SIG .257	.1805 N(52) SIG .100	.2483 N(49) SIG .043	-.3018 N(50) SIG .017	.1952 N(29) SIG .156	.1567 N(56) SIG .126	.1104 N(56) SIG .209	.2351 N(56) SIG .041		
CODIFKH	.0220 N(27) SIG .457	-.1389 N(27) SIG .240	-.1951 N(44) SIG .102	-.0610 N(44) SIG .349	.0793 N(66) SIG .265	-.1845 N(31) SIG .160	-.1979 N(44) SIG .100	.1537 N(59) SIG .123	.0713 N(54) SIG .304	.1634 N(55) SIG .117	.1831 N(56) SIG .088	-.0918 N(54) SIG .254	.2020 N(28) SIG .073	.0901 N(65) SIG .236	-.0266 N(65) SIG .417	.0046 N(65) SIG .486	-.1721 N(44) SIG .132	
CRUSIH	.2098 N(33) SIG .051	.2704 N(33) SIG .064	.1210 N(44) SIG .217	.2042 N(44) SIG .092	.0914 N(79) SIG .212	.2285 N(41) SIG .075	-.0572 N(51) SIG .345	.1126 N(72) SIG .173	.0331 N(66) SIG .396	.0727 N(67) SIG .279	-.1457 N(66) SIG .121	-.1010 N(66) SIG .064	-.0028 N(35) SIG .494	-.1241 N(79) SIG .138	-.0520 N(79) SIG .325	.2492 N(79) SIG .013	.1961 N(56) SIG .074	.1048 N(61) SIG .405

APPENDIX 12.2 RESULTS OF MULTIPLE REGRESSIONS ON PATENT AND KNOW-HOW LICENSING

RESULTS OF MULTIPLE REGRESSIONS ON PATENT AND KNOW-HOW LICENSING

Dependent Variable: PLSI

Minimum Pairwise N of Cases = 24

Pearson Correlation Coefficients:

	PLSI	GLTURNOV	RD4	RD3	UKPATS	REGISPAT	PRODVER2	GRDIV	ORGSTR
PLSI	1.000	-.557	-.344	.043	-.008	-.384	-.332	-.016	.272
GLTURNOV	-.557	1.000	.117	.036	.377	.166	.340	-.079	.083
RD4S	-.344	.117	1.000	-.164	.146	.282	.128	-.227	-.051
RD3	.043	.036	-.164	1.000	.162	.118	-.134	-.133	.021
UKPATS	-.008	.377	.146	.162	1.000	.140	.290	.112	-.223
REGISPAT	-.384	.166	.282	.118	.140	1.000	.201	-.513	-.122
PRODVER2	-.332	.340	.128	-.134	.290	.201	1.000	-.019	-.067
GRDIV	-.016	-.079	-.227	-.133	.112	-.513	-.019	1.000	.149
ORGSTR	.272	.083	-.051	.021	-.223	-.122	-.067	.149	1.000

Multiple R	.89960
R Square	.80928
Adjusted R Square	.74197
Standard Error	1.15961

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	6	97.00338	16.16723
Residual	17	22.85988	1.34470

F = 12.02294 Signif F = .0000

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
GLTURNOV	-1.238728	.202644	-.723504	-6.113	.0000
ORGSTR	2.071749	.515663	.454336	4.018	.0009
UKPATS	4.439644	1.042391	.530174	4.259	.0005
RD4	-.000714	.000267	-.299421	-2.671	.0161
GRDIV	-.645796	.167034	-.501766	-3.866	.0012
REGISPAT	-.677371	.191511	-.455747	-3.537	.0025
(Constant)	23.334980	4.124581		5.658	.0000

------------- Variables not in the Equation -------------

Variable	Beta In	Partial	Min Toler	T	Sig T
RD3	-.100391	-.215540	.645386	-.883	.3904
PRODVER2	-.107532	-.224178	.661334	-.920	.3712

Dependent Variable: PLII

Minimum Pairwise N of Cases = 24

Pearson Correlation Coefficients:

	PLII	GLTURNOV	RD4	RD3	UKPATS	REGISPAT	PRODVER2	GRDIV	ORGSTR
PLII	1.000	-.517	-.341	.315	-.013	-.275	-.290	.044	.270
GLTURNOV	-.517	1.000	.117	-.122	.322	.166	.340	.097	.083
RD4	-.341	.117	1.000	-.170	.177	.282	.128	-.118	-.051
RD3	.315	-.122	-.170	1.000	.059	.065	-.222	.048	.074
UKPATS	-.013	.322	.177	.059	1.000	.163	.342	.196	-.263
REGISPAT	-.275	.166	.282	.065	.163	1.000	.201	-.426	-.122
PRODVER2	-.290	.340	.128	-.222	.342	.201	1.000	.067	-.067
GRDIV	.044	.097	-.118	.048	.196	-.426	.067	1.000	.248
ORGSTR	.270	.083	-.051	.074	-.263	-.122	-.067	.248	1.000

Multiple R	.72911	Analysis of Variance			
R Square	.53160		DF	Sum of Squares	Mean Square
Adjusted R Square	.43299	Regression	4	29.77966	7.44491
Standard Error	1.17517	Residual	19	26.23926	1.38101

F = 5.39091 Signif F = .0045

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
GLTURNOV	-.731855	.197864	-.625267	-3.699	.0015
ORGSTR	1.238325	.516112	.397237	2.399	.0268
UKPATS	7.398790	3.744919	.347424	1.976	.0629
RD4	-.000504	.000261	-.309236	-1.934	.0681
(Constant)	8.340736	3.908222		2.134	.0461

------------- Variables not in the Equation -------------

Variable	Beta In	Partial	Min Toler	T	Sig T
RD3	.146110	.205873	.776253	.893	.3839
REGISPAT	-.104225	-.143343	.795532	-.614	.5466
PRODVER2	-.158208	-.209474	.753631	-.909	.3754
GRDIV	-.116339	-.155961	.730081	-.670	.5114

Dependent Variable: KHLSI

Minimum Pairwise N of Cases = 32

Pearson Correlation Coefficients:

	KHLSI	GLTURNOV	RD4	RD3	PRODVER2	GRDIV	CODIFKH	ORGSTR
KHLSI	1.000	-.503	-.014	.298	-.418	-.289	-.392	.193
GLTURNOV	-.503	1.000	.114	-.122	.340	-.079	.189	.083
RD4	-.014	.114	1.000	-.192	-.036	.012	.129	-.094
RD3	.298	-.122	-.192	1.000	-.222	-.049	-.004	.074
PRODVER2	-.418	.340	-.036	-.222	1.000	-.019	-.038	-.067
GRDIV	-.289	-.079	.012	-.049	-.019	1.000	-.055	.149
CODIFKH	-.392	.189	.129	-.004	-.038	-.055	1.000	-.089
ORGSTR	.193	.083	-.094	.074	-.067	.149	-.089	1.000

Multiple R	.77513	Analysis of Variance			
R Square	.60082		DF	Sum of Squares	Mean Square
Adjusted R Square	.52406	Regression	5	117.18463	23.43693
Standard Error	1.73045	Residual	26	77.85552	2.99444

F = 7.82681 Signif F = .0001

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
GLTURNOV	-.736686	.257102	-.391602	-2.865	.0081
GRDIV	-.534850	.178045	-.378213	-3.004	.0058
CODIFKH	-7.402851	2.876682	-.329157	-2.573	.0161
PRODVER2	-3.449733	1.594664	-.288719	-2.163	.0399
ORGSTR	1.166160	.638362	.232753	1.827	.0792
(Constant)	9.148499	4.948880		1.849	.0759

------------- Variables not in the Equation -------------

Variable	Beta In	Partial	Min Toler	T	Sig T
RD4	.093195	.144392	.808637	.730	.4724
RD3	.159237	.244256	.818602	1.259	.2195

Dependent Variable: KHLII

Minimum Pairwise N of Cases = 32

Pearson Correlation Coefficients:

	KHLII	GLTURNOV	RD4	RD3	PRODVER2	GRDIV	CODIFKH	ORGSTR
KHLII	1.000	-.559	-.009	.379	-.444	-.234	-.202	.209
GLTURNOV	-.559	1.000	.114	-.122	.340	-.079	.189	.083
RD4	-.009	.114	1.000	-.192	-.036	.012	.129	-.094
RD3	.379	-.122	-.192	1.000	-.222	-.049	-.004	.074
PRODVER2	-.444	.340	-.036	-.222	1.000	-.019	-.038	-.067
GRDIV	-.234	-.079	.012	-.049	-.019	1.000	-.055	.149
CODIFKH	-.202	.189	.129	-.004	-.038	-.055	1.000	-.089
ORGSTR	.209	.083	-.094	.074	-.067	.149	-.089	1.000

Multiple R	.74509	Analysis of Variance			
R Square	.55515		DF	Sum of Squares	Mean Square
Adjusted R Square	.48925	Regression	4	54.42113	13.60528
Standard Error	1.27087	Residual	27	43.60765	1.61510

F = 8.42381 Signif F = .0002

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
GLTURNOV	-.764956	.174117	-.573567	-4.393	.0002
RD3	.671838	.320670	.272667	2.095	.0457
GRDIV	-.308527	.131041	-.307739	-2.354	.0261
ORGSTR	1.003137	.465295	.282412	2.156	.0402
(Constant)	8.187003	3.366147		2.432	.0219

------------- Variables not in the Equation -------------

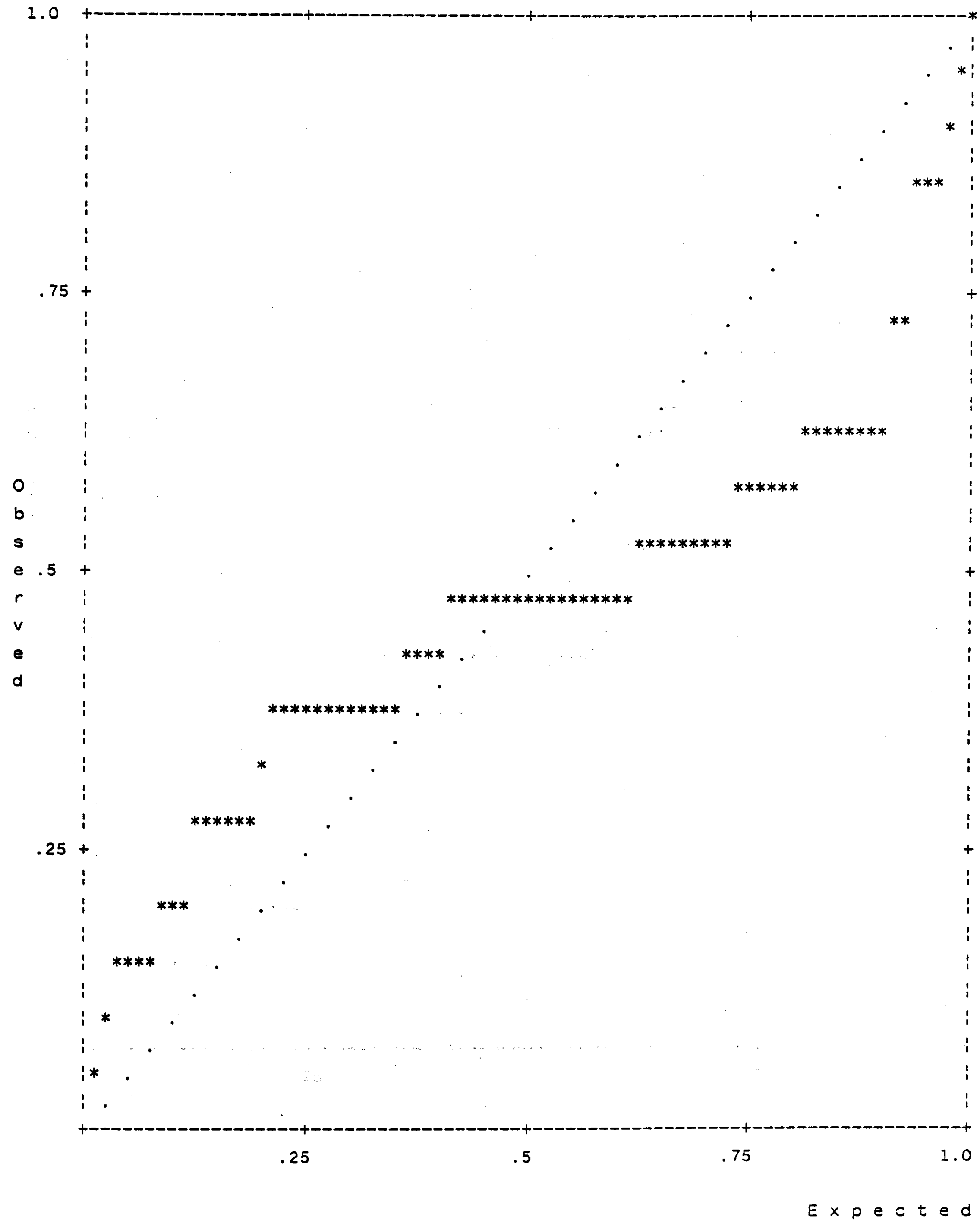
Variable	Beta In	Partial	Min Toler	T	Sig T
RD4	.146890	.214213	.944224	1.118	.2737
PRODVER2	-.208049	-.286719	.844871	-1.526	.1391
CODIFKH	-.088202	-.129026	.929276	-.663	.5129

APPENDIX 12.3 ANALYSIS OF RESIDUALS

NORMAL PROBABILITY PLOTS OF STANDARDIZED RESIDUALS

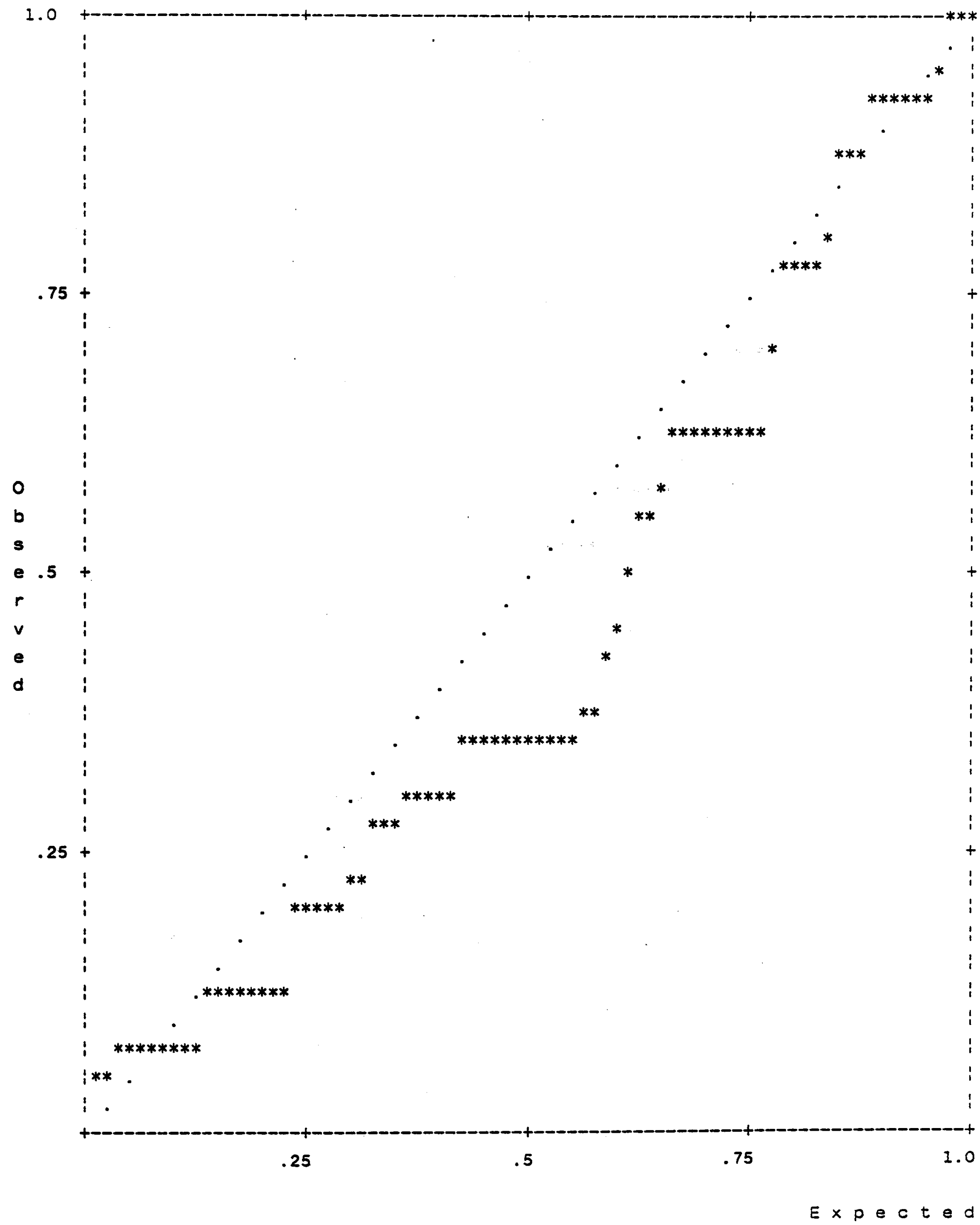
Dependent Variable: PLSI

Normal Probability (P-P) Plot
Standardized Residual



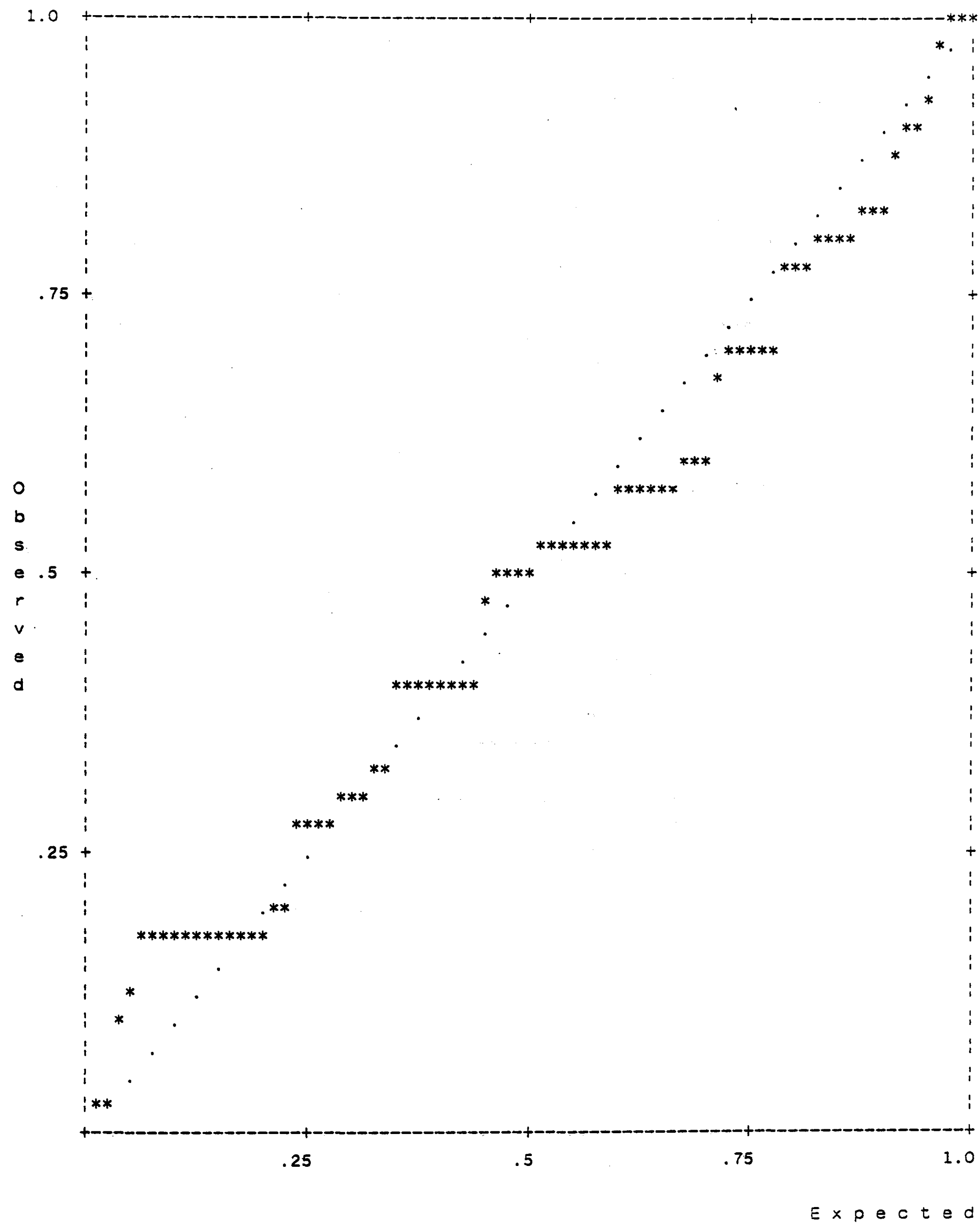
Dependent Variable: PLII

Normal Probability (P-P) Plot
Standardized Residual



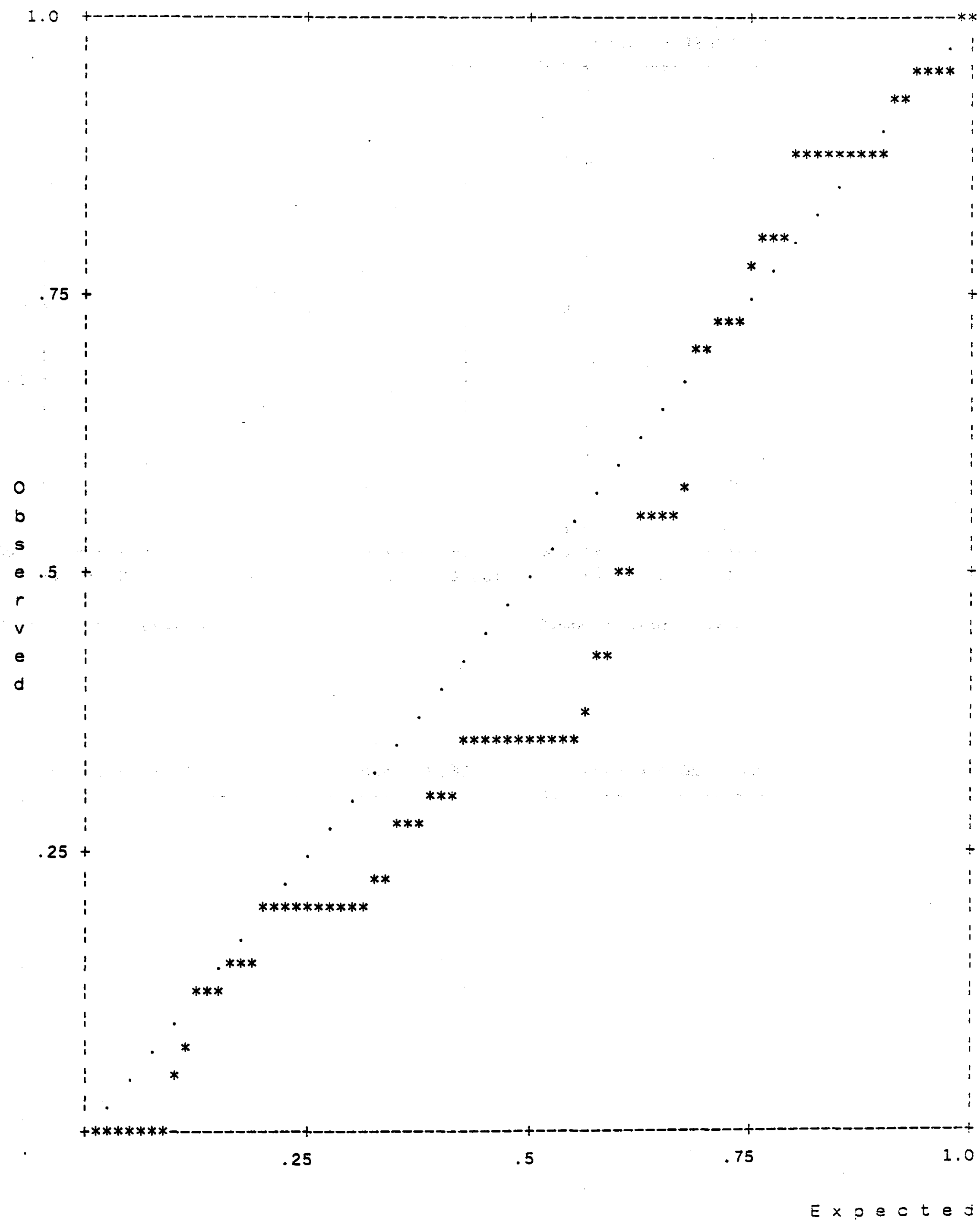
Dependent Variable: KHLSI

Normal Probability (P-P) Plot
Standardized Residual



Dependent Variable: KHLII

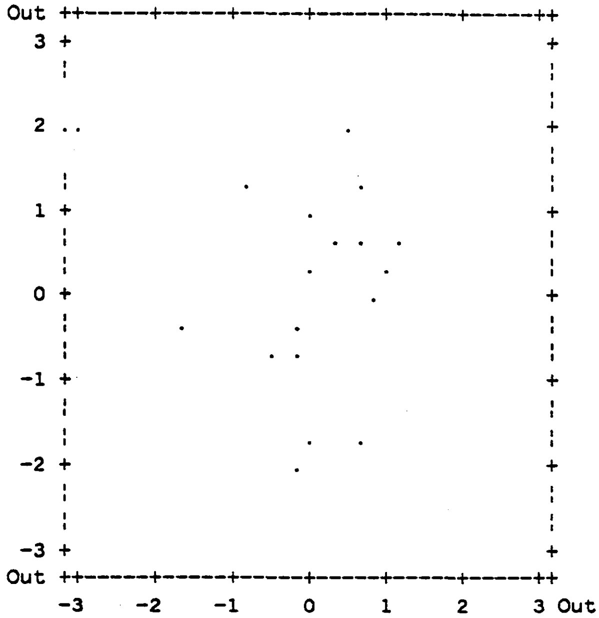
Normal Probability (P-P) Plot
Standardized Residual



STANDARDIZED PARTIAL REGRESSION PLOTS

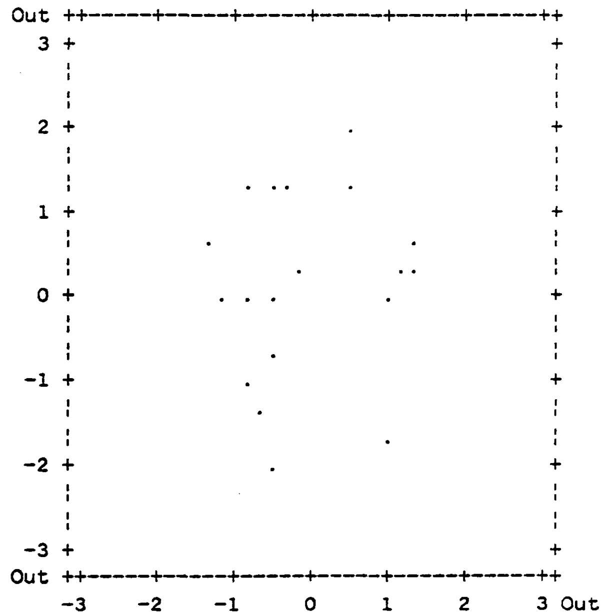
Dependent Variable: PLSI

Across - GRDIV Down - PLSI



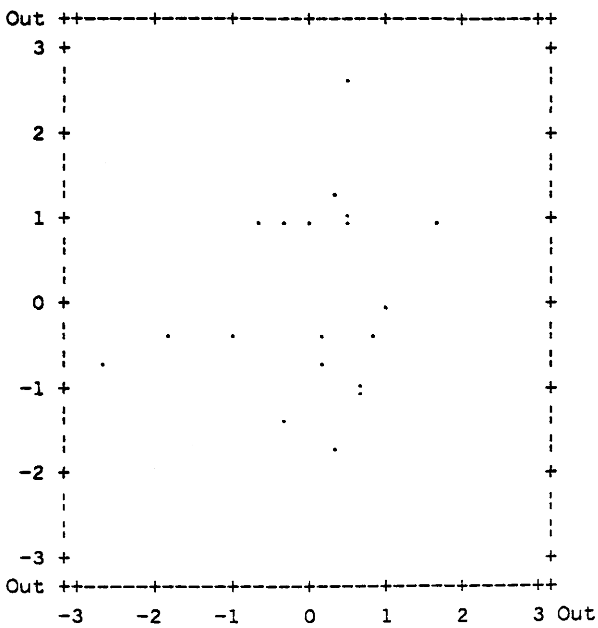
Symbols Used (Max N) . = 1.0

Across - REGISPAT Down - PLSI



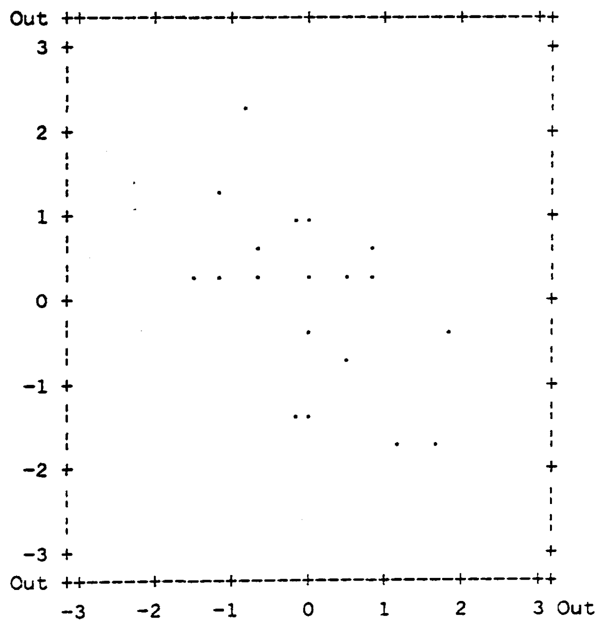
Symbols Used (Max N) . = 1.0

Across - UKPATS Down - PLSI

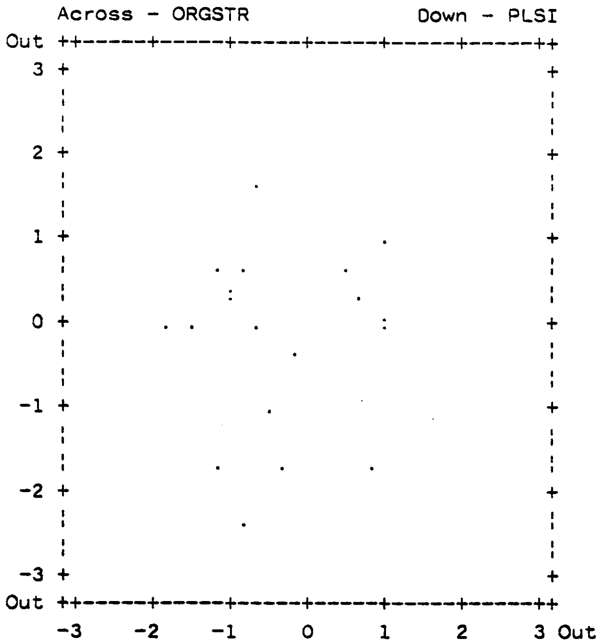


Symbols Used (Max N) . = 1.0 : = 2.0

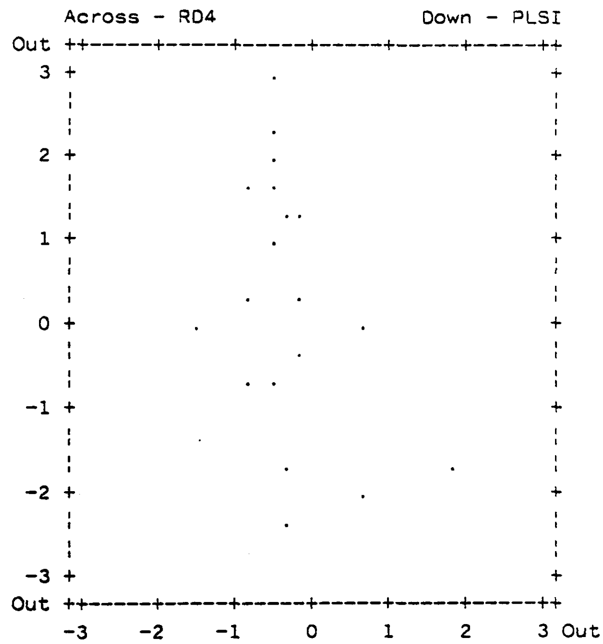
Across - GLTURNOV Down - PLSI



Symbols Used (Max N) . = 1.0

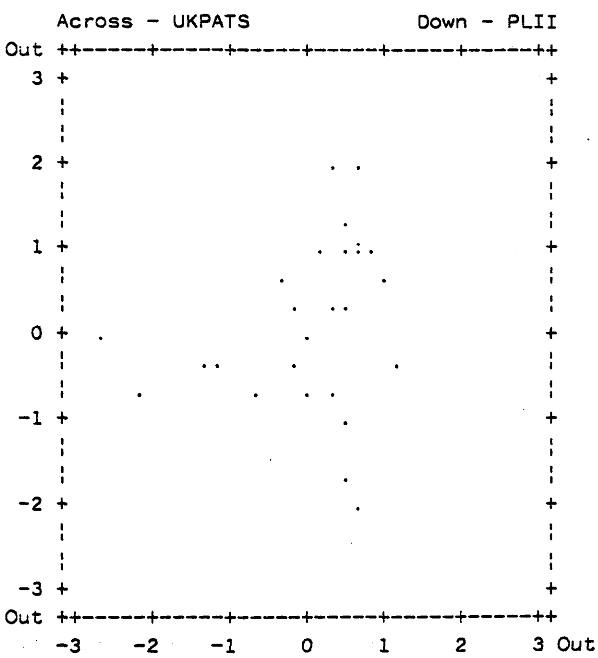


Symbols Used (Max N) . = 1.0 : = 2.0

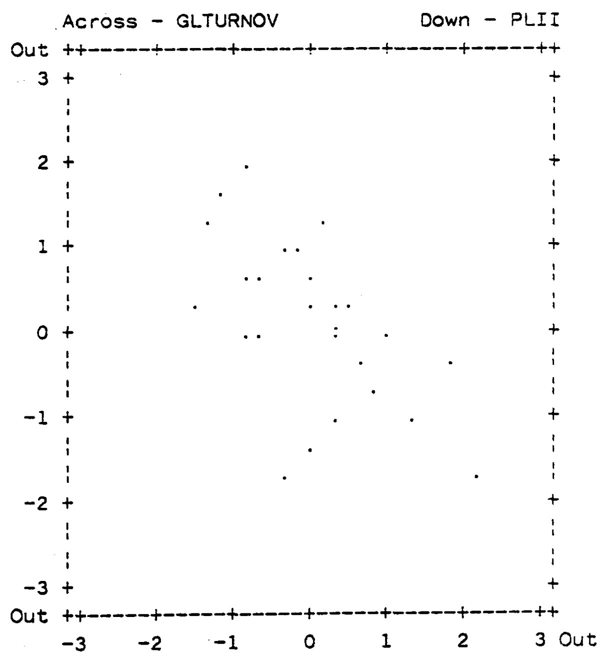


Symbols Used (Max N) . = 1.0

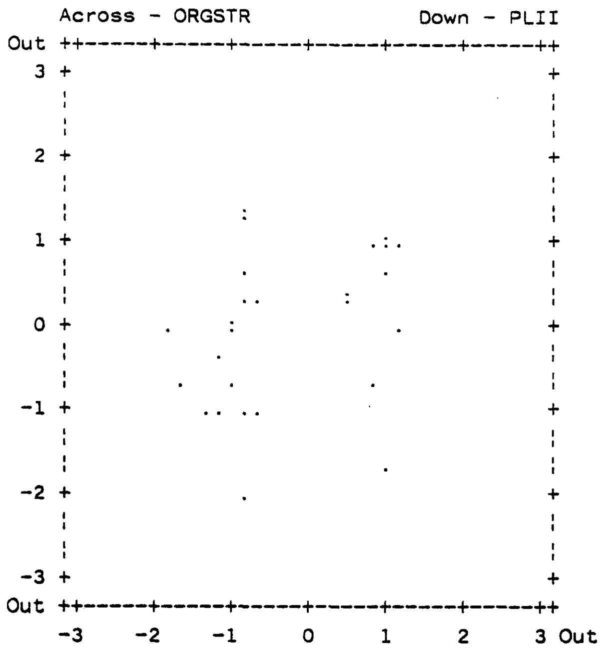
Dependent Variable: PLII



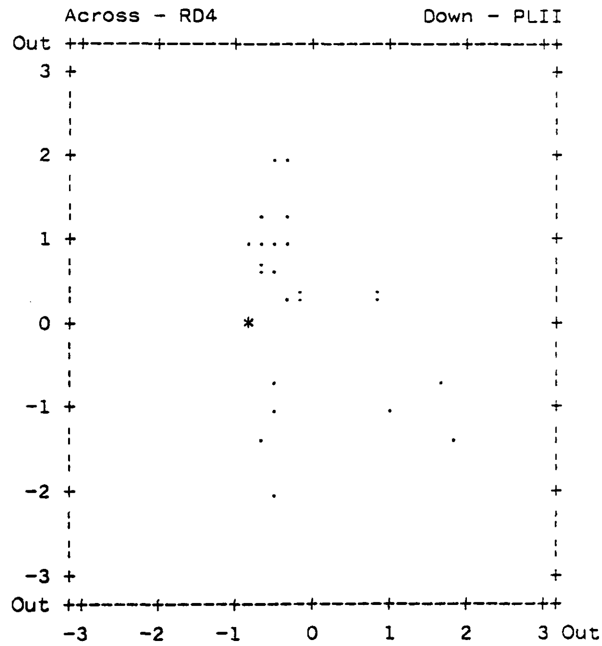
Symbols Used (Max N) . = 1.0 : = 2.0



Symbols Used (Max N) . = 1.0 : = 2.0

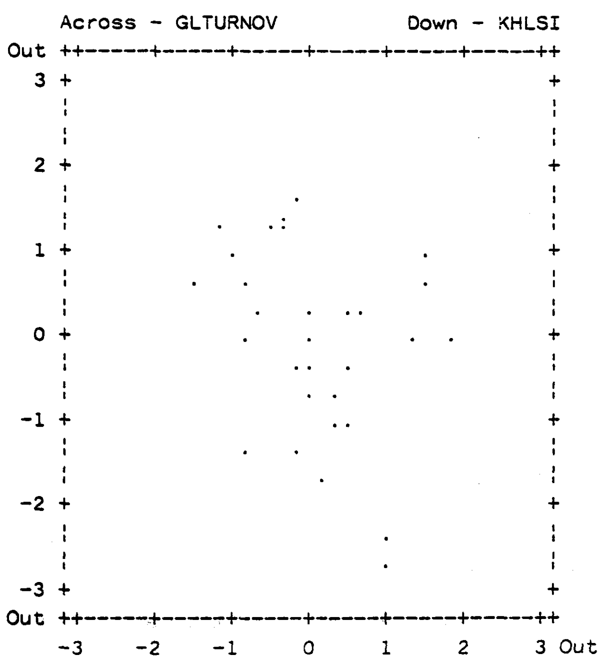


Symbols Used (Max N) . = 1.0 : = 2.0

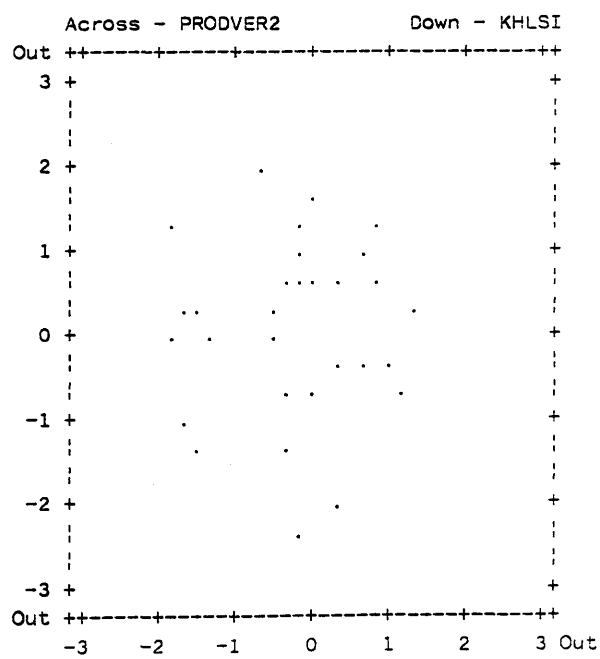


Symbols Used (Max N) . = 1.0 : = 2.0 * = 3.0

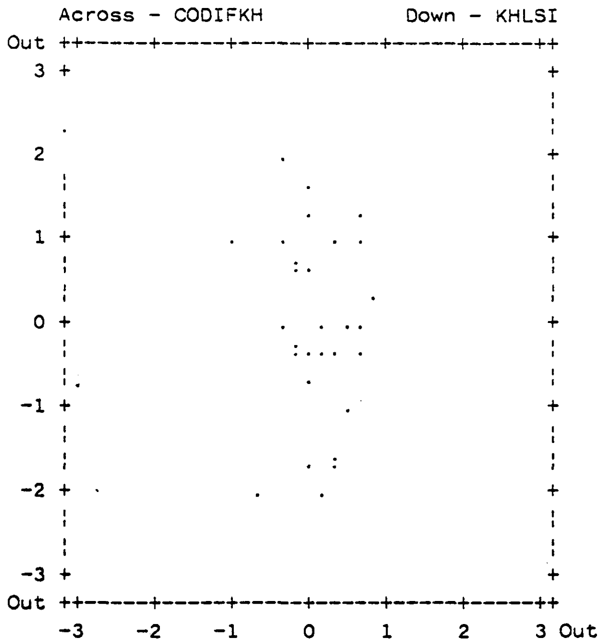
Dependent Variable: KHLSI



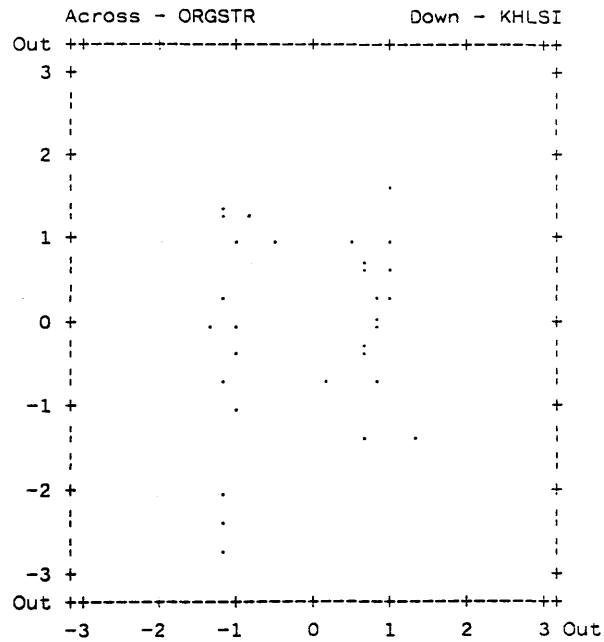
Symbols Used (Max N) . = 1.0 : = 2.0



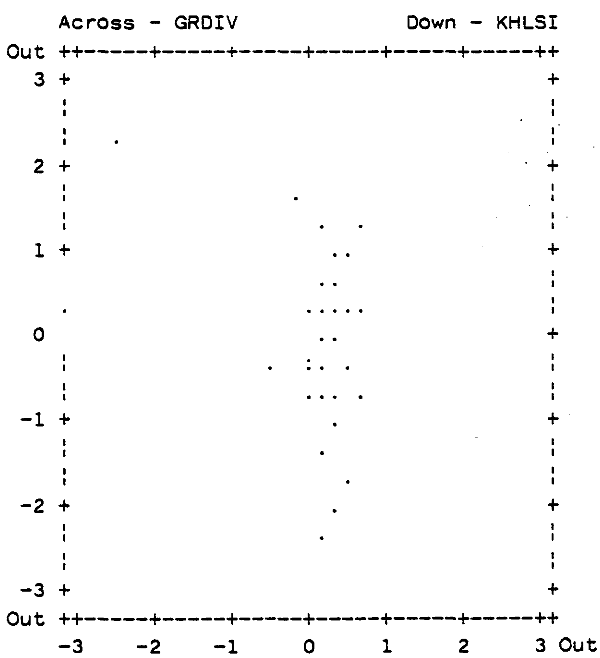
Symbols Used (Max N) . = 1.0



Symbols Used (Max N) . = 1.0 : = 2.0

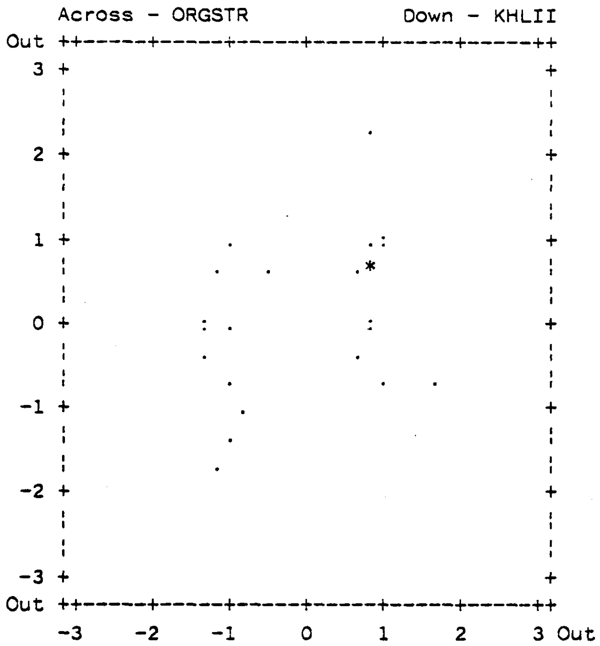


Symbols Used (Max N) . = 1.0 : = 2.0

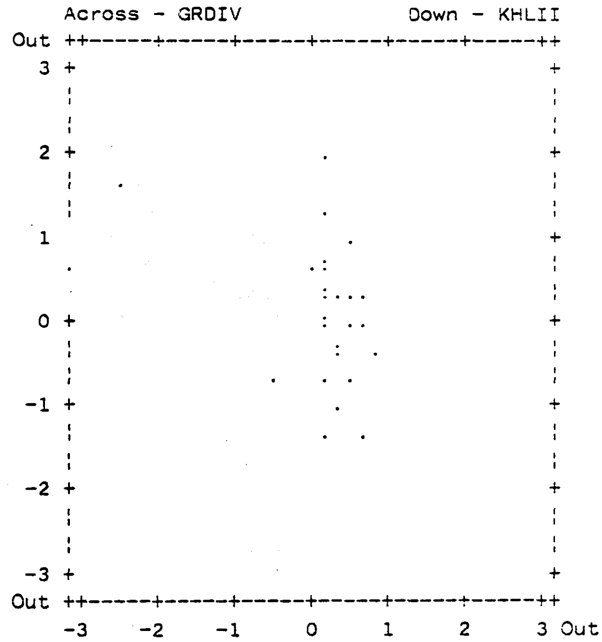


Symbols Used (Max N) . = 1.0 : = 2.0

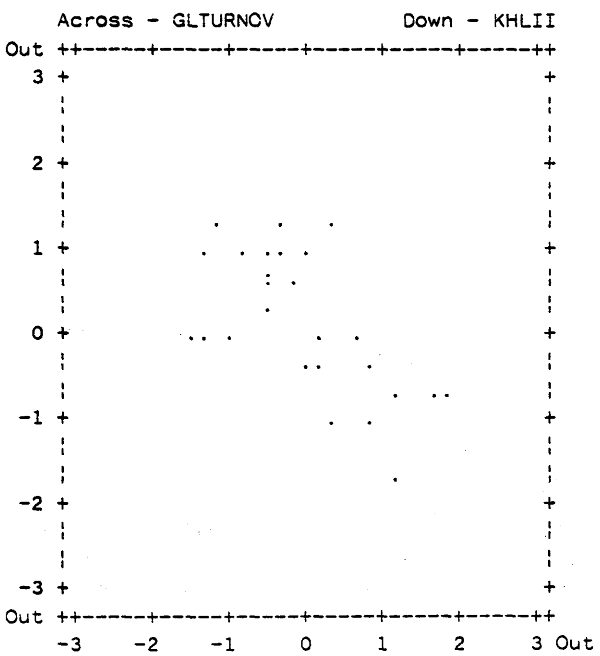
Dependent Variable: KHLII



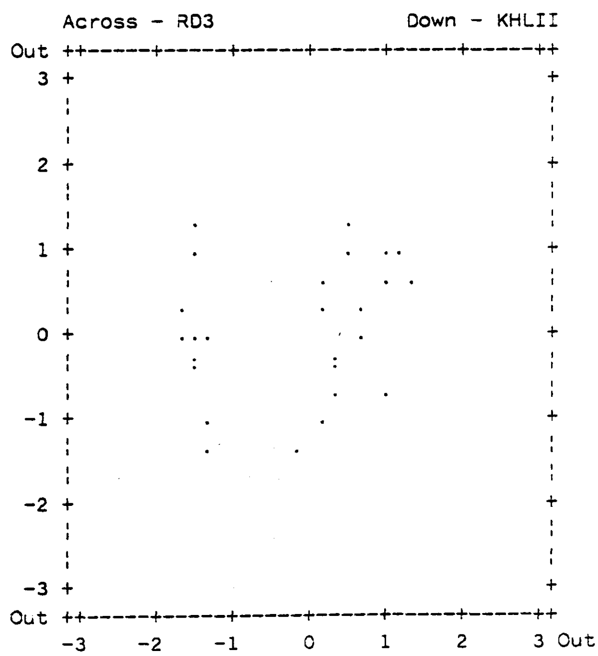
Symbols Used (Max N) . = 1.0 : = 2.0 * = 5.0



Symbols Used (Max N) . = 1.0 : = 2.0



Symbols Used (Max N) . = 1.0 : = 2.0



Symbols Used (Max N) . = 1.0 : = 2.0

CASEWISE PLOTS OF STANDARDIZED RESIDUALS AND OUTLIERS STATISTICS

Dependent Variable: PLSI

```
           -3.0           0.0           3.0
 Case £    O:..............:..............:O     *ZRESID    *LEVER    *MAHAL   *COOK D
    1       .       *      .              .     -1.4108     .2314    5.3222     .1469
    2       .              .      *       .      1.3402     .2904    6.6792     .1910
    3       .              .              .         .      1.0657   24.5111       .
    4       .              .     *        .      1.2951     .1007    2.3167     .0464
    6       .              .             *.      3.0264     .1303    2.9972     .3282
    7       .        *     .              .     -1.1759     .1627    3.7429     .0638
    9       . *            .              .     -2.8929     .0689    1.5844     .1671
   11       .              .              .         .       .1750    4.0244       .
   12       .              .              .         .       .0998    2.2951       .
   16       .              .              .         .       .3499    8.0487       .
   17       .              .              .         .       .1447    3.3277       .
   20       .              .              .         .       .2029    4.6677       .
   22       .              .              .         .       .0987    2.2698       .
   25       .            * .              .      -.3615     .0723    1.6629     .0027
   28       .      *       .              .     -1.8652     .3694    8.4961     .5890
   30       .              .      *       .      1.4471     .2232    5.1344     .1467
   31       .              .              .         .       .1121    2.5790       .
   32       .             *.              .      -.2234     .5900   13.5700     .0332
   33       .              .              .         .       .1229    2.8267       .
   37       .              .              .         .       .1328    3.0533       .
   40       .              .              .         .       .1996    4.5910       .
   41       .          *   .              .      -.8807     .3454    7.9444     .1142
   42       .          *   .              .      -.8151    1.2873   29.6090     .0000
   45       .              .              .         .       .1729    3.9774       .
   46       .              .              .         .       .4286    9.8584       .
   47       .              .   *          .       .8546     .1938    4.4564     .0420
   50       .              .              .         .       .3484    8.0136       .
   52       .              .*             .       .2991     .2019    4.6444     .0054
   58       .              .         *    .      2.2022     .1385    3.1857     .1857
   59       .              .              .         .       .3002    6.9038       .
   61       .              .       *      .      1.8764     .5748   13.2193    2.1072
   67       .    *         .              .     -2.1629     .1264    2.9063     .1622
   73       .              .  *           .       .6247     .1911    4.3953     .0220
   74       .              .              .         .       .1737    3.9961       .
   76       .              .              .         .       .1779    4.0913       .
   79       .              .      *       .      1.5285     .1473    3.3878     .0959
   84       .              .              .         .       .2733    6.2848       .
 Case £    O:..............:..............:O     *ZRESID    *LEVER    *MAHAL   *COOK D
           -3.0           0.0           3.0
```

Residuals Statistics:

		Min	Max	Standard Deviation	Outlying Value	N
Standardized Residual	(*ZRESID)	-2.8929	3.0264	1.6292	>3.0000	19
Leverage	(*LEVER)	.0689	1.2873	.2536	>.5833	37
Mahalanobis' Distance	(*MAHAL)	1.5844	29.6090	5.8332	>13.4167	37
Cook's D	(*COOK D)	.0000	2.1072	.4745	>1.0000	19

Durbin-Watson Test: d = 1.78082

Dependent Variable: PLII

```
        -3.0           0.0            3.0
Case £  O:.............:.............:O     *ZRESID   *LEVER    *MAHAL  *COOK D
     1  .            * .              .     -.3575    .1684    3.8723    .0086
     2  .              .*             .      .2986    .3033    6.9767    .0143
     3  .              .              .          .    .4375   10.0619        .
     4  .              .    *         .     1.0207    .0805    1.8508    .0330
     6  .              .       *      .     1.7252    .1031    2.3708    .1178
     7  .              . *            .      .3940    .1674    3.8500    .0104
     9  .   *          .              .    -2.3573    .0703    1.6176    .1578
    11  .              .              .          .    .1866    4.2913        .
    12  .              .              .          .    .0933    2.1448        .
    15  .           *  .              .     -.5595    .2436    5.6022    .0350
    16  .              .              .          .    .3421    7.8689        .
    17  .              .              .          .    .1364    3.1382        .
    20  .              .              .          .    .2199    5.0585        .
    22  .              .              .          .    .0756    1.7396        .
    25  .         *    .              .    -1.0957    .0609    1.4010    .0306
    28  .          *   .              .     -.7498    .2094    4.8162    .0503
    30  .             *.              .     -.1947    .1190    2.7378    .0017
    31  .              .              .          .    .0765    1.7587        .
    32  .              .    *         .     1.0344    .0680    1.5642    .0296
    33  .              .              .          .    .0918    2.1119        .
    36  .              .*             .      .2749    .2076    4.7742    .0067
    37  .              .              .          .    .1137    2.6151        .
    40  .              .              .          .    .2138    4.9181        .
    41  .              .*             .      .2194    .2301    5.2933    .0049
    42  .            * .              .     -.4673    .3092    7.1118    .0364
    45  .              .              .          .    .1843    4.2383        .
    46  .              .              .          .    .1149    2.6424        .
    47  .              .    *         .      .9354    .1492    3.4311    .0510
    50  .              .              .          .    .2316    5.3277        .
    52  .              .*             .      .1360    .2183    5.0198    .0018
    55  .          *   .              .     -.7425    .1139    2.6187    .0240
    56  .              .   *          .      .7799    .1421    3.2681    .0335
    58  .              .*             .      .2487    .1008    2.3176    .0024
    59  .              .              .          .    .3112    7.1577        .
    61  .              .     *        .     1.1522    .4673   10.7468    .5603
    63  .              .   *          .      .7311    .1065    2.4501    .0218
    65  .              .   *          .      .7820    .1127    2.5917    .0264
    67  .      *       .              .    -1.8575    .0804    1.8481    .1092
    68  .              . *            .      .3779    .0870    2.0005    .0048
    73  .              .   *          .      .7211    .1127    2.5914    .0224
    74  .              .              .          .    .1790    4.1178        .
    76  .              .              .          .    .1834    4.2185        .
    79  .              .       *      .     1.8118    .0665    1.5302    .0893
    80  .              .              .          .    .2072    4.7654        .
    84  .              .              .          .    .2166    4.9817        .
    85  .              .              .          .    .1082    2.4875        .
Case £  O:.............:.............:O     *ZRESID   *LEVER    *MAHAL  *COOK D
        -3.0           0.0            3.0
```

Residuals Statistics:

	Min	Max	Standard Deviation	Outlying Value	N
Standardized Residual (*ZRESID)	-2.7702	2.1291	1.1695	>3.0000	26
Leverage (*LEVER)	.0609	.4673	.0951	>.4167	46
Mahalanobis' Distance (*MAHAL)	1.4010	10.7468	2.1873	>9.5841	46
Cook's D (*COOK D)	.0017	.5603	.1100	>1.0000	26

Durbin-Watson Test: d = 1.47483

```
Dependent Variable: KHLSI


         -3.0           0.0           3.0
Case £   O:.............:.............:O      *ZRESID    *LEVER     *MAHAL    *COOK D
   1      .    *         .              .     -1.9123     .1089     3.3746      .1155
   3      .    *         .              .     -1.9306     .7773    24.0950    13.6971
   4      .              .      *       .      1.4340     .0517     1.6018      .0338
   5      .              .              .           .     .2169     6.7229          .
   7      .              . *            .       .4336     .0946     2.9317      .0052
   8      .              .              .           .     .1124     3.4858          .
   9      .              .  *           .       .5518     .0657     2.0358      .0060
  11      .             *.              .     -.1490      .1221     3.7850      .0008
  17      .              .              .           .     .1505     4.6669          .
  20      .          *   .              .     -.7377     1.6513    51.1902      .0000
  22      .              .              .           .     .1054     3.2686          .
  23      .           *  .              .     -.5804      .1983     6.1487      .0217
  25      .          *   .              .     -.8119      .0459     1.4238      .0100
  26      .              .        *     .      1.7212     .1496     4.6384      .1331
  29      .              .              .           .     .0983     3.0460          .
  30      .              .   *          .       .7840     .0912     2.8258      .0163
  31      .              .       *      .      1.6445     .0793     2.4584      .0630
  32      .              .     *        .      1.1426     .2836     8.7909      .1459
  33      .              .      *       .      1.3185     .0624     1.9345      .0330
  37      .             *.              .     -.1344      .0548     1.7001      .0003
  40      .              .              .           .     .1956     6.0623          .
  41      .              *              .       .0277     .0708     2.1935      .0000
  42      .              .              .           .     .8457    26.2162          .
  44      .              .*             .       .2274     .0977     3.0273      .0015
  45      .      *       .              .     -1.5771     .1621     5.0266      .1232
  48      .              .              .           .     .1107     3.4318          .
  50      .             *.              .     -.1104      .1053     3.2636      .0004
  51      .     *        .              .     -1.7275     .0627     1.9431      .0569
  52      .            * .              .     -.4098      .1817     5.6335      .0096
  53      .              .              .           .     .1753     5.4329          .
  58      .              .  *           .       .5428     .1938     6.0080      .0184
  59      .              .              .           .     .0755     2.3390          .
  61      .  *           .              .     -2.3807     .0877     2.7196      .1448
  62      .              .   *          .       .7699     .1190     3.6882      .0206
  67      .            * .              .     -.4172      .0644     1.9970      .0034
  73      .              .  *           .       .5926     .0376     1.1653      .0046
  74      .            * .              .     -.4800      .1576     4.8867      .0110
  75      .              .              .           .     .0764     2.3676          .
  76      .              .              .           .     .1020     3.1608          .
  78      .              .              .           .     .0341     1.0557          .
  82      .              .        *     .      1.8972     .1290     3.9981      .1363
  83      .          *   .              .     -.7280      .0940     2.9155      .0145
  84      .              .    *         .       .9180     .1618     5.0145      .0416
Case £   O:.............:.............:O      *ZRESID    *LEVER     *MAHAL    *COOK D
         -3.0           0.0           3.0
```

Residuals Statistics:

		Min	Max	Standard Deviation	Outlying Value	N
Standardized Residual	(*ZRESID)	-2.3807	1.8972	1.1571	>3.0000	30
Leverage	(*LEVER)	.0341	1.6513	.2784	>.3750	43
Mahalanobis' Distance	(*MAHAL)	1.0557	51.1902	8.6306	>11.6250	43
Cook's D	(*COOK D)	.0000	13.6971	2.4939	>1.0000	30

Durbin-Watson Test: d = 1.84714

Dependent Variable: KHLII

```
               -3.0           0.0            3.0
   Case £   O:..............:..............:O     *ZRESID    *LEVER    *MAHAL   *COOK D
        1   .         *    .              .     -1.0234     .1614    5.0041     .0619
        2   .              .              .           .     .1344    4.1652         .
        3   .        *     .              .     -1.2863     .6932   21.4894    3.1576
        4   .              .      *       .      1.3172     .0578    1.7908     .0372
        6   .              .              .           .     .0868    2.6907         .
        7   .              .  *           .       .6858     .0874    2.7109     .0144
        8   .              .              .           .     .1571    4.8689         .
        9   .              .   *          .       .8191     .1225    3.7971     .0288
       11   .        *     .              .     -1.2440     .0885    2.7429     .0478
       12   .              .              .           .     .0311     .9627         .
       14   .              .              .           .     .0571    1.7706         .
       16   .              .              .           .     .1110    3.4420         .
       17   .              .              .           .     .0950    2.9453         .
       20   .              .*             .       .1807     .1270    3.9361     .0015
       22   .              .              .           .     .0720    2.2330         .
       23   .          *   .              .      -.8661     .0837    2.5944     .0220
       25   .              . *            .       .3069     .1189    3.6870     .0039
       26   .              . *            .       .4607     .1936    6.0027     .0159
       29   .              .              .           .     .1004    3.1119         .
       30   .              .*             .       .1338     .1443    4.4724     .0009
       31   .              .       *      .      1.5203     .1143    3.5445     .0922
       32   .              .   *          .       .8097     .3523   10.9211     .1323
       33   .            * .              .      -.3104     .0327    1.0148     .0014
       37   .            * .              .      -.4705     .0536    1.6620     .0045
       40   .              .              .           .     .0965    2.9914         .
       41   .              .         *    .      2.0976     .1189    3.6846     .1829
       42   .              .              .           .     .8497   26.3393         .
       45   .              . *            .       .4585     .0529    1.6389     .0042
       46   .              .              .           .     .0715    2.2153         .
       47   .              .              .           .     .1908    5.9163         .
       49   .              .              .           .     .0446    1.3834         .
       50   .              .*             .       .2221     .1335    4.1380     .0023
       51   .        *     .              .     -1.2053     .0887    2.7501     .0450
       58   .              . *            .       .4593     .0987    3.0586     .0072
       59   .              .              .           .     .0525    1.6280         .
       62   .              .*             .       .2307     .0414    1.2834     .0009
       66   .              .              .           .     .0317     .9816         .
       67   .            * .              .      -.3929     .1228    3.8060     .0066
       73   .              .  *           .       .5494     .0794    2.4625     .0085
       74   .             *.              .      -.1963     .0583    1.8066     .0008
       76   .              .              .           .     .1350    4.1838         .
       78   .              .              .           .     .0344    1.0659         .
       79   .              .              .           .     .0770    2.3861         .
       83   .              .  *           .       .6362     .1173    3.6372     .0166
       84   .              . *            .       .4345     .2221    6.8839     .0172
   Case £   O:..............:..............:O     *ZRESID    *LEVER    *MAHAL   *COOK D
               -3.0           0.0            3.0
```

Residuals Statistics:

		Min	Max	Standard Deviation	Outlying Value	N
Standardized Residual	(*ZRESID)	-1.2863	2.0976	.8547	>3.0000	26
Leverage	(*LEVER)	.0311	.8497	.1519	>.3125	45
Mahalanobis' Distance	(*MAHAL)	.9627	26.3393	4.7099	>9.6875	45
Cook's D	(*COOK D)	.0008	3.1576	.6149	>1.0000	26

Durbin-Watson Test: d = 1.92942

CHAPTER THIRTEEN - THE INTELLECTUAL PROPERTY CONTENT OF LICENSING AGREEMENTS: THEORY AND EVIDENCE

CHAPTER THIRTEEN - THE INTELLECTUAL PROPERTY CONTENT OF LICENSING AGREEMENTS: THEORY AND EVIDENCE

13.1 INTRODUCTION

This chapter tests a number of hypotheses concerning the intellectual property characteristics of licensing agreements. The basic research question is as follows: do the characteristics of intellectual property which is licensed by MNCs to unrelated overseas firms differ from the characteristics of intellectual property which is licensed by MNCs to their overseas subsidiaries? The hypotheses which were generated from this general question were derived from the literature on the transaction cost theory of the MNC (Chapter 5).

To recap, briefly, this school of thought holds that companies will establish foreign subsidiaries rather than licensing agreements with unrelated overseas firms when imperfections in the arm's-length market for intellectual property give rise to transaction costs which are greater than those which arise from the expansion of the firm's boundaries.

Transaction costs in the intellectual property market can be considered as belonging to one of two broad categories: ex-ante and ex-post costs [Hill and Chan Kim (1988)]. The former consist of the costs of drafting, negotiating, monitoring and enforcing a licensing agreement, including the costs associated with establishing a fee for the intellectual property. The latter are the costs which arise from opportunistic behaviour on the part of the licensee, which may involve dissemination of the intellectual property to third parties and the consequent loss of future earnings.

Implicit in the transaction cost literature is the view that internal markets are superior to external markets in their ability to economise on these transaction costs [Williamson (1975)]. This arises principally from the fact that the "governance structure" of an internal market functions through the exercise of managerial authority, rather than through the co-operation relied upon by markets. Ex-post transaction costs are reduced within an authority-based system since opportunism is more easily monitored and sanctioned. Ex-ante costs are also lowered as the negotiation process between different units of the same organization is subject to greater control by managers who have superior access to information than either unit and the authority to resolve any disputes which may arise.

Most of the hypotheses tested in this chapter are concerned with differences in the intellectual property content of the unrelated and related licensing agreements of the company sample. The former arose from bargaining between independent concerns, while the latter were the outcome of negotiations between different units of the same MNC. The hypotheses were tested using appropriate data from Section II of the questionnaire (unrelated licensing) and Section III of the questionnaire (related licensing).

13.2 THE KNOW-HOW CONTENT OF PATENT LICENSING AGREEMENTS

13.2.1 The Hypothesis Explained

The hypothesis which was tested is set out below in its alternative and null forms:

H_A: Unrelated patent licensing agreements involve fewer transfers of know-how than related patent licensing agreements.

H_O: There is no difference between the know-how content of unrelated and related patent licensing agreements.

This hypothesis was based upon the premise that the arm's-length (ie external) market for know-how involves greater transaction costs than the intra-firm (ie internal) market for know-how. These greater costs arise from the difficulties inherent in licensing know-how to unrelated (rather than related) companies. Williamson (1981) and Teece (1980-86) have highlighted three main impediments to the external transfer of know-how which give rise to ex-ante transaction costs, thereby making internal transfer more appealing.

Firstly, there is the "recognition" problem. It is often difficult to fully publicize the availability of certain forms of proprietary know-how since the value of such know-how is dependent upon the maintenance of confidentiality. As a result, potential licensing opportunities may go unrealized.

Secondly, there is the "disclosure" problem. Assuming that the recognition problem is overcome, it is necessary to communicate the value of know-how to potential licensees without revealing its exact nature. If value can only be communicated by disclosing the exact nature of the know-how in question, then the basis for a licensing agreement will have been destroyed since the potential licensee will have obtained the know-how for free. The maintenance of information asymmetry between the know-how proprietor and potential licensees is therefore a necessary pre-requisite for know-how to retain its value. In these circumstances, however, potential licensees may fear opportunistic representations from the proprietor and may thus be unwilling to pay their estimate of the full value of the know-how. The external market for know-how licences will thus be prone to failure.

The "disclosure" problem is essentially a manifestation of the problem of "information impactedness", originally described by Williamson (1975, pp 31-37). This condition is less likely to arise in the market for pure patents because patents necessitate full public disclosure of the specifications of the technology that is the subject of the patent.[1] In the market for know-how there is no such disclosure, and therefore scope for "buyer uncertainty" to arise [Buckley and Casson (1976, pp 38-39)].[2]

However, even if information concerning the value of know-how is not impacted, and can therefore be communicated to potential licensees without destroying the basis for a licensing agreement, the external market may still be prone to failure if the problem of "team organization" exists. This arises when information has a high tacit content, such that it cannot be transferred to other organizations without the transfer of personnel. Although consulting teams may be used in the short-term to overcome this problem for one-off transfers, where a succession of transfers is likely the internal market becomes more appealing as it can more easily accomodate the strains likely to arise in recurrent contracting.

In addition to the ex-ante transaction costs which arise from the problems of "recognition", "disclosure" and "team organization", there are also ex-post transaction costs associated with the external market for know-how which arise from the opportunistic behaviour of licensees. This may manifest itself in the licensee, or an employee of the licensee, "leaking" licensed know-how to other companies, or using it for purposes other than those originally intended.

Given the presumed superiority of internal markets in economising upon these transaction costs, one would expect to find that unrelated patent licensing agreements had a lower know-how content than related patent licensing agreements. This hypothesis was tested for each of the two categories of know-how included in the questionnaire, ie know-how in the technical field of the patent and know-how supplied on a broader basis, and also for both of these categories combined.

In addition to the hypothesis that unrelated agreements had a lower content of both categories of know-how than related agreements, it was also hypothesised that the difference in know-how content between the two types of agreement would be more pronounced for know-how that was supplied on a broader basis than just the technical field of the patent. There were two reasons for this secondary hypothesis. The first was simply that the supply of know-how in the technical field of the patent is often essential for patents to be utilised properly, and so we would expect to find this type of know-how to feature more in both categories of agreement.

The second reason was based upon the proposition that know-how provided on a broader basis than the technical field of the patent is more prone to be used by a licensee for purposes not specified under the terms of a licensing agreement due to the fact that it is less "product-specific" than know-how which relates to the technical field of the patent. An example of know-how with a low degree of product-specificity is instant camera technology, which has offered the potential for transfer into electronic components, miniature batteries, chemicals, sensing and measurement devices, and precision machine tools [see Galbraith and Kay (1986, p 14)]. The greater probability of opportunistic exploitation of this type of know-how by licensees will thus make companies less inclined to license it in the arm's-length market in comparison with know-how which has a high degree of product-specificity.

The data used to test the primary hypothesis are displayed in Tables 13-1, 13-2 and 13-3. The first of these tables was constructed from the responses to Question 4 in Section II of the questionnaire, which asked the companies to estimate the proportion of their unrelated patent licensing agreements which also involved the supply of know-how.

TABLE 13-1

THE KNOW-HOW CONTENT OF UNRELATED PATENT LICENSING AGREEMENTS

Proportion Of Agreements Providing Know-how	KNOW-HOW RELATED TO TECHNICAL FIELD OF PATENT		KNOW-HOW SUPPLIED ON A BROADER BASIS	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	0	0.0	13	25.5
A Few	6	11.8	13	25.5
About Half	4	7.8	6	11.8
Most	17	33.3	8	15.7
All/Virtually All	24	47.1	11	21.5
Total	51	100.0	51	100.0

Data on the extent to which related patent licensing agreements included the supply of know-how were obtained from Question 3 in Section III of the questionnaire. The data are displayed in Table 13-2.

TABLE 13-2

THE KNOW-HOW CONTENT OF RELATED PATENT LICENSING AGREEMENTS

Proportion Of Agreements Providing Know-how	KNOW-HOW RELATED TO TECHNICAL FIELD OF PATENT		KNOW-HOW SUPPLIED ON A BROADER BASIS	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	2	4.4	5	11.6
A Few	2	4.4	4	9.3
About Half	1	2.2	1	2.3
Most	9	20.0	13	30.2
All/Virtually All	31	69.0	20	46.6
Total	45	100.0	43	100.0

The totals from Tables 13-1 and 13-2 are combined in Table 13-3, which illustrates the difference in the extent of total know-how provision between related and unrelated patent licensing agreements.

TABLE 13-3

THE TOTAL KNOW-HOW CONTENT OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

Proportion of Agreements Providing Know-how	UNRELATED LICENSING		RELATED LICENSING	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	13	12.8	7	8.0
A Few	19	18.6	6	6.8
About Half	10	9.8	2	2.3
Most	25	24.5	22	25.0
All/Virtually All	35	34.3	51	57.9
Total	102	100.0	88	100.0

13.2.2 The Hypothesis Tested

The appropriate statistical test for any hypothesis is dependent upon the characteristics of the research design and the level of measurement of the variables involved. The research design chosen to test this hypothesis can be characterised, using the classification scheme of Cohen and Holliday (1982), as a "one group design". This single group was composed of MNCs that:

a) licensed patents and know-how to unrelated overseas companies; and
b) licensed patents and know-how to related overseas companies (ie overseas subsidiaries).

The research design therefore involved repeated measures on the same subjects under two conditions. Employing the terminology of Siegel (1956), the two samples derived from these repeated measures can be classified as "related" (rather than "independent") since each company in the group answered both the questions that were compared to test the hypothesis.

Since the variables were measured at the ordinal level the appropriate test was the Wilcoxon Matched-Pairs Signed-Ranks Test (hereafter referred to as the Wilcoxon test). Had the data been of interval strength then a correlated t-test for equality of means would have been more appropriate.

The steps involved in the calculation of the Wilcoxon test statistic, T, were as follows. Firstly, the difference in scores between each pair of values was found. These differences were then rank-ordered from smallest to largest without regard to sign. The actual signs of each difference were then added to the rank values. The test statistic T was then obtained by summing both the positive and negative ranks and selecting the smaller of the two.

Two types of ties occur with this test. The first type occurs when two observations are equal. In this situation the difference in scores is zero, so the pair of observations are dropped from the calculation. The second type of tie occurs when two or more pairs of scores have the same difference. When this happens, the rank positions of the pairs are averaged.

When the number of pairs of observations, n, is less than 25, critical value tables can be used to determine the significance of the test statistic. When n is greater than 25 the sampling distribution of T is approximately normal, so the T value has to be transformed using the following formula:

$$Z = \frac{T - \mu T}{\sigma T}$$

where μT and σT represent the mean and standard deviation of the sampling distribution of T.

A notable feature of the Wilcoxon test is its high power efficiency. When the assumptions of the t-test are met, the power efficiency is 95.5 per cent [Siegel (1956, p83)].

The hypothesis was tested, firstly, for know-how which was supplied in the technical field of the patent (hereafter referred to as 'patent-specific' know-how). An impression of the relationship being tested can be gained from Figure 1 in Appendix 13-1. This figure plots the patent-specific know-how content of unrelated patent licensing agreements against the patent-specific know-how content of related patent licensing agreements. Each asterisk represents the position of a single company. Where more than one company occupied the same co-ordinates, the number of companies was printed.

Most of the points plotted on the scattergram should have fallen below the 45^{o} line since related licensing agreements were hypothesised to possess more patent-specific know-how content than unrelated licensing agreements. Inspection of Figure 1 reveals that 13 of the 34 points plotted did fall below this line. However, a further 17 points actually fell on the 45^{o} line; for these companies there was no difference between the extent of patent-specific know-how provision in their unrelated and related patent licensing agreements. The remaining 4 companies actually had more patent-specific know-how content in their unrelated agreements than they did in their related agreements.

Table 13-4 presents the results of the Wilcoxon test for patent-specific know-how.

TABLE 13-4

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE PATENT-SPECIFIC KNOW-HOW CONTENT OF
UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
12.50	4	- RANKS (RELATED < UNRELATED)
7.92	13	+ RANKS (RELATED > UNRELATED)
	17	TIES
	--	
	34	TOTAL

Z = -1.2545   1-TAILED P = .10485

A one-tailed test was employed because the hypothesis indicated the predicted direction of the differences between the two variables, ie that unrelated patent licensing agreements would involve fewer transfers of patent-specific know-how than related patent licensing agreements.[3]

As the significance of the Z score was 0.10485, the null hypothesis could not be rejected. It can be concluded, therefore, that unrelated patent licensing agreements did not involve significantly fewer transfers of patent-specific know-how than related patent licensing agreements.

The hypothesis was then tested for the second category of know-how, that which did not relate to the technical field of the patent but was supplied on a broader basis (hereafter referred too as 'broad' know-how). Figure 2 in Appendix 13-1 plots the broad know-how content of unrelated patent licensing agreements against the broad know-how content of related patent licensing agreements. Of the 34 points plotted, 19 fell below the 45^{o} line. A further 12 points fell on the line, while only 2 companies were plotted above it.

Table 13-5 presents the results of the Wilcoxon test for broad know-how.

TABLE 13-5

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE BROAD KNOW-HOW CONTENT OF
UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
10.75	2	- RANKS (RELATED < UNRELATED)
11.03	19	+ RANKS (RELATED > UNRELATED)
	12	TIES
	--	
	33	TOTAL

Z = -3.2672 1-TAILED P = .00055

As the Z score was highly significant, the null hypothesis was rejected. It can be concluded, therefore, that unrelated patent licensing agreements did involve significantly fewer transfers of broad know-how than related patent licensing agreements.

Finally, the hypothesis was tested for both categories of know-how combined, ie know-how related to the patents supplied and know-how supplied on a broader basis. The combined know-how content of unrelated and related patent licensing agreements are plotted against one another in Figure 3 of Appendix 13-1. The axes of the scatterplot have an upper limit of 10 since the responses to the questions concerning these two categories of know-how (which each contained five point scales) were combined to produce a single rating for total know-how content.

Inspection of Figure 3 reveals that 20 of the 33 points plotted fell below the 45^{O} line. A further 10 points actually fell on the line, while the remaining 3 companies had more total know-how content in their unrelated agreements than they did in their related agreements.

Table 13-6 presents the results of the Wilcoxon test for total know-how content.

TABLE 13-6

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE TOTAL KNOW-HOW CONTENT OF
UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
17.00	3	- RANKS (RELATED < UNRELATED)
11.25	20	+ RANKS (RELATED > UNRELATED)
	10	TIES
	--	
	33	TOTAL

Z = -2.6461 1-TAILED P = .00400

As the significance of the Z score was 0.0040, the null hypothesis was rejected. It can be concluded, therefore, that unrelated patent licensing agreements did involve a significantly smaller amount of total know-how transfers than related patent licensing agreements.

The previous two results suggest that the bulk of this difference was accounted for by broadly-based know-how rather than by know-how related to the technical field of the patent. The secondary hypothesis that the difference between unrelated and related agreements would be more pronounced for know-how that was supplied on a broader basis than the technical field of the patent was therefore deemed to be well-founded.

13.3 THE TRADEMARK CONTENT OF PATENT LICENSING AGREEMENTS

13.3.1 The Hypothesis Explained

The hypothesis which was tested is set out below in its alternative and null forms:

H_A: Unrelated patent licensing agreements involve fewer transfers of trademarks than related patent licensing agreements.

H_O: There is no difference between the trademark content of unrelated and related patent licensing agreements.

The hypothesis is based upon the association of trademarks with product quality. Because trademarks are a means of differentiating products their value is dependent upon the uniformity of product quality across different producers. It is therefore not uncommon for companies which license trademarks to include clauses in their licensing agreements which allow for the periodic checking of the licensee's output [Lowe and Crawford (1984, p4)].

Given the need to attain a satisfactory standard of product quality, the problem of "team organization" is likely to arise when trademarks are licensed. In addition to the repeated monitoring of licensee output to ensure that product quality does not deteriorate, initial training of licensee personnel is also necessary to ensure adequate quality in the crucial early stages of licensed production.[4] It is therefore to be expected that companies will be more inclined to license trademarks to overseas subsidiaries than to independent foreign concerns, given the advantages of internal hierarchical control in reducing the ex-ante transaction costs that arise in the arm's-length market. We would therefore expect to find that unrelated patent licensing agreements would involve fewer transfers of trademarks than related patent licensing agreements.

The data used to test the hypothesis are displayed in Table 13-7, which reports the responses obtained from Question 4(c) in Section II of the questionnaire (unrelated agreements) and from Question 3(c) in Section III of the questionnaire (related agreements).

TABLE 13-7

THE TRADEMARK CONTENT OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

Proportion of Agreements Providing Trademarks	UNRELATED LICENSING		RELATED LICENSING	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	8	15.7	6	13.3
A Few	19	37.3	7	15.6
About Half	4	7.8	1	2.2
Most	12	23.5	10	22.2
All/Virtually All	8	15.7	21	46.7
Total	51	100.0	45	100.0

13.3.2 The Hypothesis Tested

An initial impression of the validity of the hypothesis can be gained from Figure 4 in Appendix 13-1, which contains the crosstabulation of the trademark content of the two categories of licensing agreement. This reveals that 15 of the 34 companies plotted fell below the 45° line, which indicates that these companies licensed more trademarks to related companies than to unrelated companies. Of the remaining 19 companies only 5 were plotted above the line, while 14 fell on the line itself.

TABLE 13-8

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE TRADEMARK CONTENT OF
UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
6.00	5	- RANKS (RELATED < UNRELATED)
12.00	15	+ RANKS (RELATED > UNRELATED)
	14	TIES
	--	
	34	TOTAL

Z = -2.8000 1-TAILED P = .00026

The results of the Wilcoxon test for trademarks are presented in Table 13-8. As the Z score was highly significant the alternative hypothesis was accepted. It can be concluded, therefore, that unrelated patent licensing agreements involved significantly fewer transfers of trademarks than related patent licensing agreements.

13.4 THE PATENTABLE CONTENT OF KNOW-HOW LICENSING AGREEMENTS

13.4.1 The Hypothesis Explained

The hypothesis which was tested is set out below in its alternative and null forms:

H_A: Unrelated know-how licensing agreements involve fewer transfers of patentable know-how than related know-how licensing agreements.

H_O: There is no difference between the patentable know-how content of unrelated and related know-how licensing agreements.

The hypothesis is concerned with patentable know-how, ie know-how which could be described in a patent but which is deliberately left unpatented by the proprietor. If companies choose not to register a patent then the value of their know-how is dependent upon their ability to keep it secret. If another company were to obtain access to the know-how and then acquire a patent for it, it would appropriate returns over the life-span of the patent that would have belonged to the originator of the know-how had it been patented from the outset.

Transaction cost theory suggests that there is a greater probability of know-how "leaking" from unrelated companies than from related companies. The cost suffered by a company which experiences know-how leakage will be greater if its know-how is of a patentable nature, and we would therefore expect companies to be strongly inclined to use internal markets when transferring this type of know-how. In so doing they forego the contract-based control available in external markets in favour of the authority-based control available in internal markets, and are thereby able to reduce the ex-post transaction costs arising from opportunistic licensee behaviour.

The hypothesis was tested using the data in Table 13-9, which reports the responses obtained from Question 13(a) in Section II of the questionnaire (unrelated agreements) and from Question 4(a) in Section III of the questionnaire (related agreements).

TABLE 13-9

THE PATENTABLE CONTENT OF UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

Proportion of Patentable Know-how in Licensing Agreements	UNRELATED LICENSING		RELATED LICENSING	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	26	43.3	16	29.6
Some	28	46.7	25	46.3
About Half	2	3.3	10	18.5
Most	4	6.7	3	5.6
All/Virtually All	0	0.0	0	0.0
Total	60	100.0	54	100.0

13.4.2 The Hypothesis Tested

The scatterplot of the patentable know-how content of the two categories of licensing agreement is shown in Figure 1 of Appendix 13-2. This reveals that the majority of companies (27) fell on the 45^{o} line, with 10 companies falling below it and 4 above it.

The results of the Wilcoxon test for patentable know-how are presented in Table 13-10. As the significance of the Z score was only 0.08365 the null hypothesis could not be rejected. It can therefore be concluded that there was no statistically significant difference between the patentable content of unrelated and related know-how agreements.

TABLE 13-10

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE PATENTABLE CONTENT OF
UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
7.63	4	- RANKS (RELATED < UNRELATED)
7.45	10	+ RANKS (RELATED > UNRELATED)
	27	TIES
	--	
	41	TOTAL

Z = -1.3811 1-TAILED P = .08365

This result may be interpreted in the light of Parry's (1985) argument that the internalisation (ie transaction cost) approach ignores the problem of know-how leakages from within internal hierarchies. He argued that there are difficulties in enforcing "quasi-contractual control" over employees within an organization to prevent know-how leakage, and went on to state that "it may well be that a formal, contractual arrangement with an independent third party such as in the case of a licensing agreement, for example, is easier to enforce than the quasi-contractual obligations of employees" (op cit, p567). In this regard it is of interest to note that Mansfield and Romeo (1980) found evidence that the technology of US companies sometimes "leaked out" through non-US companies hiring away the personnel employed by their overseas subsidiaries.

Although the result reported here cannot be regarded as a direct test of Parry's proposition, the fact that there was no apparent difference between the patentable know-how content of both types of licensing agreement does suggest that there may be little difference between internal and external markets in terms of their ability to stem know-how leakages.[5]

13.5 THE NON-PROPRIETARY CONTENT OF KNOW-HOW LICENSING AGREEMENTS

13.5.1 The Hypothesis Explained

The hypothesis which was tested is set out below in its alternative and null forms:

H_A: Unrelated know-how licensing agreements contain either more or less non-proprietary know-how than related know-how licensing agreements.

H_O: There is no difference between the non-proprietary know-how content of unrelated and related know-how licensing agreements.

Non-proprietary know-how refers to know-how that can be obtained from a number of companies, ie it does not belong exclusively to the licensor. As a result, the transaction costs associated with the licensing of this type of know-how in the external market will be lower than those which would be incurred in licensing proprietary know-how.

Given the availability of non-proprietary know-how from sources other than the licensor, the ex ante transaction costs arising from the problems of recognition, disclosure and team organization could be expected to be modest. For example, the licensor could overcome the disclosure (ie information impactedness) problem by pointing to the impact made by the non-proprietary know-how on the operations of other companies using it. The ex-post transaction costs arising from licensee opportunism can also be expected to be minimal for this type of know-how, given that the licensor has little to lose from leakage since the know-how is already disseminated amongst other companies.

Unlike the previous hypotheses tested in this chapter, the expectation here is that the null hypothesis will hold, ie there will be no difference in the non-proprietory know-how content of the two categories of licensing agreement. As the alternative hypothesis holds that unrelated agreements will contain either more or less non-proprietary know-how, a two-tailed test was used.

The test of the hypothesis was based upon the data in Table 13-11, which reports the responses obtained from Question 13(b) in Section II of the questionnaire (unrelated agreements) and from Question 4(b) in Section III of the questionnaire (related agreements).

TABLE 13-11

THE NON-PROPRIETARY CONTENT OF UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

Proportion of Non-Proprietary Know-how in Licensing Agreements	UNRELATED LICENSING		RELATED LICENSING	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
None	6	9.5	10	17.9
Some	22	34.9	22	39.3
About Half	11	17.5	7	12.5
Most	17	27.0	12	21.4
All/Virtually All	7	11.1	5	8.9
Total	63	100.0	56	100.0

13.4.2 The Hypothesis Tested

The scatterplot of the non-proprietory know-how content of the unrelated and related agreements is shown in Figure 2 of Appendix 13-2. This reveals that 27 of the 44 companies which were plotted fell on the 45^{O} line, indicating that the majority of companies had the same non-proprietary know-how content in their unrelated and related agreements. Of the remaining companies, more were plotted above the line (9) than below it (8).

The results of the Wilcoxon test for non-proprietory know-how are presented in Table 13-12. As the two-tailed significance of the Z score was 0.6192 the null hypothesis was accepted. It can therefore be concluded that there was no statistically significant difference in the non-proprietary content of unrelated and related know-how agreements.

TABLE 13-12

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE PATENTABLE CONTENT OF
UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
9.67	9	- RANKS (RELATED < UNRELATED)
8.25	8	+ RANKS (RELATED > UNRELATED)
	27	TIES
	--	
	44	TOTAL

Z = -0.4971 2-TAILED P = .61920

13.6 THE CODIFIED CONTENT OF KNOW-HOW LICENSING AGREEMENTS

13.6.1 The Hypotheses Explained

Codified know-how consists of knowledge that can be embodied in physical artefacts such as designs, drawings and the like. Uncodified know-how is knowledge that is "tacit" in nature and can only therefore be embodied in individuals.

Two hypotheses were tested about the relative know-how content of unrelated and related licensing agreements depending upon whether or not the know-how was licensed in a codified form. The first hypothesis, which concerned know-how licensed in codified form, is set out below in its alternative and null forms.

H_A: Unrelated know-how licensing agreements contain either more or less codified know-how than related know-how licensing agreements.

H_O: There is no difference between the codified know-how content of unrelated and related know-how licensing agreements.

The expectation here was that the null hypothesis would hold, ie that both types of licensing agreement would contain the same amount of codified know-how. This rested upon the fact that the transfer of codified know-how does not necessarily require face-to-face contact, and so the problem of team organization can be expected to be minimal for this type of know-how. Also, insofar as codified know-how is more easy to understand than uncodified know-how, the problems of recognition and disclosure can be expected to be less severe.

The second hypothesis, which is concerned with uncodified know-how, is set out below in its alternative and null forms:

H_A: Unrelated know-how licensing agreements contain less uncodified know-how than related know-how licensing agreements.

H_O: There is no difference between the uncodified know-how content of unrelated and related know-how licensing agreements.

The expectation here was that the alternative hypothesis would hold, ie that unrelated agreements would contain less uncodified know-how than related agreements. This was based upon the fact that uncodified know-how is subject to the "team organization" problem since it requires the transfer of the licensor's personnel and organizational support in order to make its transfer effective. In addition, given the greater difficulties involved in both being aware of and communicating the value of knowledge which resides within individuals, the problems of recognition and disclosure are non-trivial and will increase the ex-ante transaction costs of licensing this type of know-how.

The tests of the hypotheses were based upon the responses to questions which asked for information about the nature of the know-how licensed to unrelated and related companies. Four categories of know-how were defined in the questionnaire:

(a) Documented information;
(b) Manufacturing process equipment;
(c) Organizational back-up;
(d) Training of licensee personnel.

The companies were asked to indicated on a scale of one to four the extent to which their know-how licensing agreements contained each of these categories.

Both categories (a) and (b) consist of codified know-how. The first consists of know-how embodied in written documents, while the second consists of know-how embodied in equipment. Examples of both were included in the questionnaire to assist the respondents in correctly classifying their know-how. The examples given of documented information were formulae, computer programmes and blueprints, while catalysts and machine tools were cited as examples of manufacturing process equipment.

Categories (c) and (d) consist of uncodified know-how. The first, organizational back-up, consists of knowledge provided by the licensor's personnel about its methods of operation, such as its sales and marketing methods. The second consists of the direct training of licensee personnel.

The extent to which the unrelated licensing agreements of the company sample contained each of the four categories of know-how is displayed in Table 13-13, which is based upon the data derived from Question 14 in Section II of the questionnaire.

The know-how content of the related licensing agreements of the company sample is displayed in Table 13-14, which is based upon the data derived from Question 5 in Section III of the questionnaire.

13.6.2 The Hypotheses Tested

The first hypothesis, concerned with codified know-how, was tested by comparing the relative amounts of each of the know-how categories (a) and (b) which were reported to be present in unrelated and related licensing agreements.

The scatterplot which depicts the reported levels of category (a), documented information, in the two types of licensing agreements is shown in Figure 1 of Appendix 13-3. This reveals that the vast majority of the companies (33 out of 44) plotted along the 45° line, indicating that they licensed the same amount of documented information to unrelated companies as they did to related companies. Of the remaining 10 companies, 4 licensed more of this type of know-how to unrelated companies, while 7 licensed more to their related companies.

TABLE 13-13

THE KNOW-HOW CONTENT OF UNRELATED KNOW-HOW LICENSING AGREEMENTS

	Documented Information		Manufacturing Process Equipment		Organizational Back-up		Training of Licensee Personnel	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
Never	1	1.5	12	18.2	10	15.2	1	1.5
Occasionally	5	7.6	23	34.8	29	43.9	13	19.7
Frequently	15	22.7	19	28.8	15	22.7	26	39.4
Always	45	68.2	12	18.2	12	18.2	26	39.4
Total	66	100.0	66	100.0	66	100.0	66	100.0

Question: In what form is the company's know-how generally licensed to unrelated overseas companies?

TABLE 13-14

THE KNOW-HOW CONTENT OF RELATED KNOW-HOW LICENSING AGREEMENTS

	Documented Information		Manufacturing Process Equipment		Organizational Back-up		Training of Licensee Personnel	
	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies	Number of Companies	Per Cent of Companies
Never	0	0.0	5	9.4	6	11.1	1	1.9
Occasionally	5	9.1	18	34.0	12	22.2	6	11.1
Frequently	16	29.1	17	32.1	15	27.8	18	33.3
Always	34	61.8	13	24.5	21	38.9	29	53.7
Total	55	100.0	53	100.0	54	100.0	54	100.0

Question: If the company has know-how licensing agreements with any overseas subsidiaries, please indicate the form in which the company's know-how is generally licensed.

The results of the Wilcoxon test for documented information are given in Table 13-15.

TABLE 13-15

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE EXTENT OF DOCUMENTED INFORMATION
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
7.57	4	- RANKS (RELATED < UNRELATED)
5.00	7	+ RANKS (RELATED > UNRELATED)
	33	TIES
	44	TOTAL

Z = -.1778 2-TAILED P = .85890

A two-tailed test was employed since the alternative hypothesis did not indicate which of the two types of licensing agreement was expected to possess more or less documented information. As the Z score was highly insignificant the alternative hypothesis was rejected. It can therefore be concluded that, as anticipated, there was no difference between unrelated and related licensing agreements in terms of their inclusion of documented information.

The scatterplot depicting the reported levels of the other category of codified know-how, manufacturing process equipment, is shown in Figure 2 of Appendix 13-3. This reveals that a smaller number of companies (27 out of 42) plotted along the 45° line. Of the remaining 15 companies, more reported that a greater proportion of this type of know-how was licensed to related companies (12), than reported the opposite (3).

The results of the Wilcoxon test for manufacturing process equipment are reported in Table 13-16.

TABLE 13-16

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE EXTENT OF MANUFACTURING PROCESS EQUIPMENT
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
7.50	3	- RANKS (RELATED < UNRELATED)
8.13	12	+ RANKS (RELATED > UNRELATED)
	27	TIES
	--	
	42	TOTAL

Z = -2.1299 2-TAILED P = .03320

As the two-tailed significance of the Z-score was significant at the .05 level, the null hypothesis was rejected. It is clear from the above table that related agreements contained more manufacturing process equipment than unrelated agreements. Had this been the original alternative hypothesis, it would have been confirmed by a one-tailed test. It can therefore be concluded that, contrary to expectations, know-how embodied in manufacturing process equipment was more prevalent in intra-firm licensing agreements than in arm's-length licensing agreements.

The results for know-how categories (a) and (b) suggest that companies were more reluctant to license their know-how externally if it was embodied in equipment than if it was embodied in documents. This may have been due to the fact that it is easier for equipment to be used by unauthorised third parties than it is for documents to be used. In this respect the work of Boisot (1986) is relevant, as he has pointed out that the ease with which codified knowledge can be diffused (ie decoded and acted upon) depends, inter alia, upon what he terms its "semantic" characteristics. A semantic problem will arise if the recipient of information does not have the skills to decode and understand it: "putting one's thoughts down on paper may expand one's audience if one expresses them in words, but could shrink if one states them in a mathematical form" (op cit, p139).

Documented know-how is likely to give rise to greater semantic difficulties than know-how that is embodied in equipment. Documented know-how such as formulae and blueprints have to be decoded to allow the information which they contain to be understood and acted upon. The only decoding required for equipment, on the other hand, is a set of operating instructions. Even these may not be required if the equipment is similar to other items that are freely available in the marketplace.

There is thus a greater probability of incurring ex-post opportunism costs when manufacturing process equipment is licensed because of the greater ease with which it can be disseminated. This consideration may therefore have dominated the fact that such equipment embodies highly codified know-how, and made companies less reluctant to license it externally.[6]

Having tested the first hypothesis concerning codified know-how, categories (a) and (b), the second hypothesis was then tested. This was concerned with uncodified know-how, categories (c) and (d), and held that they would be less prevalent in unrelated agreements than they would in related agreements.

Figure 3 in Appendix 13-3 shows the reported levels of organizational back-up in the two categories of licensing agreement. It is apparent from this scatterplot that the number of companies falling below the 45° line (19) is much greater than the number positioned above it (6), indicating that the companies tended to license more organizational back-up to their overseas subsidiaries than they did to unrelated companies. A further 19 companies were positioned on the 45° line, indicating that for them there was no difference in the level of organizational back-up transferred to both categories of licensee.

The results of the Wilcoxon test for organizational back-up are shown in Table 13-17.

TABLE 13-17

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE EXTENT OF ORGANIZATIONAL BACK-UP
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
12.58	6	- RANKS (RELATED < UNRELATED)
13.13	19	+ RANKS (RELATED > UNRELATED)
	19	TIES
	44	TOTAL

Z = -2.3409 1-TAILED P = .00960

A one-tailed test was used in this instance since the alternative hypothesis predicted that unrelated licensees would receive less organizational back-up than related licensees. As the Z score was highly significant, the alternative hypothesis was accepted.

Figure 4 in Appendix 13-3 shows the levels of the other category of uncodified know-how (the training of licensee personnel) that were reported to be present in the two categories of licensing agreement. The pattern is similar to that obtained for organizational back-up insofar as more companies are positioned below the 45° line than above it. The main difference between them is that more companies are positioned on the 45° line for the training of licensee personnel.

The results of the Wilcoxon test for the training of licensee personnel are given in Table 13-18.

TABLE 13-18

WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST
COMPARING THE EXTENT OF TRAINING OF LICENSEE PERSONNEL
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

MEAN RANK	COMPANIES	
9.75	2	- RANKS (RELATED < UNRELATED)
7.73	13	+ RANKS (RELATED > UNRELATED)
	29	TIES
	44	TOTAL

Z = -2.3002 1-TAILED P = .01070

As the one-tailed significance of the Z score was highly significant the alternative hypothesis was accepted, allowing the conclusion to be reached that unrelated licensing agreements contained less organizational back-up than related licensing agreements.

13.7 THE INTERNALLY-TRANSFERRED CONTENT OF UNRELATED KNOW-HOW LICENSING AGREEMENTS

13.7.1 The Hypothesis Explained

The hypothesis is set out below in its alternative and null forms.

H_A: The number of companies will increase along the range of values measuring the extent to which the know-how content of their unrelated licensing agreements had previously been transferred to their overseas subsidiaries.

H_O: The companies will be uniformly distributed across the range of values measuring the extent to which the know-how content of their unrelated licensing agreements had previously been transferred to their overseas subsidiaries.

The idea underlying this hypothesis is that the propensity of MNCs to license know-how to unrelated overseas companies will be positively associated with the extent to which the know-how has already been transferred to their overseas subsidiaries. Davidson and McFetridge (1984; 1985) have produced evidence in support of the view that arm's-length international technology transfers are more likely to be favoured over intra-firm transactions the greater the number of prior transfers of the technology in question. The hypothesis tested in this study is more specific in that it focuses on the extent to which prior know-how transfers have occurred with overseas subsidiaries.

The hypothesis is based upon the premise that know-how which has been transferred within a MNC can then be licensed more easily to unrelated overseas companies because its important parameters and its performance in different situations will have become apparent [Teece (1981b, p87)]. The need for team organization to support the transfer will therefore be reduced.

In addition, the ex-ante transaction costs arising from the problems of recognition and disclosure will be lower for this type of know-how. Because it has already been licensed internally, the MNC will have assessed its marketability, and will also be able to disclose its value to potential unrelated licensees by indicating the impact which the know-how has made on its own operations without disclosing its exact nature.

13.7.2 The Hypothesis Tested

The research design for this hypothesis was a "one group design", in which the group consisted of companies that were involved in know-how licensing to unrelated overseas firms.

For each company in the group, a single observation was made on one variable: the proportion of know-how licensed to unrelated companies that had already been transferred to the company's own overseas subsidiaries. The data was obtained from Question 13(c) in Section II of the questionnaire, and is displayed in Table 13-19.

Inspection of Table 13-19 reveals that 65.6 per cent of companies reported that at least 'some' of the know-how which they licensed to unrelated companies had previously been transferred to their overseas subsidiaries. The question which arises is whether or not this is a sufficient number to accept the general proposition that internal licensing of know-how increased the probability of the know-how subsequently being licensed externally. Should, for example, the fact that the remaining 34.4 per cent of companies ticked the 'none' category be taken as sufficient justification for refuting the general proposition?

TABLE 13-19

THE INTERNALLY-TRANSFERRED CONTENT OF UNRELATED KNOW-HOW LICENSING AGREEMENTS

	Number of Companies	Per Cent of Companies
None	21	34.4
Some	14	23.0
About Half	5	8.2
Most	11	18.0
All/Virtually All	10	16.4
Total	61	100.0

Question: Please estimate the proportion of know-how licensed to unrelated overseas companies which had previously been transferred to the company's overseas subsidiaries.

Defining an appropriate criterion for making a judgement was necessarily a somewhat arbitrary exercise, given the available data. Nevertheless, it was decided to frame the hypothesis on the supposition that the data would be skewed towards the right-end of the five point scale if there was enough evidence to support the general proposition.

The hypothesis was tested using the Kolmogorov-Smirnov one-sample test (referred to hereafter the KS test). As this test is suitable for ordinal-level data it was chosen in preference to the less powerful chi square one-sample test, which is only appropriate for nominal-level data.

The KS test compares the goodness of fit of an observed cumulative frequency distribution, $S_N(X)$, with a specified cumulative frequency distribution, $F_O(X)$ [see Siegel (1956, pp47-52)]. The distribution chosen to test the hypothesis was the uniform distribution, which assumes an equal spread of observations across the range of possible values. This distribution represents what would be expected under H_O. The KS test statistic, D, is calculated by taking the value of the largest absolute deviation between the specified and observed distributions, as follows:

$$D = \max |F_O(X) - S_N(X)|$$

The data used to calculate the KS test statistic are shown in Table 13-20.[7] The first row, f, contains the frequency count of companies which selected each of the values on the five-point scale. The second row contains the cumulative proportions expected at each point on the scale under the assumption that the companies were uniformly distributed across the five values. The third row contains the cumulative number of companies at each point on the scale, divided by the total number of companies (61) to give cumulative proportions. The bottom row reports the deviation of each sample value, $S_N(X)$, from its paired expected value, $F_O(X)$.

TABLE 13-20

ACTUAL AND HYPOTHETICAL DISTRIBUTIONS OF COMPANIES ACROSS THE SCALE MEASURING THE PROPORTION OF INTERNALLY-TRANSFERRED KNOW-HOW PRESENT IN UNRELATED LICENSING AGREEMENTS

	None	Some	About Half	Most	All/Virt. All
	1	2	3	4	5
f	21	14	5	11	10
$F_O(X)$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
$S_N(X)$	$\frac{21}{61}$	$\frac{35}{61}$	$\frac{40}{61}$	$\frac{51}{61}$	$\frac{61}{61}$
$F_O(X) - S_N(X)$	-0.144	-0.174	-0.056	-0.036	0.000

Since the alternative hypothesis being tested was that the proportion of companies selecting each category would increase as we moved along the range of possible values from 1 to 5, this implied that the the observed cumulative frequency distribution would everywhere lie below the hypothetical cumulative frequency distribution. In order for the alternative hypothesis to be accepted, therefore, the value of the greatest deviation between the two distributions needed to have a positive sign, in addition to being higher than the appropriate critical value [see Sprent (1981, p197)].

The alternative hypothesis was therefore rejected as the differences between the two distributions were all negative. This was in spite of the fact that the largest of the absolute differences, 0.174, was greater than critical value of D for a one-tailed test at the .05 level [ie greater than 0.154; see Miller (1956)]. Thus, had the alternative hypothesis been that the proportion of companies selecting each category would decrease as we moved along the range of possible values from 1 to 5, this would have been accepted.

It can therefore be concluded that, although a number of companies did indicate that varying proportions of the know-how content of their unrelated licensing agreements had previously been transferred to their overseas subsidiaries, there was no clear-cut evidence to support the general proposition that know-how was more likely to be licensed to external parties if it had already been licensed internally.

13.8 CONCLUSIONS

This chapter has described the logic behind, and the testing of, a number of hypotheses derived from the transaction cost literature on the MNC. The results of the tests which were concerned with the relative intellectual property content of unrelated and related licensing agreements are summarized in Table 13-21.

The hypothesis concerning the total know-how content of patent licensing agreements was confirmed, although the individual results for the two categories of 'patent-specific' and 'broad' know-how suggested that the result was attributable to the latter category rather than the former. The hypothesis relating to the trademark content of patent licensing agreements was also confirmed.

The hypothesis concerning the patentable content of know-how licensing agreements was not confirmed, which calls into question the argument that companies would be less inclined to license this type of know-how externally in view of the potentially heavy costs which could result from its leakage. It is of interest to note that the hypothesis concerning the 'patent-specific' know-how content of patent licensing agreements was also rejected. It may therefore be that the association of know-how with patents was the common characteristic in both cases which caused the rejection of these hypotheses.

TABLE 13-21

SUMMARY OF HYPOTHESIS TEST RESULTS CONCERNING THE INTELLECTUAL PROPERTY CONTENT OF UNRELATED AND RELATED LICENSING AGREEMENTS

HYPOTHESIS	SIGNIFICANCE OF TEST STATISTIC	DECISION
PATENT LICENSING AGREEMENTS		
Unrelated agreements contain less patent-specific know-how than related agreements	.10485	Reject
Unrelated agreements contain less broad know-how than related agreements	.00055	Accept
Unrelated agreements contain less total know-how than related agreements	.00400	Accept
Unrelated agreements contain fewer trademarks than related agreements	.00026	Accept
KNOW-HOW LICENSING AGREEMENTS		
Unrelated agreements contain less patentable know-how than related agreements	.08365	Reject
Unrelated agreements contain the same level of non-proprietary know-how as related agreements	.61920	Accept
Unrelated agreements contain the same amount of codified know-how as related agreements:		
(a) documented information	.85890	Accept
(b) manufacturing process equipment	.03320	Reject
Unrelated agreements contain less uncodified know-how than related agreements:		
(c) organizational back-up	.00960	Accept
(d) training of licensee personnel	.01070	Accept

The hypothesis that know-how of a non-proprietary nature would be as common in unrelated agreements as in related agreements was confirmed. So too was the hypothesis that the same amount of codified know-how would be found in both unrelated and related agreements, but only in the case of documented information. For the other category of codified know-how, manufacturing process equipment, it was found that related agreements possessed a significantly greater amount of manufacturing process equipment than unrelated agreements.

A possible explanation for this finding may lie in the fact that, although the licensing of both categories of know-how does not neceassarily require team organization, know-how embodied in equipment is easier to decode than know-how embodied in documents and is therefore at a greater risk of being leaked to third parties. The hypothesis that unrelated agreements would contain less codified know-how than related agreements was confirmed for both types of know-how tested, ie organizational back-up and the training of licensee personnel.

The final hypothesis was concerned with unrelated know-how licensing agreements, the argument being that MNCs would be more likely to license their know-how to unrelated companies if it had already been licensed internally (ie to overseas subsidiaries). Although a number of MNCs did report that the know-how which they licensed to unrelated companies had, to varying degrees, been previously transferred to overseas subsidiaries, there was not sufficient evidence to suggest that these instances had not occurred by chance and so the hypothesis was rejected.

In conclusion, the results reported here, although not overwhelming, lend some support to the arguments of the transaction cost school of thought. It must be borne in mind, however, that the hypotheses are only indirect tests of transaction cost theory in that they are not based on direct measurements of the basic building blocks of the theory, such as licensee opportunism, information impactedness, etc. The hypotheses have sought to predict the extent to which different types of intellectual property would be present in arm's-length and intra-firm licensing agreements on the basis of the problems involved in trading these intangible assets between independent concerns, and the consequent transaction costs which these problems were likely to generate. As a result of this indirect approach, there may be some grounds for questioning the internal validity of the hypotheses.

Nevertheless, as noted earlier in Chapter Seven, the transaction cost model has proved difficult to test directly because of the inherent difficulty in operationalizing its underlying concepts. The approach adopted here of generating from these concepts testable propositions that are related to variables which can be directly measured is consistent with the approach adopted by other empirical studies based on the same literature, eg Rugman (1981).

Some more direct evidence relating to the transaction cost explanation of international licensing activity was, however, obtained from Question 11 in Section II of the questionnaire. This question was aimed at those companies which possessed know-how that could have been of use to other companies, but which nevertheless did not have any unrelated know-how licensing agreements.

Fourteen companies fell into this category. Of these, one of the companies answered that it had no unrelated licensing agreements because it had never considered the possibility of licensing its know-how. In transaction cost terminology, a condition of "bounded rationality" might be purported to explain this company's lack of licensing involvement. The remaining thirteen companies were asked to indicate if any one or more of five stated reasons explained their company's decision not to license their know-how. The responses are shown in Table 13-22.

TABLE 13-22

REASONS FOR KNOW-HOW NOT BEING LICENSED

	Number of Companies
The risk of losing a competitive advantage.	7
The cost of policing the licence.	5
The difficulty of communicating the value of know-how to potential buyers without revealing its exact nature.	4
The need to transfer scarce company personnel to make the know-how effective.	3
The absence of suitable licensee firms.	2

Question: Please indicate if any of the following reasons explain the company's decision not to license its know-how.

The most popular explanation for know-how not being licensed was the risk of losing a competitive advantage, which was chosen by seven out of the thirteen companies. The cost of policing the licence, defined in the questionnaire as the cost of "ensuring that the licensee adheres to its contractual obligations", was the second most popular explanation, with five companies selecting it. The explanation which ranked third in popularity was "the difficulty of communicating the value of know-how to potential buyers without revealing its exact nature". This explanation, a description of the problem of information impactedness, was chosen by four of the companies.

The next most popular explanation, with three companies choosing it, was "the need to transfer scarce company personnel to make the know-how effective". This explanation is essentially a description of the problem of team organization. The least popular explanation, chosen by only two of the companies, was the absence of suitable licensee firms.

Although the responses in Table 13-22 demonstrate that a number of the companies associated themselves with explanations consistent with some of the concepts underlying transaction cost theory, this cannot be regarded as providing evidence in support of those concepts in view of the very small number of companies which answered the question.[8] In addition, the question was only directed at those companies which completed the questionnaire, and which therefore had some form of licensing activity. Had the sample been widened to include those companies which possessed know-how but which had no licensing activity at all, a different set of rankings may have emerged from those shown in Table 13-22.

CHAPTER THIRTEEN

NOTES

1. Williamson's problem of "information impactedness" may still arise in the market for pure patents, despite the absence of information asymmetry, if "one agent makes representations that the true state of the world is different than both parties know it to be and if, in addition, it is costly for an outside arbiter to determine what the true state of the world is." (1975, p32).

2. Buckley and Casson (1976) also highlighted the "recognition" problem as an impediment to market contracting in knowledge via their discussion of the concept of "buyer uncertainty".

3. The $SPSS^X$ package only calculates two-tailed probabilities for the Wilcoxon test, so the one-tailed probability was found by dividing the two-tailed probability by two.

4. Casson (1982, p26) pointed out that quality control also involves the metering of quantity and the timing of supply, although these were described as being of "secondary interest".

5. Companies may also be indifferent between internal and external markets if they believe that new technological developments are likely to leak out in any case, in spite of the particular transfer mode adopted. Mansfield's (1985) opinion survey of 100 US companies found that just over one third of them believed that information concerning their new products would be known to competitors within six months (op cit, pp 220-221). Information about new processes (with the exception of chemical processes) was believed to leak out more slowly, but to still be known to the majority of their rivals within about 12-18 months. This leakage was attributed to the movement of personnel between companies and the voluntary exchange of scientific information at professional meetings and conferences.

6. The fact that the hypothesis concerning manufacturing process equipment was rejected may explain why the 'codifiability of know-how' variable in one of the multiple regression models in Chapter Twelve (dependent variable, KHLSI) had a negative sign, contrary to expectations - ie the variable may have been mis-specified.

7. The KS test statistic was calculated by hand since $SPSS^X$ calculates D on the assumption that the hypothetical $F_O(X)$ distribution is continuous. This was an inappropriate assumption since the data was discrete in nature.

8. None of the thirteen companies selected the "other" category in Question 12, while three of them chose not to select any of the five explanations which were given. Four of the companies selected more than one explanation; when asked to indicate which of these had the most influence, two of them indicated "the risk of losing a competitive advantage", while a third chose "the need to transfer scarce company personnel to make the know-how effective". The fourth company did not discriminate between the choices it had made.

REFERENCES

BOISOT, M. 'Markets and Hierarchies in a Cultural Perspective', Organization Studies, Vol 7, No 2, 1986, pp 135-158.

BUCKLEY, P.J. & CASSON, M.C., The Future of the Multinational Enterprise, London: Macmillan, 1976.

CASSON, M.C., 'Transaction Costs and the Theory of the Multinational Enterprise', in Rugman, A.M. (ed.), New Theories of the Multinational Enterprise, London: Croom Helm, 1982.

COHEN, L. & HOLLIDAY, M., Statistics for Social Scientists, London: Harper & Row, 1982.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'International Technology Transactions and the Theory of the Firm', The Journal of Industrial Economics, Vol 32, No 3, March 1984, pp 253-264.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'Key Characteristics in the Choice of International Technology Transfer Mode', Journal of International Business Studies, Vol 16, No 2, Summer 1985, pp 5-21.

GALBRAITH, C.S. & KAY, N.M., 'Towards a Theory of Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 3-19.

HILL, C.W. & CHAN KIM, W., 'Searching for a Dynamic Theory of the Multinational Enterprise: A Transaction Cost Model', Strategic Management Journal, Vol 9, 1988, pp 93-104.

LOWE, J. & CRAWFORD, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon, 1984.

MANSFIELD, E. & ROMEO, A., 'Technology Transfer To Overseas Subsidiaries By US-Based Firms', Quarterly Journal of Economics, Vol 95, December 1980, pp 737-750.

MANSFIELD, E., 'How Rapidly does New Industrial Technology Leak Out?', The Journal of Industrial Economics, Vol 34, No 2, 1985, pp 217-223.

MILLER, L.H., 'Table of Percentage Points of Kolmogorov Statistics', Journal of the American Statistical Association, Vol 51, 1956, pp 111-121.

PARRY, T.G., 'Internalization as a General Theory of Foreign Direct Investment: A Critique', Weltwirtschaftliches Archiv, Vol 121, No 3, 1985, pp 564-569.

RUGMAN, A.M., 'A Test of Internalization Theory', Managerial and Decision Economics, Vol 2, No 4, 1981, pp 211-219.

SIEGEL, S., Nonparametric Statistics for the Behavioural Sciences, New York: McGraw-Hill, 1956.

SPRENT, P., Quick Statistics: An Introduction to Non-parametric Methods, Harmondsworth, Middlesex: Pengiun, 1981.

TEECE, D.J., 'Economies of Scope and the Scope of the Enterprise', Journal of Economic Behaviour and Organization, Vol 1, September 1980: pp 223-248.

TEECE, D.J., 'The Multinational Enterprise: Market Failure and Market Power Considerations', Sloan Management Review, Vol 22, Spring 1981a, pp 3-17.

TEECE, D.J., 'The Market For Know-How and the Efficient International Transfer of Technology', The Annals of the American Academy of Political and Social Sciences, Vol 458, November 1981b, pp 81-96.

TEECE, D.J., 'Technology Transfer And R&D Activities of Multinational Firms: Some Theory and Evidence', in Hawkins, R.G. & Prasad, A.J. (eds), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981c, pp 39-74.

TEECE, D.J., 'Towards An Economic Theory of the Multiproduct Firm', Journal of Economic Behaviour and Organization, Vol 3, 1982a, pp 39-63.

TEECE, D.J., 'A Transactions Cost Theory of the Multinational Enterprise', University of Reading Discussion Paper in International Investment and Business Studies, No. 66, September 1982b.

TEECE, D.J. 'Technological and Organizational Factors in the Theory of the Multinational Enterprise', in Casson, M.C. (ed), The Growth of International Business, London: George Allen & Unwin, 1983, pp 51-62.

TEECE, D.J., 'Transactions Cost Economics and the Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 21-45.

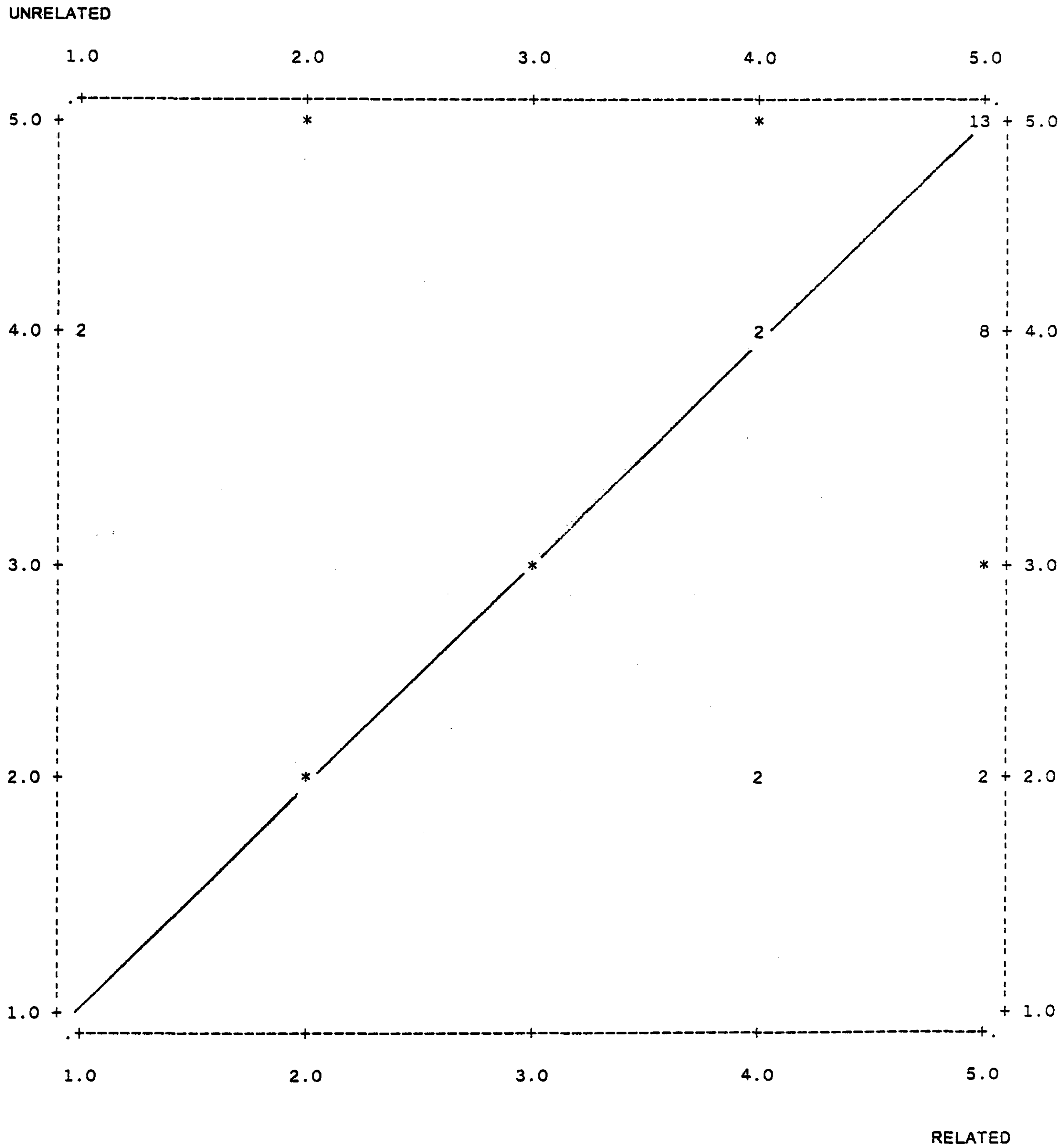
WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: The Free Press, 1975.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

APPENDIX 13.1 SCATTERPLOTS OF THE INTELLECTUAL PROPERTY CONTENT OF UNRELATED & RELATED PATENT LICENSING AGREEMENTS

FIGURE 1

SCATTERPLOT OF THE PATENT-SPECIFIC KNOW-HOW CONTENT
OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

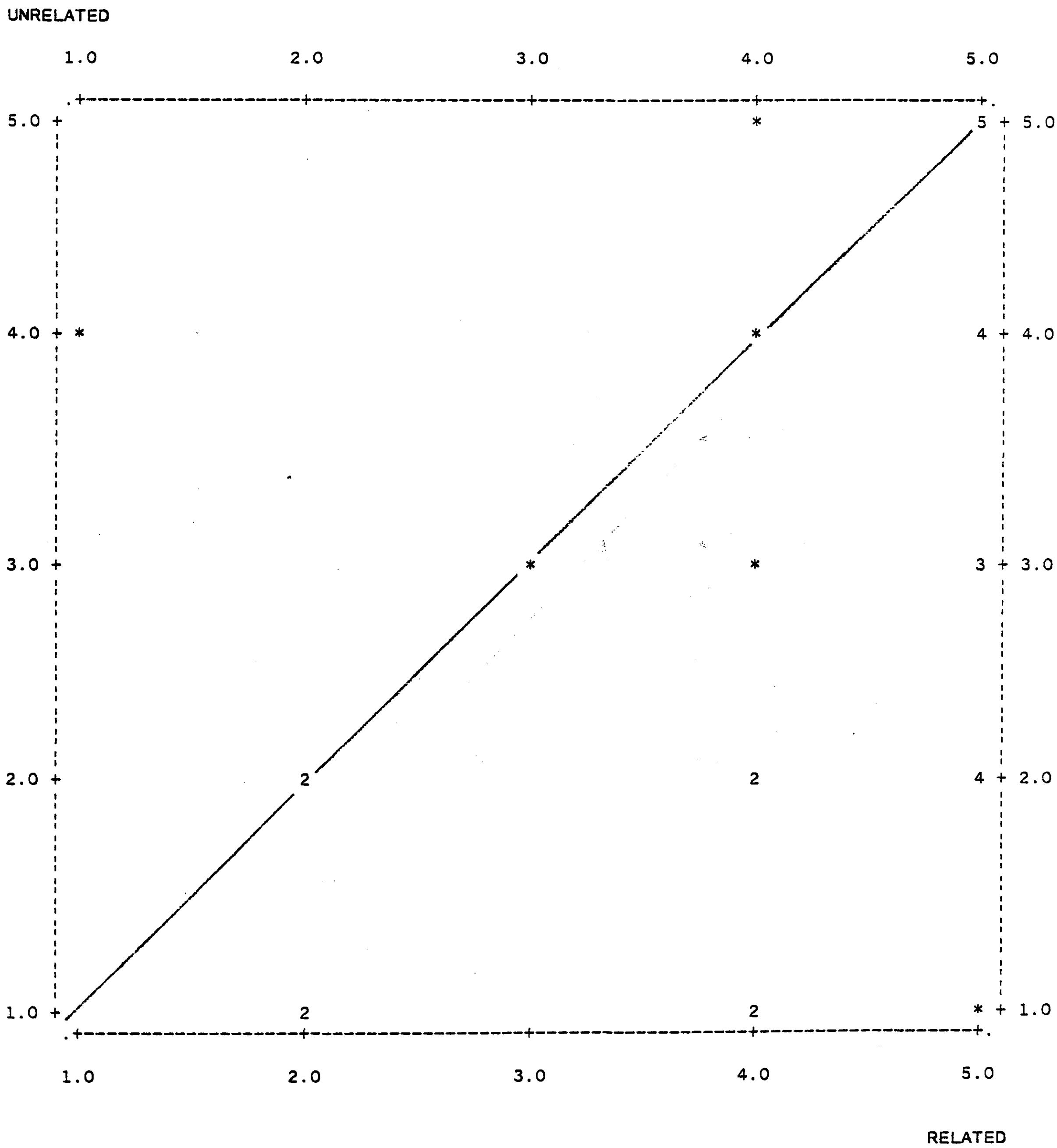


DOWN: UNRELATED Patent-specific know-how content of unrelated patent licensing agreements

ACROSS: RELATED Patent-specific know-how content of related patent licensing agreements

FIGURE 2

SCATTERPLOT OF THE BROAD KNOW-HOW CONTENT
OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

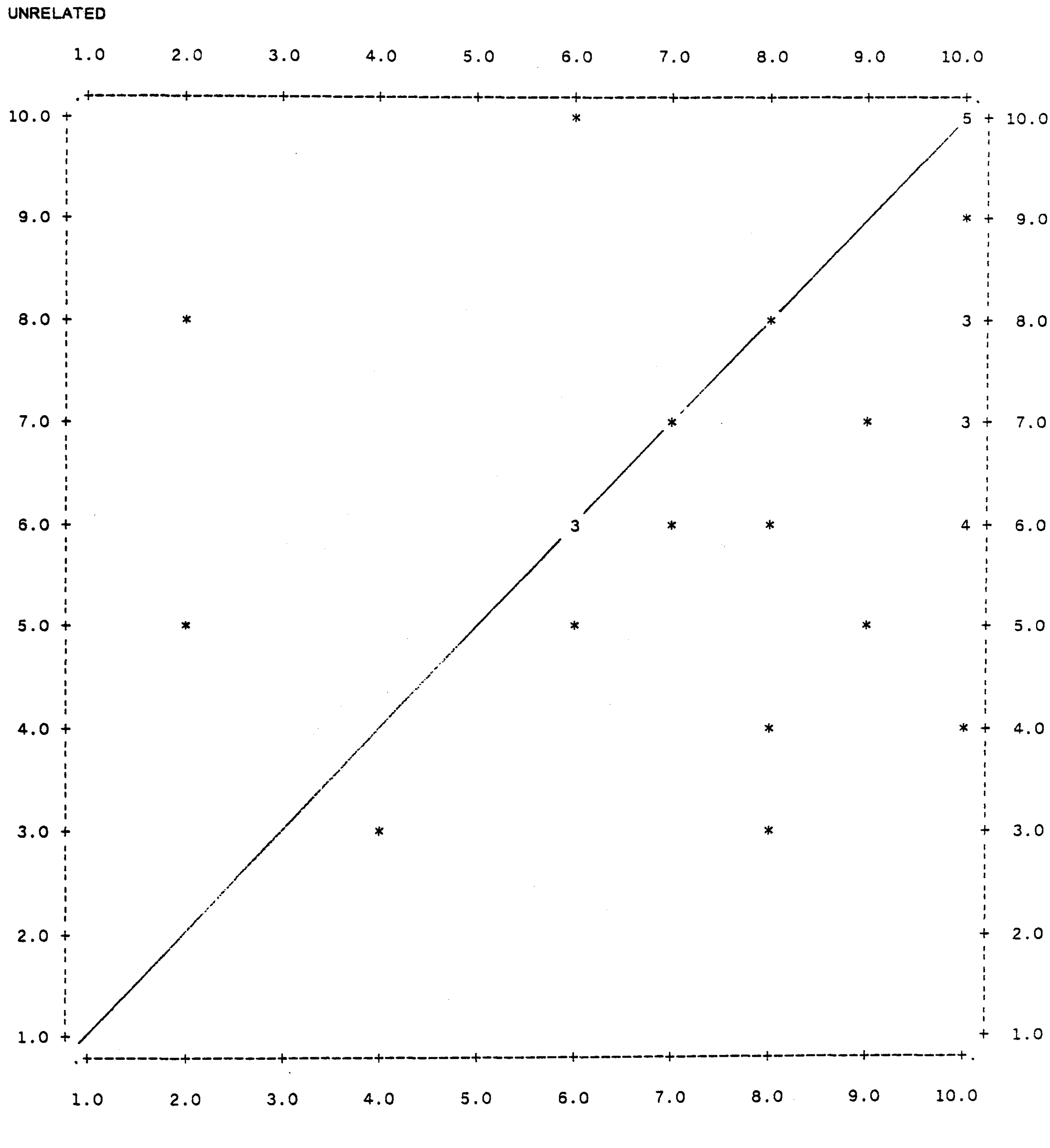


DOWN: UNRELATED Broad know-how content of unrelated patent licensing agreements

ACROSS: RELATED Broad know-how content of related patent licensing agreements

FIGURE 3

SCATTERPLOT OF THE TOTAL KNOW-HOW CONTENT
OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS

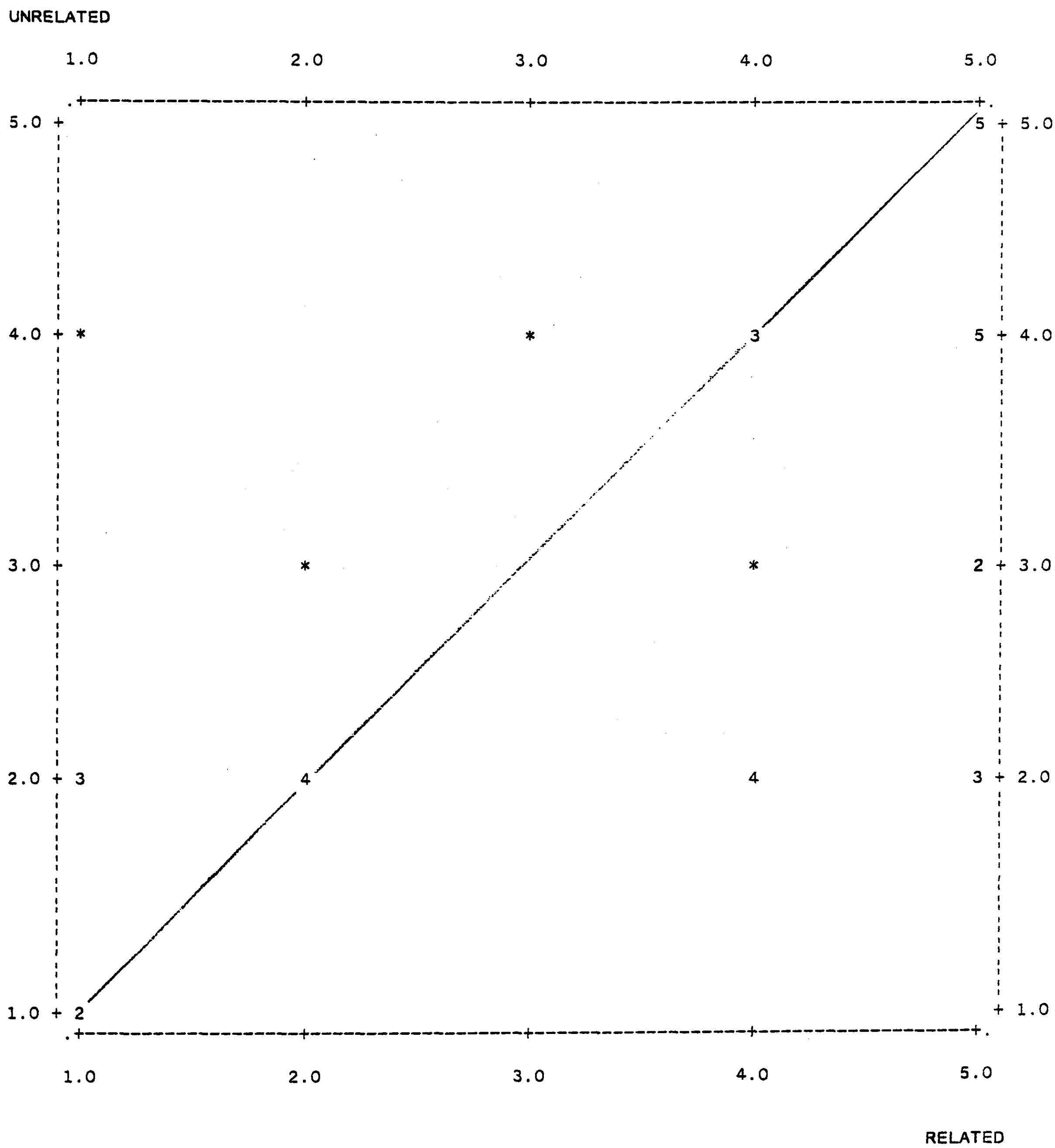


DOWN: UNRELATED Total know-how content of unrelated patent licensing agreements

ACROSS: RELATED Total know-how content of related patent licensing agreements

FIGURE 4

SCATTERPLOT OF THE TRADEMARK CONTENT
OF UNRELATED AND RELATED PATENT LICENSING AGREEMENTS



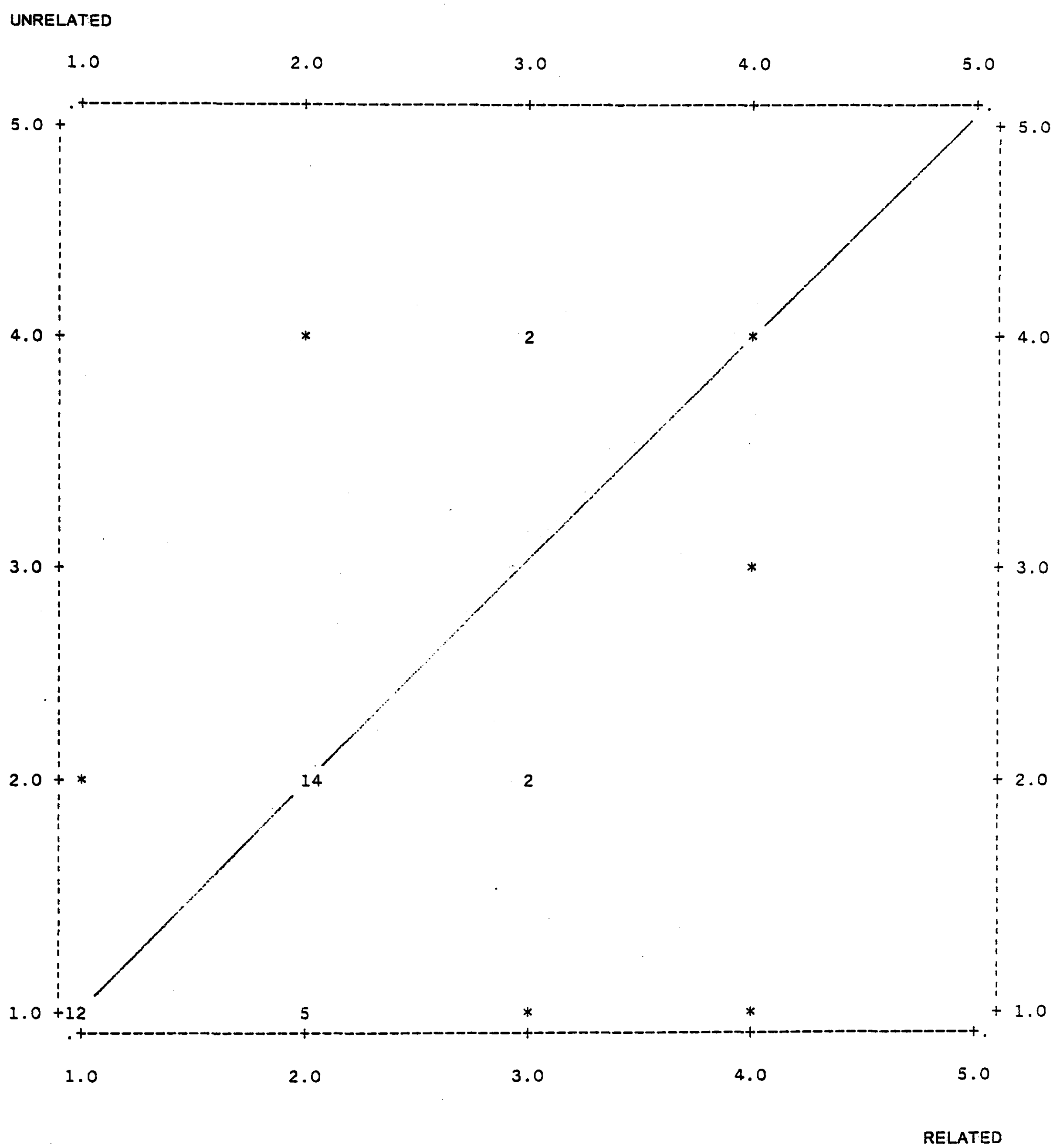
DOWN: UNRELATED Trademark content of unrelated patent licensing agreements

ACROSS: RELATED Trademark content of related patent licensing agreements

APPENDIX 13.2 SCATTERPLOTS OF THE INTELLECTUAL PROPERTY CONTENT OF UNRELATED & RELATED KNOW-HOW LICENSING AGREEMENTS

FIGURE 1

SCATTERPLOT OF THE PATENTABLE CONTENT
OF UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

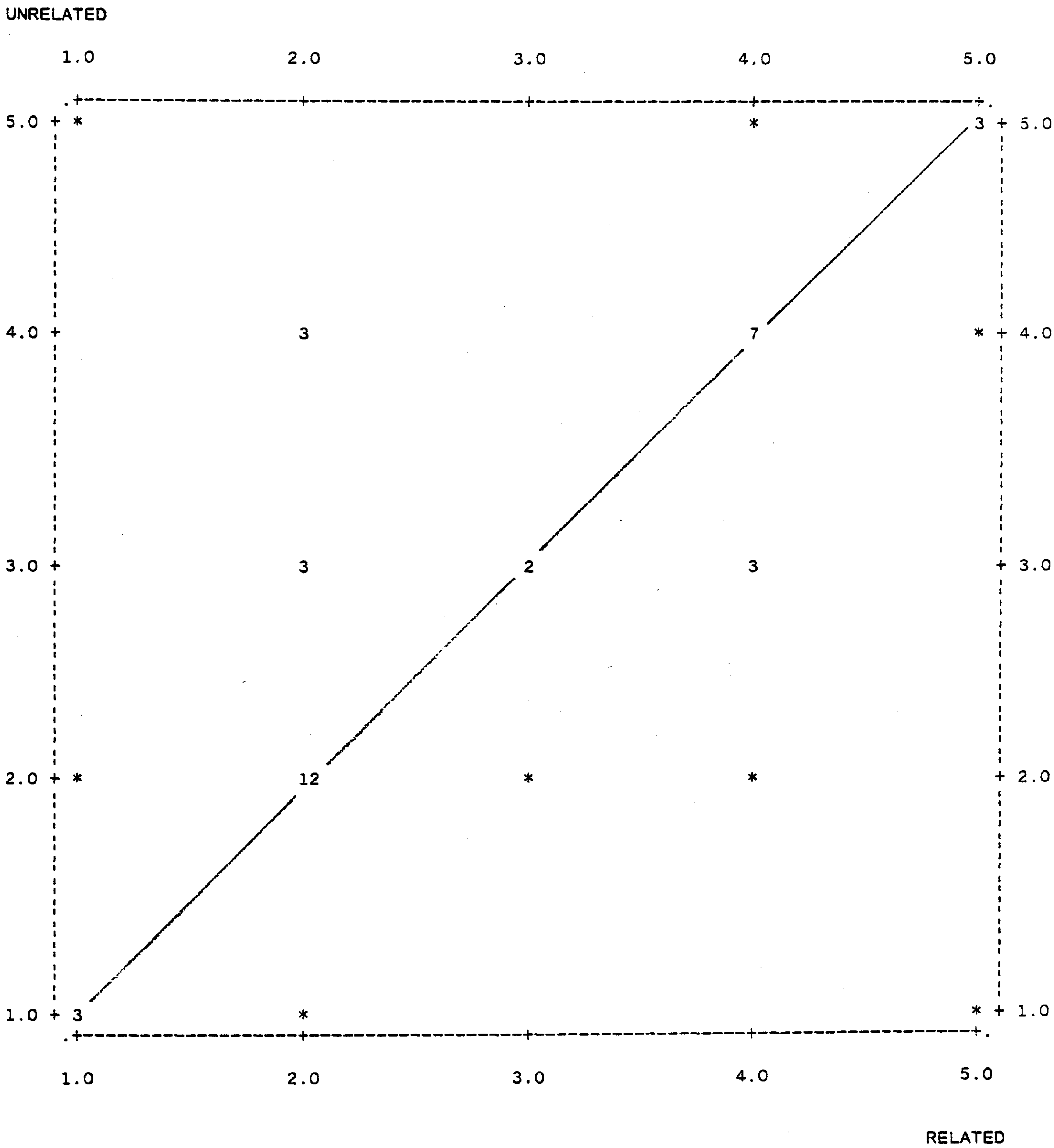


DOWN: UNRELATED Patentable content of unrelated know-how licensing agreements

ACROSS: RELATED Patentable content of related know-how licensing agreements

FIGURE 2

SCATTERPLOT OF THE NON-PROPRIETARY CONTENT
OF UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS



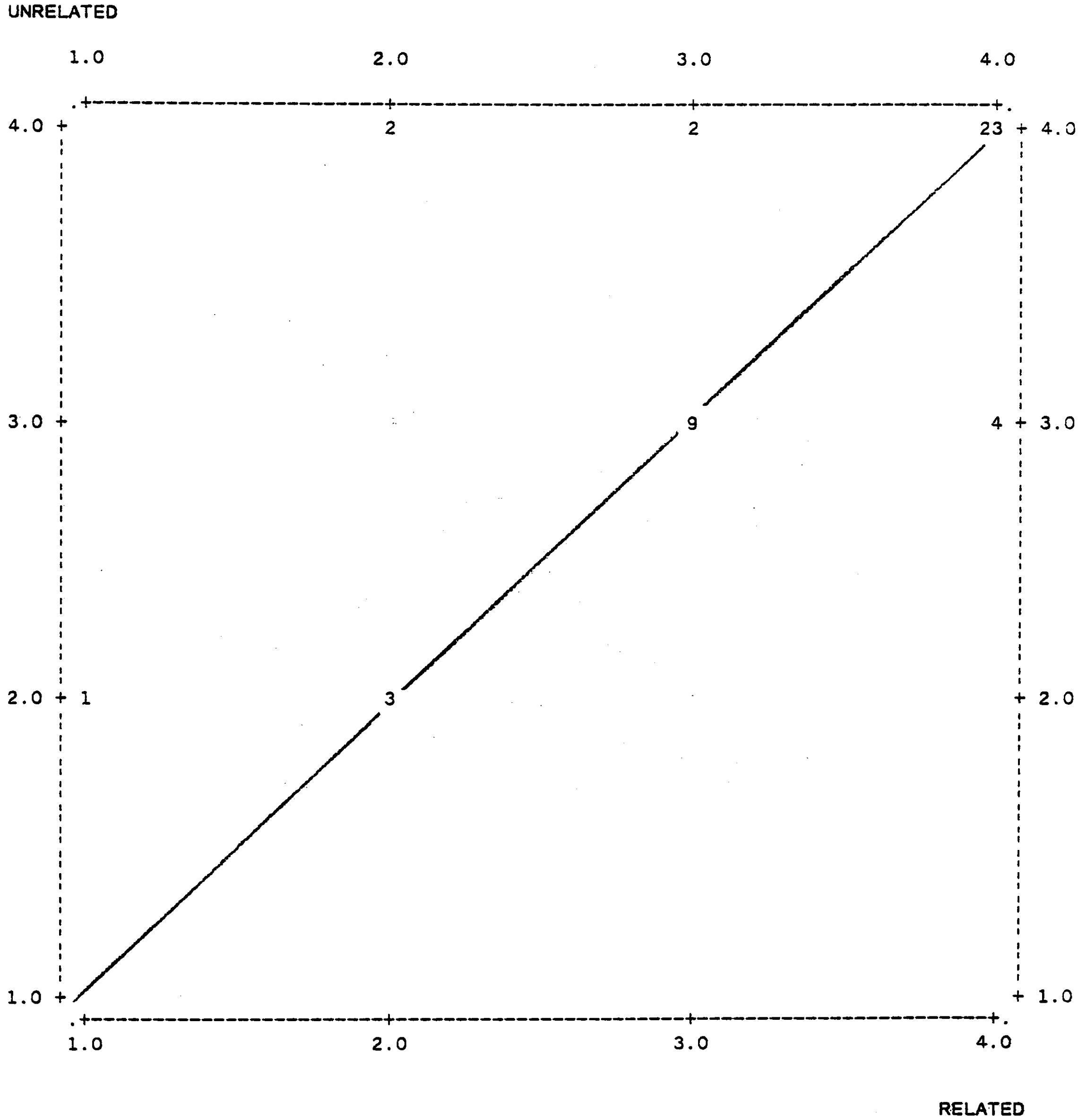
DOWN: UNRELATED Non-proprietary content of unrelated know-how licensing agreements

ACROSS: RELATED Non-proprietary content of related know-how licensing agreements

APPENDIX 13.3 SCATTERPLOTS OF THE CODIFIED CONTENT OF UNRELATED & RELATED KNOW-HOW LICENSING AGREEMENTS

FIGURE 1

SCATTERPLOT OF THE EXTENT OF DOCUMENTED INFORMATION
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

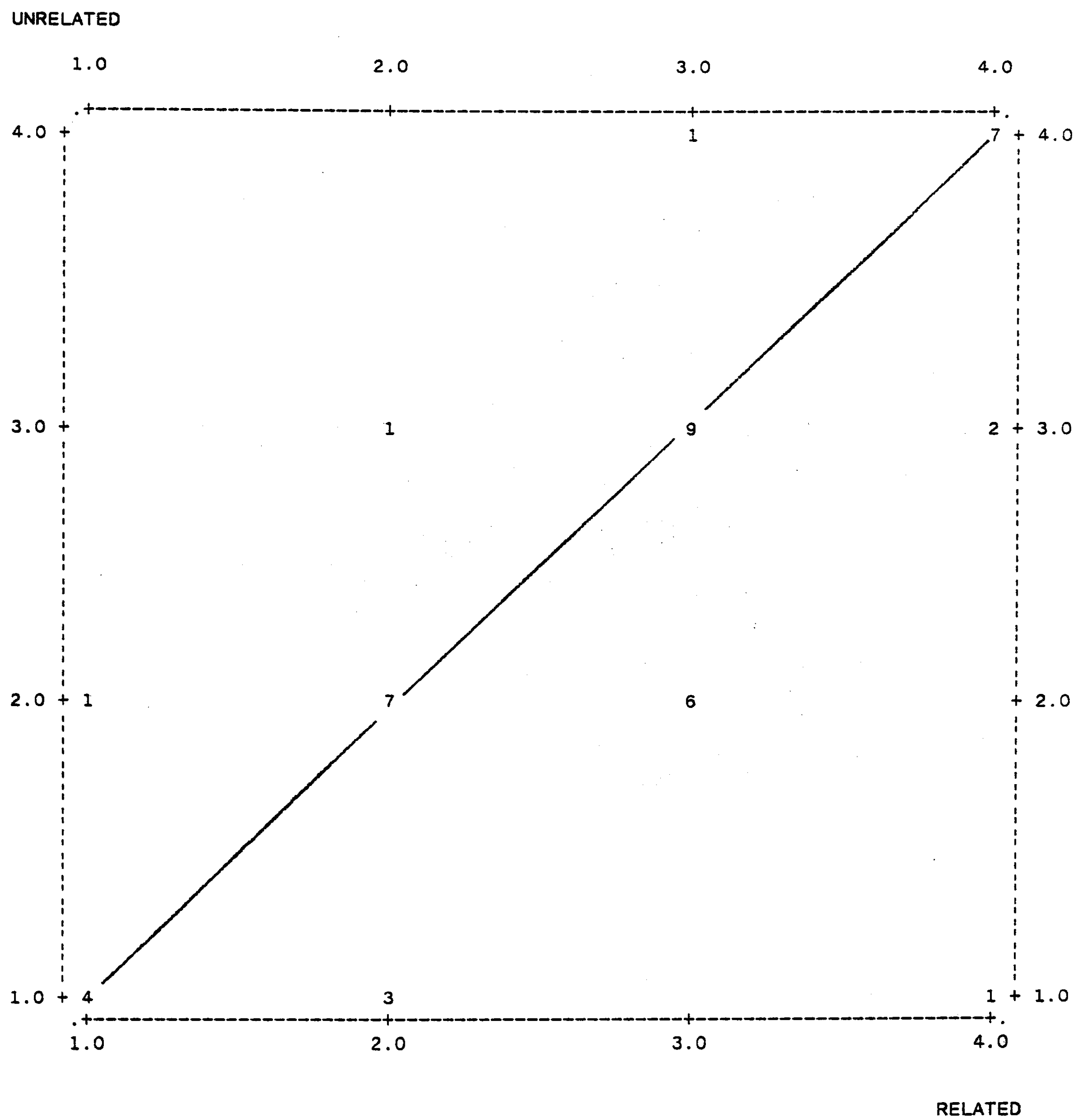


DOWN: UNRELATED Extent of documented information in unrelated know-how licensing agreements

ACROSS: RELATED Extent of documented information in related know-how licensing agreements

FIGURE 2

SCATTERPLOT OF THE EXTENT OF MANUFACTURING PROCESS EQUIPMENT
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

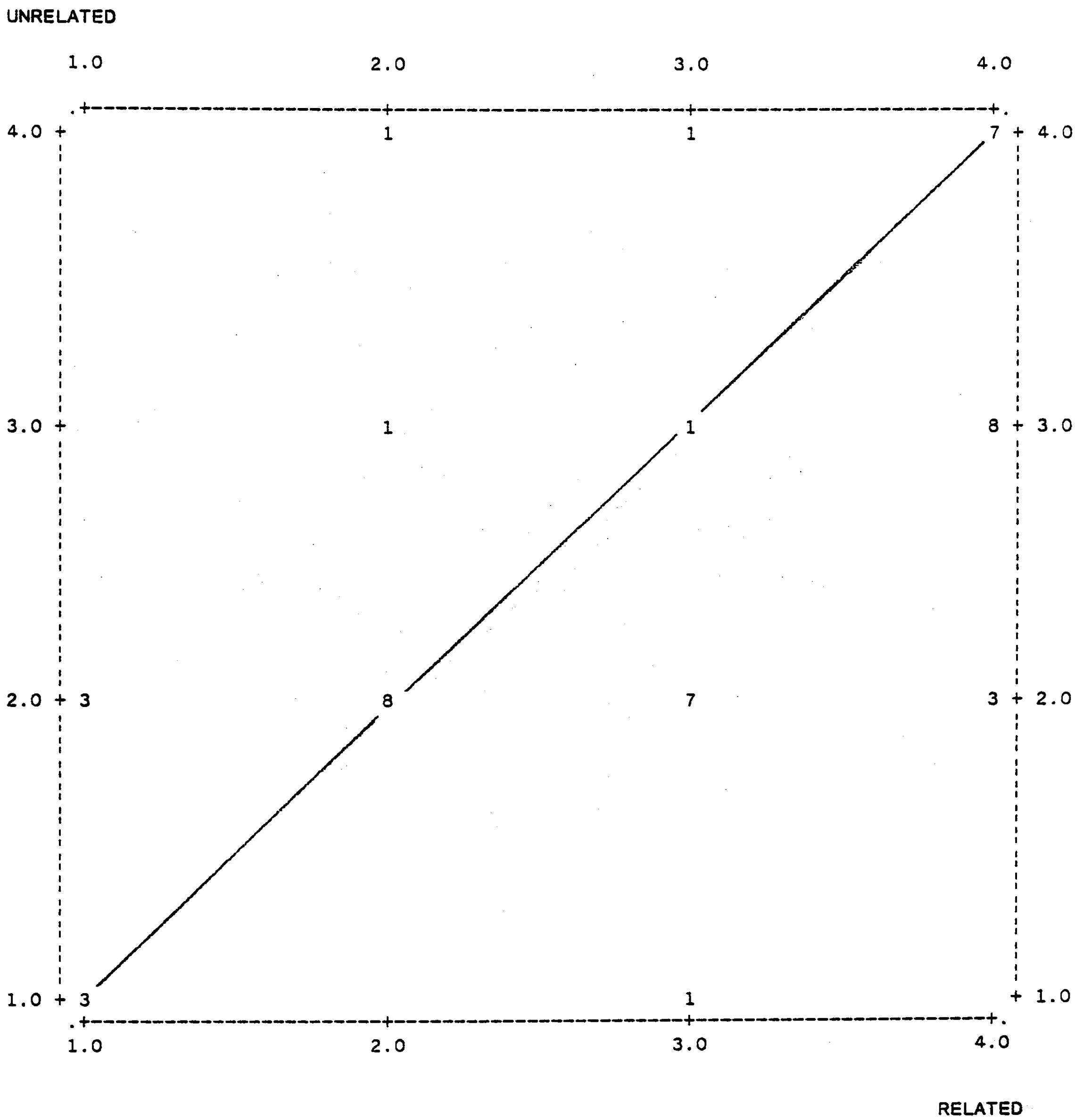


DOWN: UNRELATED Extent of manufacturing process equipment in unrelated know-how licensing agreements

ACROSS: RELATED Extent of manufacturing process equipment in related know-how licensing agreements

FIGURE 3

SCATTERPLOT OF THE EXTENT OF ORGANIZATIONAL BACK-UP
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS

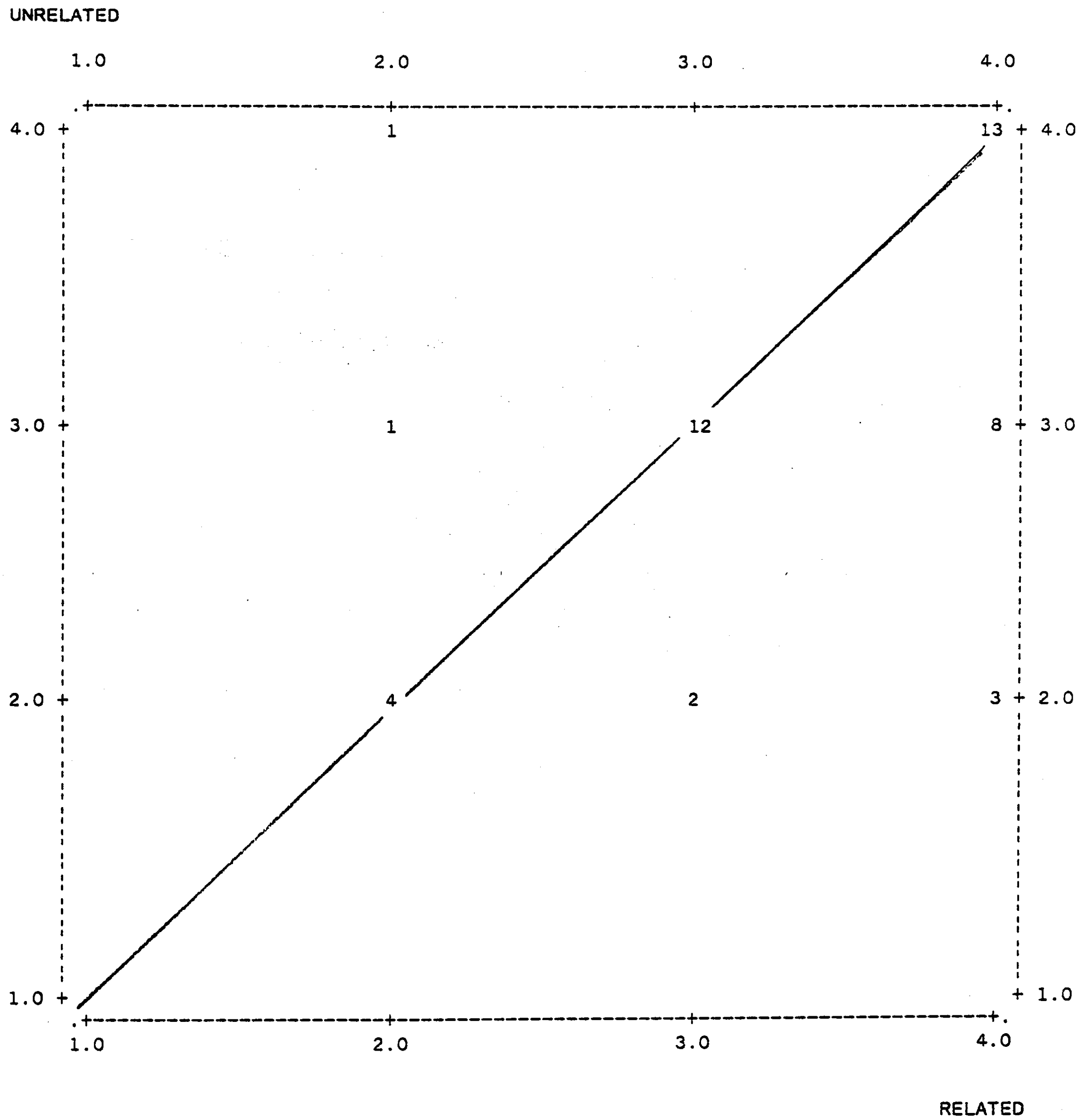


DOWN: UNRELATED Extent of organizational back-up in unrelated know-how licensing agreements

ACROSS: RELATED Extent of organizational back-up in related know-how licensing agreements

FIGURE 4

SCATTERPLOT OF THE EXTENT OF TRAINING OF LICENSEE PERSONNEL
IN UNRELATED AND RELATED KNOW-HOW LICENSING AGREEMENTS



DOWN: UNRELATED Extent of training of licensee personnel in unrelated know-how licensing agreements

ACROSS: RELATED Extent of training of licensee personnel in related know-how licensing agreements

CHAPTER FOURTEEN - SUMMARY AND CONCLUSIONS

CHAPTER FOURTEEN - SUMMARY AND CONCLUSIONS

14.1 INTRODUCTION

This thesis has attempted to describe the characteristics of UK-based MNCs that are involved in international technology licensing and to explain the incidence of such licensing. It has also attempted to explain the breakdown of the intellectual property characteristics of unrelated and related licensing agreements based upon the tenets of transaction cost theory.

The main findings of the research are described in Section 2 of this chapter, and their implications are discussed in Section 3. The penultimate section of the chapter draws attention to the limitations of the research, while the final section proposes some directions for future research.

14.2 SUMMARY OF MAIN FINDINGS

Prior to the analysis of the questionnaire data, government statistics on FDI, exports and royalties for the years from 1964 to 1984 were analysed in order to discover the overall pattern of the UK's international business activities and any trends in this pattern over the period studied. The analysis, presented in Chapter Nine, revealed that non-equity international business in general grew steadily over the period. The foreign sales of UK companies arising from licensing were always lower than those arising from exports or from FDI, but were still deemed to be material enough to merit serious consideration.

It was found that the level of foreign sales from licensing, exports and FDI varied widely across industrial sectors and geographical markets, suggesting that industry and market-specific factors affected the form of market-servicing. The Spearman correlations between FDI sales and exports, when disaggregated by industry and geographical market, were found to be statistically significant and have high negative values, suggesting that these two forms of market-servicing are substitutes for one another. No such claim could be made about licensing and the other two forms of market-servicing as the relevant correlations were found to be low and not statistically significant.

Having ascertained the broad nature of the international business activities of UK companies, the next stage in the analysis involved a description of the general characteristics of the sample of UK MNCs that responded to the questionnaire survey.

As reported in Chapter Ten, the respondents were found to be generally large in size and to operate in a wide range of industries. They indicated that they used licensing more frequently in NICs and LDCs (where it was ranked second to exporting) than they did in DCs (where it was ranked third behind exporting and direct investment). No change in this ordering was anticipated over the ensuing decade.

Most of the companies possessed both unrelated and related licensing agreements, although the former were more numerous. Know-how licensing was more prevalent than patent licensing, with the majority of companies possessing both types of agreement.

The unrelated patent licensing agreements possessed by the companies consisted almost entirely of 'voluntary' licences, and these were fairly evenly spread between 'sole', 'exclusive' and 'non-exclusive' licences. The companies therefore entered into unrelated patent licensing agreements of their own accord but differed in terms of the freedom which they gave licensees to compete against themselves.

Although the companies possessed more unrelated know-how licensing agreements than they did unrelated patent licensing agreements, the former appeared to generate less income than the latter. The related licensing agreements possessed by the companies appeared to earn less than unrelated agreements, although this result may have been affected by intra-company pricing policies. In the early 1980s the income from both unrelated and related agreements was reported by the companies to be on an upward trend, which was more pronounced for unrelated agreements.

The analysis of the determinants of the licensing decision in Chapter Eleven revealed that licensing was viewed by the vast majority of companies as a 'strategic' decision, in the sense that it was more often than not evaluated against the alternatives of FDI and exporting. This result is consistent with Telesio's (1979) survey of (mainly) US MNCs which supported the view that licensing is viewed as a 'strategic' decision. It is also in line with the finding of Adam's (1985) survey of UK MNCs that licensing is evaluated as an alternative to FDI when a decision is made to manufacture abroad.[1] Of the companies that took a 'strategic' view, only a small proportion opted for licensing because the existence of host-government controls prevented them from adopting the alternatives of FDI or exporting. This finding is at odds with the finding of Shepherd et al's (1985) survey of UK MNCs which reported that "a majority view seemed to be that .... licensing would only really be considered as a last resort, if there were important obstacles to overseas investment or exporting" (p92).[2]

Government-created market imperfections were found to be important determinants of the licensing decision. Of the twenty one variables listed in the questionnaire which the companies rated in terms of their importance in ruling out the alternatives of FDI and exporting in favour of licensing, those which measured government-created market imperfections came high up the rank-ordering. The availability of technologically competent local firms in host countries was the variable which attracted the highest ranking, a finding which is consistent with Contractor's (1981, 1985) studies of the licensing motivations of US MNCs.

The factor analysis of the intercorrelations between the ratings attributed to the twenty one variables produced seven factor constructs which accounted for this larger group of variables. The variables comprising these constructs had sufficient in common to enable them to be meaningfully interpreted. The identities of the constructs are given below, listed in order of their relative importance:

. host-country risk
. host-country legal environment and infrastructure
. host-country fiscal and repatriation policies
. resource constraints
. export marketing costs
. export-production/transportation costs
. host-country level of industrial development

The twenty one variables which comprise each of the above constructs were derived from the prevailing paradigm in the literature on the MNC, the eclectic paradigm of international production [Dunning (1977, 1979, 1988)]. To incorporate those variables which could not be easily easily expressed in terms of the constituents of the paradigm, and to take account of possible strategic considerations, the questionnaire also listed fourteen licensing objectives which the companies were asked to rate in terms of their importance.

The speed of entry to a new market emerged as the most important of the fourteen licensing objectives. The use of licensing to strengthen a company's position in a joint venture and to develop outlets for its components and other products featured among the highest-ranking objectives. On the other hand, the use of licensing to test new markets and to develop low-cost sources of raw materials and components attracted very low rankings. It would therefore appear that licensing is used more to support the existing operations of UK MNCs than it is to test the potential of new markets, and that in terms of its ability to generate auxiliary business it is seen as a means of developing the downstream end of value-added chains rather than the upstream end.

When subjected to factor analysis, the fourteen licensing objectives listed in the questionnaire were reduced to four. Once again, the variables which were grouped under the factor constructs had sufficient in common to enable meaningful labels to be attached to the constructs. The companies were judged to be following four underlying strategies, which are listed below in order of their relative importance:

- a defensive strategy
- an intermediary strategy
- a subordinate strategy
- a technology-driven strategy

In Chapter Twelve multiple linear regression was used to determine the relationship between nine corporate characteristics derived from the literature review and the involvement of the company sample in licensing. It was found that size had the strongest association with licensing activity and that the smaller companies in the sample tended to license more. Companies which had not internationalized their production very much and which had a narrow geographical spread of operations were also likely to license more. The level of R&D expenditure was found to be positively associated with the level of licensing activity.

For those companies that were involved in patent licensing, it was established that the level of licensing was positively associated with the number of patents registered in the UK, but that it was negatively associated with the number of patents registered in other countries. For those companies that licensed know-how, it was found that they were more likely to do so if their know-how required organizational back-up and the training of licensee personnel, and less likely to do so if their know-how consisted of documented information and manufacturing process equipment. Finally, it was discovered that licensing was more likely to occur if companies had low levels of geographical diversification and relatively centralised organizational structures.

In Chapter Thirteen the differences in the intellectual property content of unrelated and related licensing agreements were examined to determine if they were in accordance with the predictions of transaction cost theory. It was hypothesised that unrelated patent licensing agreements would involve fewer transfers of know-how than related patent licensing agreements because of the greater ex-ante and ex-post transaction costs which are presumed to arise in the arm's-length know-how market. This hypothesis was duly confirmed, although when know-how was split up into two categories, that relating to the technical field of the patent and that supplied on a broader basis, it was found that the hypothesis only held for the latter category.

It was also hypothesised that the trademark content of unrelated patent licensing agreements would be lower than that found in related patent licensing agreements. This was based upon the premise that unrelated agreements involve a lower degree of control than related agreements and therefore involve heavier costs to maintain the product quality which is necessary to ensure that trademarks retain their value. The hypothesis was duly confirmed.

In addition to examining differences between the intellectual property content of unrelated and related patent licensing agreements, Chapter Thirteen also examined differences in the nature of the know-how which was licensed in unrelated and related know-how agreements. It was found that unrelated agreements contained more patentable know-how than related agreements. This finding was contrary to expectations as it had been hypothesised that patentable know-how was more likely to leak out in unrelated agreements and would therefore be less prevalent in unrelated agreements in comparison to related agreements. The result suggests that know-how leakages from inside the internal hierarchies of firms may be as much of a problem as leakages from third party licensees in arm's-length agreements.

As predicted, it was found that there was no difference between the level of non-proprietary know-how present in unrelated and related know-how agreements. This result conformed to expectations since know-how that can be obtained from other companies was not expected to be affected much by the normal problems of recognition, disclosure, team organization and licensee opportunism that are associated with proprietary know-how.

Another set of hypotheses were concerned with whether or not know-how was licensed in a codified or an uncodifed form. It was anticipated that unrelated agreements would contain the same amount of codified know-how as related agreements because the transaction costs would be much the same, but that unrelated agreements would contain less uncodified know-how than related agreements because of the greater problems of recognising, disclosing and transferring this type of know-how. The hypothesis relating to uncodified know-how was confirmed for the two types of uncodified know-how that were tested (organizational back-up and the training of licensee personnel) while the hypothesis relating to codified know-how was confirmed for one of the types of codified know-how (documented information) but not for the second (manufacturing process equipment).

The final hypothesis tested in Chapter Thirteen did not involve a comparison of the characteristics of unrelated and related licensing agreements, but was concerned with a single characteristic of unrelated know-how licensing agreements, namely the extent to which the know-how had already been transferred to overseas subsidiaries. The expectation was that companies would be more likely to license know-how to unrelated licensees if it had previously been transferred to overseas subsidiaries. This was based upon the premise that the usefuleness of the know-how would have been evaluated from its internal transfer, thus making it easier for the company to deal with the problems of recognition, disclosure and team organization in the arm's-length market. There was, however, no evidence in support of this hypothesis.

Overall, the results in Chapter Thirteen are generally consistent with expectations and can be considered as lending tentative support to the transaction cost school of thought.

By way of summing up the results of the empirical study, Figure 14-1 presents a unifying framework for the market-servicing decision which draws together the various strands of the analysis by describing the relationships between the different factors that have been considered. The framework incorporates elements of the two key paradigms reviewed in the literature survey, Williamson's (1975) Markets and Hierarchies paradigm and Dunning's (1988) Factor Endowment/Market failure paradigm. The diagram suggests that four broad groups of factors influence the market-servicing decision: environmental factors in the host and home countries, the characteristics of the company making the decision, the nature of the intellectual property which it possesses, and the strategic orientation of the company.[3]

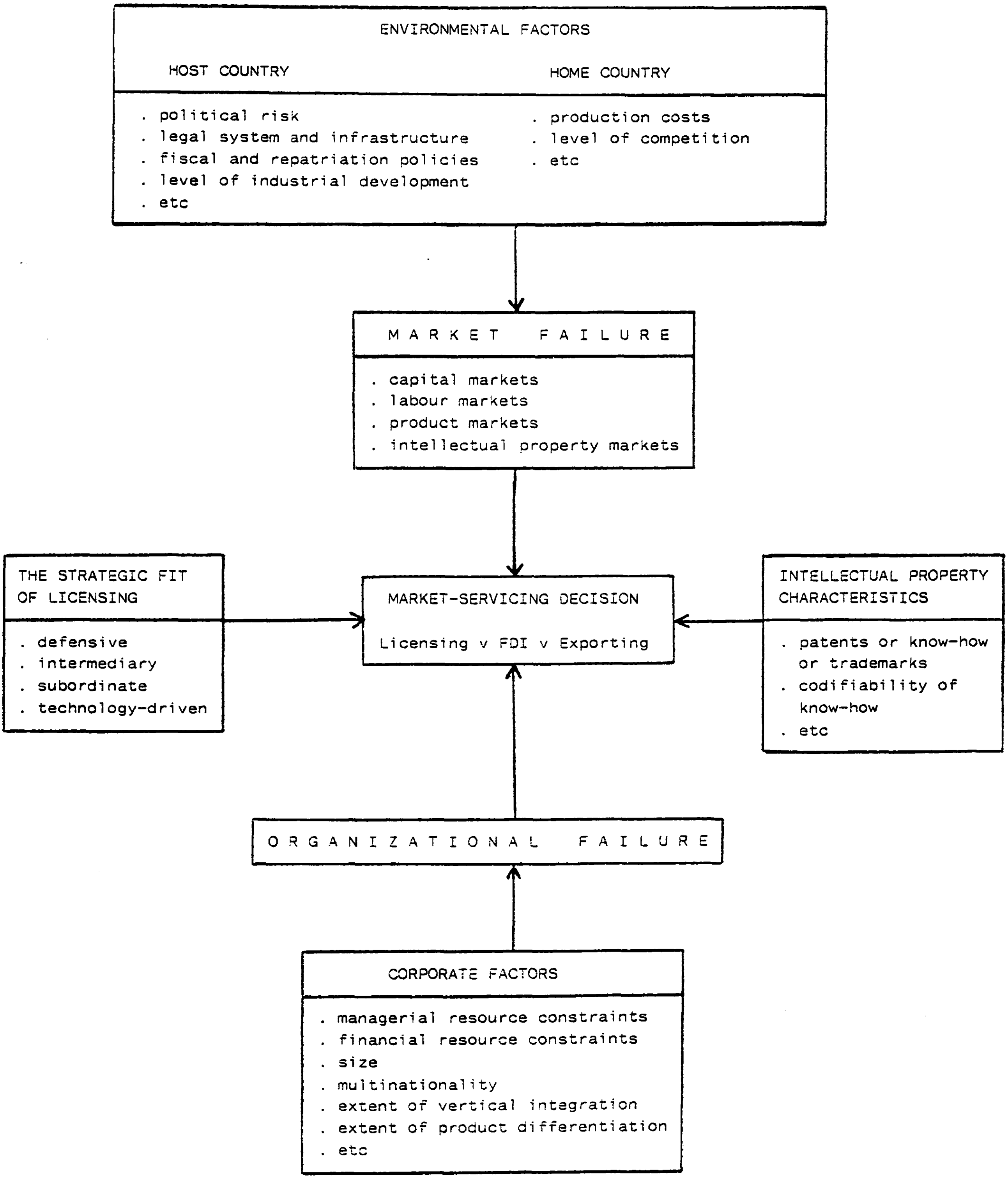
The first of these, environmental factors in the home and host country, include a number of the factor constructs derived from the variables of the eclectic paradigm of international production. These factors determine the likelihood of failures occurring in the arm's-length markets for capital, labour, products and intellectual property, eg a fiscal policy which penalises royalties at the expense of dividends may tip the balance in favour of FDI at the expense of licensing. The second group of factors, the characteristics of intellectual property, determine the likelihood of failure in the arm's-length market for intellectual property, eg know-how which is of a tacit nature is likely to suffer from the information impactedness problem, thus making it difficult for a market in know-how to be established.

The nature of the corporate entity itself will also affect the market-servicing choice. For example, a company which has limited managerial and financial resources may be constrained in its ability to set up overseas production facilities. Licensing may thus be chosen because of the failure of the organization (ie company) to facilitate an expansion of its boundaries at a cost lower than that achieved by the use of the arm's-length market in intellectual property. Finally, it must be recognised that the reaction of any particular company when faced with imperfect arm's-length and

CHAPTER 14

FIGURE 14-1

A FRAMEWORK FOR THE MARKET-SERVICING DECISION



internal markets will be influenced by the strategic direction which it is following. For example, a company which is technology-driven and which operates in an industry characterised by oligopolistic rivalry may opt for licensing because it has entered into reciprocal agreements with its competitors, even if other considerations point towards the use of FDI or exporting.

It is hoped that the framework outlined in Figure 14-1 can assist managers in identifying the appropriate factors to be considered in the market-servicing decision. In common with other frameworks related to this decision, such as those suggested by Root (1987) and Hill et al (1990), the framework outlined in this study highlights the fact that different factors may pull a company in different directions. For example, a company which is assessing a host market characterised by low labour costs and negligible political risk may be inclined towards FDI. However, if it has subsidiaries in other countries which would be able to import cheap raw materials from a licensee in the host market or to count on a local licensee to buy its products, then licensing may appear more attractive. In such a situation managers would have to analyse the trade-off between the benefits arising from the generation of auxiliary business from a licensee against the benefits from cheap local labour and low political risk insurance. The quantification of this trade-off is not an easy task, but any attempts at doing so would hopefully enable managers to come to a better understanding of the benefits (and costs) of different modes of business.

14.3 IMPLICATIONS OF THE RESEARCH

As the research is concerned with the nature of the outward licensing undertaken by UK MNCs, its implications are principally of concern to UK companies which are involved in outward licensing or which are contemplating involvement. There are, however, some implications which may be of interest to host governments and to potential foreign licensees.

The research will hopefully be of assistance to managers that are attempting to formulate a licensing policy or to integrate licensing with their existing business operations. The framework outlined in Figure 14-1 defines four broad factors which managers should consider when evaluating the licensing option, and the results reported in previous chapters have shown the relative importance attached to the constituents of these factors by the sample of 86 UK MNCs that responded to the questionnaire survey.

It is important that licensing is not evaluated solely in terms of the revenue which it generates, whether in terms of royalties or lump-sum fees, but that it is also considered in terms of its overall impact on the company and its effect on the company's future direction. It emerged, for example, that speed of entry to a new market achieved the highest rating among the licensing objectives listed in the questionnaire. Thus, although in the long-term licensing may not be as remunerative as FDI or exporting, it may be valuable as a short-term strategy to establish a presence in a foreign market, perhaps as a prelude to future equity investment.

Licensing may also be used to preserve existing markets served by exports or FDI which are threatened by host-government intervention. It was found that an important consideration behind the use of licensing was the existence of government-created market imperfections, such as restrictions on trade and exchange controls on dividends, which had the effect of making exports and FDI relatively more costly.

Licensing may be especially worthy of consideration by those companies which lack the managerial expertise or investment funds necessary for FDI. The survey found that a shortage of investment funds was of less importance than a shortage of managerial expertise in the decision to forego FDI in favour of licensing, a finding which is not surprising given the generally large size of the respondents.

A finding of interest to host governments is the attitude of the sample towards patent protection and anti-trust legislation. The survey assessed the extent to which weakness in these areas of legislation promoted the use of licensing at the expense of FDI or exports. Both reasons obtained very low rankings, which suggests that if host governments are concerned to increase inward investment from the UK at the expense of licensing then they should direct their attention towards other policy areas.

If, on the other hand, host governments are keen to attract licensed technology from UK MNCs at the expense of FDI and exports they should attempt to improve the technological competence of their indigenous companies, since this was an attribute which obtained a very high ranking in promoting licensing.

Potential foreign licensees might enhance their ability to find UK licensors if they have technology of their own to offer via a reciprocal licensing arrangement. The likelihood of finding a UK licensor might also be enhanced if foreign licensees have the flexibility to alter their purchasing policy and purchase some of the licensor's output. In addition, given the high ranking attributed by UK MNCs to the use of licensing to strengthen joint ventures, foreign companies which want access to UK technology might be more likely to succeed if they are also prepared to enter into an arrangement which involves some degree of equity participation by the UK licensor.

14.4 LIMITATIONS OF THE RESEARCH

In addition to the two limitations of the study mentioned at the outset of the thesis in Chapter One, the reliance on a heavily US-dominated literature and the use of (necessarily) cross-sectional questionnaire data, three further limitations need to be pointed out.

Firstly, given that most of the MNCs that responded to the questionnaire are large the research may not accurately represent the motivations behind the decisions of small MNCs to engage in licensing. In addition, since the study is concerned with MNCs, the findings may not be applicable to UK companies that have no foreign subsidiaries and that are confronted with a market-servicing decision which involves setting up overseas production facilities for the first time rather than extending production in an already functioning overseas plant.

Secondly, it must be acknowledged that the ratings given by the MNCs to the variables listed in the questionnaire apply to their licensing agreements in general. In a sense these ratings can be regarded as a consensus of opinion covering all of the licensing agreements in their possession. It is possible that different responses would have been obtained if the MNCs had been asked to discriminate between agreements on the basis of the host country of the licensee or the type of intellectual property licensed.[4]

Thirdly, the use of a mailed questionnaire involved the risk that respondents would interpret questions differently. The questionnaire had in a sense to "speak for itself" since the researcher could not be present to clarify any questions for the respondents. In order to ensure that the questions had a clear meaning and were designed to obtain the variables needed for analysis a pre-test of the questionnaire was undertaken, details of which were given in Chapter Eight. It must be recognised, however, that the variables included in the questionnaire following the pre-test were all derived from the extant literature and that no new variables were added to account for any peculiarities of the UK environment.

14.5 FUTURE RESEARCH

An obvious extension to the present study would be the completion of a number of case studies of the licensing decision-making process in UK MNCs. These would enrich the conclusions reported here by providing a more detailed analysis of the factors affecting licensing on an agreement-by-agreement basis, and might discover variables not presently recognised in the literature.

Case studies could also be used to refine the framework surrounding the market-servicing decision which is outlined in Figure 14-1. The present study has defined the four broad groups of factors which comprise this framework and it has provided evidence of the relative importance attached to the different variables which make up these factors. However, an issue which remains to be addressed is the precise interaction between the factors themselves. Interviews with management decision-makers would assist in identifying circumstances in which each of the environmental, corporate, strategic and intellectual property factors, or some combinations of them, might dominate and play a more important role than others.

The results from such research would provide useful insights for the development of a normative corporate policy model for the market-servicing decision. Such a model could propose weightings to be attached to the key variables affecting the decision, and these could reflect the priorities which a company attaches to the various objectives achieved through the servicing of a foreign market. In this way a trade-off could be made between the costs and benefits of each alternative mode of business. An indication of the way in which such a model might be developed is provided by Young et al (1989).

Additional research could be conducted to establish the extent to which the determinants of the licensing decision for MNCs might differ from those which affect the licensing decision for domestic UK companies with no foreign subsidiaries. A comparsion of small and medium-sized firms with large firms would also be useful to identify any differences due to size.

Future research might profitably focus upon the contractual details of licensing agreements, a readily-available data source. For example, the incidence of restrictive clauses in licensing agreements provides an indication of the control exercised by licensors over licensees and could be used to test the widely-held notion that internal licensing agreements provide more control than arm's-length agreements.

Finally, further research into the impact of transaction costs on the licensing decision is warranted. The examination of the intellectual property characteristics of licensing agreements in this study only provided an indirect test of transaction cost propositions by making plausible assumptions about the relative incidence of transaction costs in related and unrelated agreements. The use of data which gives a direct measure of these costs (eg Bouju's (1987) survey of worldwide patent infringement litigation costs) would provide more clear-cut evidence for or against the transaction cost viewpoint.

CHAPTER FOURTEEN

NOTES

1. Adam's (1985) study only considered the possibility that licensing was used as an alternative to FDI (see Chapter 8 of his thesis). It did not attempt to assess whether UK MNCs also evaluated it as an alternative to exporting.

2. The difference may be attributable to the fact that Shepherd et al surveyed a much smaller number of UK MNCs (23) since they used a case study approach rather than a questionnaire approach.

3. This diagram only illustrates the impact of the four broad factors on the market-servcing decision. It does not attempt to describe the relationship between the factors themselves. For example, a corporate factor such as size could also affect the market-servicing decision indirectly through its influence on strategic behaviour.

4. The inclusion of such refinements in the questionnaire would, of course, have resulted in a major increase in its size and therefore decreased the likelihood of an acceptable response rate being obtained.

REFERENCES

ADAM, Y.A., The Costs and Benefits of Licensing Activity: An Empirical Investigation of UK Companies Involved in Such Operations, Unpublished PhD Thesis, University of Manchester, 1985.

BOUJU, A., Patent Infringement Litigation Costs: A Practical Worldwide Survey, London: Longman, 1987.

CONTRACTOR, F.J., International Technology Licensing: Compensation, Costs and Negotiation, Lexington, Mass.: Lexington Books, 1981.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.:Quorum Books, 1985.

DUNNING, J.H., 'Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach', in Ohlin, B., Hesselborn, P.O. & Wijkman, P.M. (eds.), The International Allocation of Economic Activity, London: Macmillan, 1977, pp 395-418.

DUNNING, J.H., 'Explaining Changing Patterns of International Production: In Defence of Eclectic Theory', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 269-295.

DUNNING, J.H., 'The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions', Journal of International Business Studies, Vol 19, No 1, Spring 1988, pp 1-31.

HILL, C.W., HWANG, P. & CHAN KIM, W., 'An Eclectic Theory of the Choice of International Entry Mode', Strategic Management Journal, Vol 11, 1990, pp117-128.

ROOT, F.R., Entry Strategies for International Markets, Lexington, Mass.: D C Heath & Co, 1987.

SHEPHERD, D., SILBERSTON, A. & STRANGE, R., British Manufacturing Investment Overseas, London: Methuen & Co, 1985.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York: Praeger, 1979.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: The Free Press, 1975.

YOUNG, S., HAMILL, J., WHEELER, C. & DAVIES, J.R., International Market Entry and Development: Strategies and Management, Hemel Hempstead, Herts.: Harvester Wheatsheaf, 1989.

APPENDIX A

COVER LETTERS & FOLLOW-UPS

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Professors:
DAVID FLINT
SIDNEY J. GRAY
Head of Department
SIMON M. KEANE
JOHN BAILLIE
Johnstone Smith Chair

15 August 1984

Mr ....
....
....

Dear Mr ....,

I have much pleasure in informing you that the University of Glasgow is conducting a major investigation into the use of technology licensing by U.K. based multinational companies. The study is being carried out by Mr. Kevin Campbell, a postgraduate researcher sponsored by the Economic and Social Research Council.

The main objective is to gain a better understanding of the circumstances under which companies earn income from foreign markets by licensing, rather than by the more traditional methods of direct investment or exporting. This is a very topical and important subject, for licensing has become more widespread in recent years as changing political and economic conditions have made it a more appealing international business strategy.

I would be most grateful if you could arrange for your company's co-operation in this study by having an appropriate senior executive complete the enclosed questionnaire, which should only take about half an hour to fill in. I am sure that you will consider the effort worthwhile. As the results of the survey are likely to be of assistance in the formulation of policy decisions in this area, a copy of the key findings will be forwarded to all participants.

Yours sincerely,

S.J. Gray
Professor of Accountancy

Encls.

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DAVID FLINT
SIDNEY J. GRAY
Head of Department
SIMON M. KEANE
JOHN BAILLIE
Johnstone Smith Chair

15th August 1984

Mr ....
....
....

Dear Mr ....,

May I invite your company to participate in a research project on international technology licensing?

The project aims to gain an understanding of the role of licensing in the international operations of U.K. based multinational companies. In particular, it seeks to investigate the extent to which licensing is co-ordinated with the other elements of global business strategy - exports, joint ventures and subsidiary operations - and to determine the conditions under which it is considered the more appropriate strategy. This is a very topical and important subject, for licensing has become more widespread in recent years as changing political and economic conditions have made it a more appealing international business strategy.

The study is concerned with licensing-out, i.e. the licensing of technology to other businesses (both related and unrelated). It is concerned with technology in the form of patents and know-how, the latter consisting of confidential technical information that constitutes either a separate body of information or information ancillary to the workings of a patent. Know-how may include tangible objects such as drawings and blueprints, or it may be embodied in intangibles such as consultations with company technicians.

I would be most grateful if you could arrange for your company's participation in the survey by passing on the enclosed questionnaire to a senior executive in the group with knowledge of your company's involvement in this area. A stamp-addressed envelope is provided for returning the completed questionnaire to the University of Glasgow. The questionnaire has been designed with the aim of reducing the time required for completion, so that for most questions it is only necessary to tick an appropriate box, although in some cases it may be helpful to consult with other company colleagues. Your company's co-operation is essential for the achievement of meaningful results, and will be very much appreciated. (If your company is not involved in international licensing, please answer the first question of the questionnaire and return it without further completion).

Please be assured that all questionnaire responses will be kept strictly confidential. The results will only be presented as statistical totals for groups of companies.

In addition to uncovering the reasons for the use of international licensing, the study will also generate information on key aspects of corporate licensing practice, such as the organization of the licensing function within the company and the procedures used for locating potential licensees. When the research is completed, a report of the main findings will be mailed to each participant. This report will enable you to compare the international licensing activities of your company with prevailing corporate practices and therefore help to reveal whether your company is fully exploiting its potential in this very important area of international business.

I will be most grateful for your support of this research project. Thank you in advance for your interest and co-operation.

Yours sincerely,

Kevin Campbell, M.A.(Hons).

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SIDNEY J. GRAY
Head of Department
SIMON M. KEANE
JOHN BAILLIE
Johnstone Smith Chair

28 September 1984

Mr ....
....
....

Dear Mr ....,

Four weeks ago Professor Gray and I wrote inviting you to participate in a research project sponsored by the Economic and Social Research Council on the subject of international technology licensing. As we have not yet heard from you, I am writing to re-affirm our interest in your participation in the study. The cooperation of a large number of companies is absolutely vital for the achievement of valid and meaningful results.

Please find enclosed another copy of the questionnaire sent to you earlier. I would be most grateful if you could arrange for a senior executive in the group with knowledge of this subject to complete it and return it to me at the University of Glasgow.

I would like to emphasize that all responses will be treated in strict confidence. Results will only be presented as statistical totals for groups of companies.

When the research is completed, a summary of the main findings will be mailed to all participants. This will hopefully assist your company in the formulation of policy decisions in this area.

I look forward to hearing from you soon.

Yours sincerely,

Kevin Campbell, M.A.(Hons).

Encl.

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SIDNEY J. GRAY
Head of Department
SIMON M. KEANE
JOHN BAILLIE
Johnstone Smith Chair

24 October 1984

Mr ....
....
....

Dear Mr ....,

INTERNATIONAL TECHNOLOGY LICENSING

Ten weeks ago Professor Gray and I wrote inviting your company to participate in a research project by completing a questionnaire on the above topic, and this was followed up with a reminder letter five weeks ago. Although you have not yet responded to either of our enquiries, I am writing to inform you that we are nevertheless still interested in your company's participation in the survey, which is sponsored by the Economic and Social Research Council.

I would therefore be most grateful if you could arrange for someone in your company with knowledge of this subject to answer our questionnaire, another copy of which is enclosed. Your assistance will be very much appreciated.

I would like to stress that all information provided will be kept strictly confidential, i.e. it will only be reported in aggregate form and will not be identified with any particular company or individual respondent.

As the results of the survey will provide assistance in the formulation of policy decisions in this area, a copy of the main results will be forwarded to all participants when the research is completed.

I look forward to hearing from you shortly.

Yours sincerely,

Kevin Campbell, M.A.(Hons)

Encl.

APPENDIX B

THE QUESTIONNAIRE

University of Glasgow

CONFIDENTIAL

QUESTIONNAIRE ON INTERNATIONAL TECHNOLOGY LICENSING

THIS STUDY IS SPONSORED BY THE ECONOMIC & SOCIAL RESEARCH COUNCIL

PURPOSE OF THE STUDY

The study aims to discover the factors which promote the use of licensing-out by multinational companies. In particular it attempts to isolate the circumstances under which the licensing of patents and know-how is preferred to exporting and direct foreign investment as a means of generating business in overseas markets.

GENERAL INSTRUCTIONS FOR COMPLETION

1. The study is addressed to U.K.-based companies that are involved in international licensing and which have at least one overseas subsidiary.

2. The questionnaire should be answered by a senior executive familiar with the company's international licensing operations.

3. As the study is concerned with companies that are organized as groups, the term company - which is used throughout the questionnaire - should be understood as group, unless stated otherwise.

4. The questionnaire has been designed with the aim of minimising the time required for completion. Consequently, alternative answers are provided for most questions so that the respondent simply has to tick the box(es) which most accurately describe his/her opinion or the company's practice.

5. If any information is requested which is not routinely available, reasonable estimates will suffice. Please be assured that response based on informed judgement is infinitely more valuable than no response at all. If for any reason you do not complete the entire questionnaire, please return it anyway. Even partial information provides important input to the survey results.

6. All of the information provided will be held in strict confidence, to be presented in aggregate form only. The anonymity of individual respondents and of company names will be carefully protected.

7. Space is provided at the end of the questionnaire for any comments you may wish to make about it. You are also asked to provide your name and the company's name so that a summary of the results of the survey can be sent to you later.

8. Thank you very much for your support of this research effort. If you have any problems in completing the questionnaire, please do not hesitate to contact me:

Mr. Kevin Campbell, M.A.(Hons).
University of Glasgow,
Department of Accountancy,
65-69 Southpark Avenue,
Glasgow G12 8LE.

Tel. DAYTIME (041) 339 8855 ext 501; EVENINGS (041) 959 4044

QUESTIONNAIRE ON INTERNATIONAL TECHNOLOGY LICENSING

This survey is concerned with the licensing-out of technology in the form of patents and know-how, the latter being confidential technical information that is either unpatentable or purposely left unpatented. It is also concerned with the licensing of trademarks, but only in so far as they accompany the licensing of patents and know-how. The term "technology licensing" should be taken to include licence agreements which are part of more general contractual arrangements, such as engineering services agreements and turnkey contracts, as well as individual licence agreements.

The survey applies to two categories of licence agreement. Those with unrelated overseas companies - i.e. companies that are not members of the group - and those with overseas subsidiaries - i.e. companies in which the group has a minimum equity stake of 51%. Licensing of associated companies (companies in which the group has an ownership interest which is less than a controlling one) and of joint ventures (companies in which the group shares ownership and management with one or more unrelated concerns, but has no overall control) should be included in the first category.

Does the company have any licensing agreements covering the use of its patents and/or know-how by unrelated overseas companies or by any of its overseas subsidiaries? Please tick (√) the appropriate boxes.

	YES	NO
(a) Unrelated overseas companies	¦__¦	¦__¦
(b) Overseas subsidiaries	¦__¦	¦__¦

If you have answered YES to alternative (a), or to both alternatives, please complete the rest of the questionnaire.

If you have answered NO to alternative (a) and YES to alternative (b), please start the questionnaire at SECTION III.

If your answer is NO to both alternatives, please use the space for comments at the end of the questionnaire, or a separate sheet of paper, to state briefly why your company is not involved in licensing-out, and return the questionnaire without further completion.

SECTION I - THE INTERNATIONAL LICENSING DECISION

The questions in this section are concerned with the factors which influence the company's attitude towards the licensing of its patents and know-how to unrelated overseas companies, i.e. category (a) above.

1. In approximately how many instances does the company evaluate licensing as an alternative to direct investment, joint ventures and exporting, rather than consider it independently of these other methods of servicing a foreign market?
Please tick (√) one box.

ALWAYS ¦__¦ IN MOST CASES ¦__¦ IN SOME CASES ¦__¦ VERY RARELY ¦__¦ NEVER ¦__¦

If you have answered NEVER, go to Question 5. Otherwise answer Question 2.

2. To what extent is international licensing used by the company solely as a substitute for direct investment, joint ventures and/or exports when these methods are not possible because of host-government controls? Please tick (√) one box.

ALWAYS |__| IN MOST CASES |__| IN SOME CASES |__| VERY RARELY |__| NEVER |__|

If you have answered ALWAYS, go to Question 6. Otherwise answer Question 3.

3. In those overseas markets where licensing has been evaluated against the options of direct investment and exporting, and chosen as the most suitable strategy, please indicate if any of the factors listed below have played a significant role in ruling out direct investment and exporting. Tick (√) one box for each factor listed. (The last box should be ticked if the factor is of no relevance to the company or its overseas markets).

	OF NO SIGNIFICANCE		OF SOME SIGNIFICANCE			VERY SIGNIFICANT		NOT APPLICABLE
	1	2	3	4	5	6	7	
DIRECT INVESTMENT								
a. Shortage of investment funds	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
b. Scarcity of management personnel	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
c. High political risk	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
d. High local labour costs	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
e. High level of taxation	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
f. High currency risk	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
g. Strong local competition	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
h. Small size of market	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
i. Exchange controls on dividends	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|
j. Other:________________	|_|	|_|	|_|	|_|	|_|	|_|	|_|	|_|

EXPORTING

a. High transport costs	☐	☐	☐	☐	☐	☐	☐	☐
b. High production costs in U.K.	☐	☐	☐	☐	☐	☐	☐	☐
c. Trade restrictions (Tariffs, quotas etc.)	☐	☐	☐	☐	☐	☐	☐	☐
d. Poor distribution facilities in local market	☐	☐	☐	☐	☐	☐	☐	☐
e. Different local product standards	☐	☐	☐	☐	☐	☐	☐	☐
f. Different local preferences	☐	☐	☐	☐	☐	☐	☐	☐
g. Other:______________________	☐	☐	☐	☐	☐	☐	☐	☐

4. In your experience how significant are the following factors in influencing the company to favour licensing rather than direct investment or exports? Please tick (√) one box for each factor listed.

	OF NO SIGNIFICANCE		OF SOME SIGNIFICANCE			VERY SIGNIFICANT		NOT APPLICABLE
	1	2	3	4	5	6	7	
a. Weak patent protection legislation in host countries	☐	☐	☐	☐	☐	☐	☐	☐
b. Weak anti-trust legislation in host countries	☐	☐	☐	☐	☐	☐	☐	☐
c. Availability of technologically competent candidate licensees	☐	☐	☐	☐	☐	☐	☐	☐
d. Limited knowledge of host country market	☐	☐	☐	☐	☐	☐	☐	☐
e. Lower tax rate on royalties than dividends	☐	☐	☐	☐	☐	☐	☐	☐
f. Weaker exchange controls on royalties	☐	☐	☐	☐	☐	☐	☐	☐
g. Other:______________________	☐	☐	☐	☐	☐	☐	☐	☐

5. Listed below are a number of objectives which international licensing may be intended to achieve. Please estimate the degree of significance attached by your company to each of these objectives by ticking (√) one box in each case. (The last box should be ticked if the objective has never been pursued by the company).

	OF NO SIGNIFICANCE 1	2	OF SOME SIGNIFICANCE 3	4	5	VERY SIGNIFICANT 6	7	NOT APPLICABLE
a. To supplement the R & D budget with additional sources of income	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
b. To gain reciprocal access to the licensee's technology	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
c. To exploit 'spin-off' technology i.e. technology which does not suit the company's existing product range	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
d. To earn extra income from technology which has outlived its usefuleness to the company	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
e. To reduce currency risk	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
f. To protect patents against compulsory licensing by host governments	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
g. To pre-empt the infringement of patents by local firms	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
h. To develop markets for components or other products made by the company	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
i. To diversify the form of company income as a means of reducing risk	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
j. To develop low-cost sources of raw materials, components or end products for other company operations	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
k. To test new markets before committing risk capital	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
l. To build goodwill and acceptance for other company products and services	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
m. To strengthen the company's position in a joint venture	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
n. To enter a new market quickly	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
o. Other:____________________	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

6. Which of the following methods of overseas business are used most often by the company at the present time, and which does the company expect to adopt in the next decade? Please rank in order of current and expected use for the three categories of overseas market listed below (4=most use to 1=least use; 0=not used/not expected to be used).

(a) Current Overseas Business Methods

	DEVELOPED COUNTRIES	NEWLY INDUSTRIALIZING COUNTRIES	LESS DEVELOPED COUNTRIES
	(insert rankings)	(insert rankings)	(insert rankings)
DIRECT INVESTMENT	______	______	______
JOINT VENTURE	______	______	______
LICENSING	______	______	______
EXPORTING	______	______	______

(b) Future Overseas Business Methods

	(insert rankings)	(insert rankings)	(insert rankings)
DIRECT INVESTMENT	______	______	______
JOINT VENTURE	______	______	______
LICENSING	______	______	______
EXPORTING	______	______	______

DEVELOPED COUNTRIES are those nations which belong to the Organization for Economic Co-operation and Development (OECD): U.S.A., Canada, Japan, France, Germany etc.

NEWLY INDUSTRIALIZING COUNTRIES are those nations from the non-communist developing world which are significant exporters on a global scale: Brazil, Mexico, India, etc.

LESS DEVELOPED COUNTRIES comprise the remainder of the non-communist developing nations: Chile, Columbia, Egypt, Malaysia etc.

SECTION II - INTERNATIONAL LICENSING ACTIVITY

This section seeks to build upon the previous section by examining some features of the company's licensing agreements with unrelated overseas companies.

The section is in two parts: the first, Part A, deals with licensing agreements which provide either patents on their own or patents combined with know-how and/or trademarks; the second, Part B, deals with licensing agreements which cater exclusively for transfers of know-how, or know-how combined with trademarks.

PART A: PATENT LICENSING

1. Does the company have patent licensing agreements with unrelated overseas companies? Please tick (√) one box.

YES |__| NO |__| (go to Question 10)

2. Approximately how many of the company's patent licensing agreements are:

(a) VOLUNTARY LICENCES?	(i.e. agreements freely negotiated with other firms)	|__|%
(b) LICENCES OF RIGHT?	(i.e. licences granted on patents the company does not wish to exploit)	|__|%
(c) COMPULSORY LICENCES?	(i.e. licences granted because of non-use of patent or disagreement over terms)	|__|%

3. Approximately how many of the company's voluntary licences fall into the following categories?

(a) SOLE LICENCES	(i.e. licences which exclude the company from granting a licence to other firms in the same territory as the licensee)	|__|%
(b) EXCLUSIVE LICENCES	(i.e. licences which exclude the company from granting licences to other firms in the same territory and from competing with the licensee)	|__|%
(c) NON-EXCLUSIVE LICENCES	(i.e. licences which do not give any of the above undertakings)	|__|%

4. How many of the company's patent licensing agreements with unrelated overseas companies also provide for the following? Please tick (√) one cell in each scale.

(a) Supply of know-how in the technical field of the patent:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

(b) Supply of know-how on a broader basis:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

(c) Use of company trademarks:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

5. How many patent licensing agreements does the company have with unrelated overseas companies? Please tick (√) the appropriate box.

(a) 1 - 5 [ ] (d) 50 - 100 [ ]

(b) 5 - 20 [ ] (e) 100 - 200 [ ]

(c) 20 - 50 [ ] (f) > 200 [ ]

6. How much did the company earn, after tax, from these licensing agreements in the last accounting year? Please tick (√) the appropriate box.

< £0.1m [ ] £0.1 - 1m [ ] £1 - 5m [ ] £5 - 10m [ ] £10 - 20m [ ] > £20m [ ]

Can you give an exact figure? £____________

7. How does this sum compare with 5 years ago?
Please tick (√) the appropriate box, allowing for the effect of inflation.

SIGNIFICANTLY MORE [ ] SLIGHTLY MORE [ ] APPROXIMATELY THE SAME [ ] SLIGHTLY LESS [ ] SIGNIFICANTLY LESS [ ]

8. Approximately what proportion of the company's patent licensing revenue from unrelated overseas companies comes from <u>annual royalties</u>, calculated as a percentage of licensee sales? Please tick (√) <u>one</u> box.

(a) 100% [ ] (d) 20 - 50% [ ]

(b) 90 - 100% [ ] (e) 10 - 20% [ ]

(c) 50 - 90% [ ] (f) < 10% [ ]

9. Within which of the following ranges does the <u>royalty rate</u> charged for these patent licences usually fall? Please tick (√) <u>one</u> box.

(a) < 1% of sales [ ] (d) 5 - 7.5% of sales [ ]

(b) 1 - 2.5% of sales [ ] (e) 7.5 - 10% of sales [ ]

(c) 2.5 - 5% of sales [ ] (f) > 10% of sales [ ]

PART B: KNOW-HOW LICENSING

10. Has your company entered into written agreements with unrelated overseas companies to supply know-how without also supplying patents?
Please tick (√) one box.

YES [ ] (go to Question 12) NO [ ] (answer Question 11, then proceed to SECTION III)

11. Does your company possess know-how that could be of use to other companies?
Please tick (√) one box.

YES [ ] NO [ ]

If YES, has your company ever considered the possibility of licensing this know-how?

YES [ ] NO [ ]

If YES, please indicate if any of the following reasons explain the company's decision not to license its know-how. Please tick (√) any appropriate box.

[ ] (a) The risk of losing a competitive advantage.

[ ] (b) The difficulty of communicating the value of know-how to potential buyers without revealing its exact nature.

[ ] (c) The need to transfer scarce company personnel to make the know-how effective.

[ ] (d) The absence of suitable licensee firms.

[ ] (e) The cost of policing the licence, i.e. of ensuring that the licensee adheres to its contractual obligations.

[ ] (f) Other: ______________________________

If you have ticked more than one box, please indicate below which reason(s) had most influence on the company's decision:

12. How many of the company's know-how agreements with unrelated overseas companies allow for the use of company trademarks by the licensee? Please tick (√) one cell.

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

13. Using the following scale

1	2	3	4	5
None	Some	About half	Most	All/Virtually All

please estimate the proportion of know-how licensed to unrelated overseas companies which:

(Enter number in box)

(a) Could conceivably be patented [ ]

(b) Could be obtained from other companies [ ]

(c) Has previously been transferred to the company's overseas subsidiaries [ ]

14. In what form is the company's know-how <u>generally</u> licensed to unrelated overseas companies? Please enter a number in each box according to the following scale.

1	2	3	4
Never	Occasionally	Frequently	Always

(Enter number in box)

(a) Documented information (Formulae, computer programmes, blueprints etc.)

(b) Manufacturing process equipment (Catalysts, machine tools etc.)

(c) Organizational back-up (Sales and marketing methods etc.)

(d) Training of licensee personnel

15. How many know-how licensing agreements does the company have with unrelated overseas companies? Please tick (√) the appropriate box.

(a) 1 - 5
(b) 5 - 20
(c) 20 - 50
(d) 50 - 100
(e) 100 - 200
(f) > 200

16. How much did the company earn, after tax, from these know-how agreements in the last accounting year? Please tick (√) the appropriate box.

< £0.1m | £0.1 - 1m | £1 - 5m | £5 - 10m | £10 - 20m | > £20m

Can you give an exact figure? £____________

17. How does this sum compare with 5 years ago?
Please tick (√) one box, allowing for the effect of inflation.

SIGNIFICANTLY MORE | SLIGHTLY MORE | APPROXIMATELY THE SAME | SLIGHTLY LESS | SIGNIFICANTLY LESS

18. Approximately how much of the company's know-how revenue from unrelated overseas companies comes from <u>annual royalties</u>, calculated as a percentage of licensee sales? Please (√) tick <u>one</u> box.

(a) 100%
(b) 90 - 100%
(c) 50 - 90%
(d) 20 - 50%
(e) 10 - 20%
(f) < 10%

19. Within which of the following ranges does the <u>royalty rate</u> charged for these know-how licences usually fall? Please tick (√) <u>one</u> box.

(a) < 1% of sales
(b) 1 - 2.5% of sales
(c) 2.5 - 5% of sales
(d) 5 - 7.5% of sales
(e) 7.5 - 10% of sales
(f) > 10% of sales

SECTION III - INTRA-GROUP LICENSING

This section applies to patent and know-how licensing transactions carried out within the company, i.e. between the parent and the company's overseas subsidiaries.

1. To what extent are the company's patents and know-how made available to overseas subsidiaries? Please tick (√) the appropriate boxes.

	In all cases	In most cases	Sometimes	Very rarely	Never
PATENTS	☐	☐	☐	☐	☐
KNOW-HOW	☐	☐	☐	☐	☐

If you have answered NEVER to both patents and know-how, please go to SECTION IV.

2. To the extent that patents and know-how are made available to overseas subsidiaries, how far is this dealt with by means of formal licensing agreements? Please tick (√) the appropriate boxes.

	In all cases	In most cases	Sometimes	Very rarely	Never
PATENTS	☐	☐	☐	☐	☐
KNOW-HOW	☐	☐	☐	☐	☐

If you have answered NEVER to both patents and know-how, please go to SECTION IV.

3. If the company has patent licensing agreements with one or more overseas subsidiaries, please indicate the extent to which they provide for the following. Tick (√) one cell in each scale.

(a) Supply of know-how in the technical field of the patent:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

(b) Supply of know-how on a broader basis:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

(c) Use of company trademarks:

1	2	3	4	5
None	A Few	About half	Most	All/Virtually All

4. If the company has know-how licensing agreements with any overseas subsidiaries, please estimate, using the following scale

1	2	3	4	5
None	Some	About half	Most	All/Virtually All

the proportion of know-how in these agreements which:

(Enter number in box)

(a) Could conceivably be patented |__|

(b) Could be obtained from other companies |__|

5. If the company has know-how licensing agreements with any overseas subsidiaries, please indicate the form in which the company's know-how is generally licensed. Enter a number in each box according to the following scale.

1	2	3	4
Never	Occasionally	Frequently	Always

(Enter number in box)

(a) Documented information (Formulae, computer programmes, blueprints etc.) |__|

(b) Manufacturing process equipment (Catalysts, machine tools etc.) |__|

(c) Organizational back-up (Sales and marketing methods etc.) |__|

(d) Training of licensee personnel |__|

6. How much revenue did the company receive from the licensing of its patents and know-how to overseas subsidiaries in the last accounting year? Please tick (√) the appropriate boxes.

	< £0.1m	£0.1-1m	£1-5m	£5-10m	£10-20m	> £20m
PATENT LICENCE INCOME	|_|	|_|	|_|	|_|	|_|	|_|
KNOW-HOW LICENCE INCOME	|_|	|_|	|_|	|_|	|_|	|_|

Can you give exact figures?

PATENT LICENCE INCOME £____________ KNOW-HOW LICENCE INCOME £____________

7. How do these sums compare with 5 years ago? Please tick (√) one box for each category of licence income, allowing for inflation.

	Significantly more	Slightly more	Approximately the same	Slightly less	Significantly less
PATENT LICENCE INCOME	|_|	|_|	|_|	|_|	|_|
KNOW-HOW LICENCE INCOME	|_|	|_|	|_|	|_|	|_|

SECTION IV - GENERAL INFORMATION

1. SALES TURNOVER

Approximately how much of the company's turnover was generated in the following overseas markets in the last accounting year? Please express as a percentage of total turnover.

a. Europe (excl. U.K.) |__|%

b. North America |__|%

c. Latin America |__|%

d. Asia |__|%

e. Africa |__|%

f. Middle East |__|%

g. Australasia |__|%

2. RESEARCH AND DEVELOPMENT

(a) How much expenditure did the company devote to Research and Development in the last accounting year? Please tick (√) the appropriate box.

< £1m |_| £1 - 10m |_| £10 - 50m |_| £50 - 100m |_| > £100m |_|

Can you give an exact figure? £____________

If not, can you express Research and Development expenditure as a percentage of the company's sales turnover? Please tick (√) the appropriate box.

(a) < 1% |__|

(b) 1 - 2.5% |__|

(c) 2.5 - 5% |__|

(d) 5 - 7.5% |__|

(e) 7.5 - 10% |__|

(f) > 10% |__|

(b) Approximately what percentage of the company's Research and Development expenditure was incurred by overseas subsidiaries? |__|%

(c) How many employees are engaged in Research and Development activities? Please tick (√) the appropriate box.

0-100 |_| 100-500 |_| 500-1,000 |_| 1,000-5,000 |_| >5,000 |_|

3. PATENTS

(a) How many U.K. patents does the company currently hold? Please tick (√) the appropriate box.

(a) < 10 |__|

(b) 10 - 50 |__|

(c) 50 - 100 |__|

(d) 100 - 500 |__|

(e) 500 - 1,000 |__|

(f) > 1,000 |__|

(b) In how many countries does the company usually register its patents? Please tick (√) the appropriate box.

(a) 1 - 10 |__|

(b) 11 - 20 |__|

(c) 21 - 30 |__|

(d) 31 - 40 |__|

(e) 41 - 50 |__|

(f) > 50 |__|

(c) On average, how much has the company spent per annum over the last five years in filing and maintaining patents in other countries? £____________

4. Which of the following best describes the company's worldwide organizational structure? Please tick (√) one box.

(a) Organized globally by product divisions |__|

(b) Organized globally by geographic divisions |__|

(c) Organized globally by functional divisions (marketing, finance, etc.) |__|

(d) Organized domestically by product or functional divisions, with an international division for overseas operations |__|

(e) Organized domestically by product or functional divisions, with geographic divisions for overseas operations |__|

(f) Matrix or grid structure i.e. organized globally by some combination of product and/or geographic and/or functional divisions, involving a sharing of responsibility across divisions |__|

(g) Holding company structure i.e. organized by individual subsidiaries, each largely responsible for its own affairs |__|

(h) Other |__|
(Please describe:____)

5. Please give your name, title and company name below. A copy of the results of the survey will be forwarded to you in due course.

NAME: ____

TITLE: _______________________________________

COMPANY NAME: _________________________________

If there are any aspects of international technology licensing which you think are important and which have not been covered by the questionnaire, please use the space below to describe them. Any other comments about the questionnaire are most welcome.

Comments:

THANK YOU VERY MUCH FOR YOUR COOPERATION

CONSOLIDATED BIBLIOGRAPHY

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ADAM, Y.A., The Costs and Benefits of Licensing Activity: An Empirical Investigation of UK Companies Involved in Such Operations, Unpublished PhD Thesis, University of Manchester, 1985.

AHARONI, Y., The Foreign Investment Decision Process, Boston: Harvard University Press, 1966.

AKERLOF, G.A., 'The Market For "Lemons": Qualitative Uncertainty and the Market Mechanism", Quarterly Journal of Economics, Vol 84, August 1970, pp 488-500.

ALCHIAN, A.A. & DEMSETZ, H., 'Production, Information Costs and Economic Organization', American Economic Review, Vol 62, No 5, December 1972, pp 777-795.

ALIBER, R.Z., 'A Theory of Direct Foreign Investment', in Kindleberger C.P. (ed.), The International Corporation, Cambridge, Mass.: MIT Press, 1970.

ALIBER, R.Z., 'The MNE in a Multiple-Currency World' in Dunning J.H. (ed), The Multinational Enterprise, London: George Allen & Unwin, 1971.

ALLEN, M. (ed.), The Times 1000: 1983-84, London: Times Books, 1984.

ALSTER, N., 'New Profits From Patents', Fortune, April 25, 1988, pp 69-72.

ANDERSON, E., 'Transaction Costs as Determinants of Opportunism in Integrated and Independent Sales Forces', Journal of Economic Behaviour and Organization, Vol 9, 1988, pp 247-264.

ANDERSON, E. & GATIGNON, H., 'Modes of Foreign Entry: A Transaction Cost Analysis and Propositions', Journal of International Business Studies, Vol 27, No 3, Fall 1986, pp 1-26.

ANDERSON, N.A., 'Scales and Statistics: Parametric and Nonparametric', Psychological Bulletin, Vol 58, No. 4, 1961, pp 305-16.

ARDISSON, J.M. & BIDAULT, F, 'Technology Transfer Strategies as a Means to Build International Networks', Industrial Marketing and Purchasing, Vol 1, No 1, 1986, pp 59-71.

ARMITAGE, P., Statistical Methods in Medical Research, 2nd edn., Oxford: Blackwell Scientific Publications, 1971.

ARROW, K.J., 'Economic Welfare and the Allocation of Resources for Invention', in National Bureau of Economic Research, The Rate and Direction of Inventive Activity: Economic and Social Factors, Princeton: Princeton University Press, 1962.

ARROW, K.J., 'The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation', in The Analysis and Evaluation of Public Expenditure: The PPB System, US Joint Economic Committee, 91st Congress, 1st Session, US Government Printing Office, 1969, pp 59-73.

ARROW, K.J., Essays in the Theory of Risk-Bearing, Chicago: Markham, 1971.

BAILLIE, I., 'The Legal Framework of Licensing', Ch 7 in Lowe, J. & Crawford, N., Technology Licensing and the Small Firm, Aldershot: Gower, 1984, pp 71-81.

BAIN, J.S., Barriers to New Competition, Cambridge, Mass.: Harvard University Press, 1956.

BAKER, B.O., HARDYCK, C.D. & PETRINOVICH, L.F., 'Weak Measurement vs. Strong Statistics: An Empirical Critique of S.S. Stevens' Prescriptions on Statistics', Educational and Psychological Measurement, Vol 26, 1966, pp 291-309.

BALASUBRAMANYAM, V.N., International Transfer of Technology to India, New York: Praeger, 1973.

BALASSA, B., 'Trade Creation and Trade Diversion in the European Common Market', Economic Journal, Vol 77, 1967.

BANKS COMMITTEE, The British Patent System, Report of the Committee to Examine the Patent System, Cmnd. 4407, London: HMSO, 1970.

BARANSON, J., Manufacturing Problems in India: The Cummins Diesel Engine Experience, Syracuse, New York: Syracuse University Press, 1967.

BARANSON, J., 'Technology Transfer through the International Firm', American Economic Review, Vol 40, May 1970, pp 435-40.

BARKER, A.T., 'A Study of Attitudes Towards Products Made in Australia', Journal of Global Marketing, Vol 1, Nos 1/2, Fall/Winter 1987, pp 131-144.

BAUMOL, W.J., Business Behaviour, Value and Growth, New York: MacMillan, 1959.

BEHRMAN, J., 'Licensing Abroad of American-held Patents, Trademarks and Techniques', The Patent, Trademark and Copyright Journal of Research and Education, Vol 1, No 1, June 1957, pp 145-158.

BEHRMAN, J., 'Foreign Licensing', The Patent, Trademark and Copyright Journal of Research and Education, Vol 1, No 2, December 1957, pp 220-243.

BEHRMAN, J., 'Advantages and Disadvantages of Foreign Licensing', *The Patent, Trademark and Copyright Journal of Research and Education*, Vol 2, No 1, March 1958, pp 137-156.

BEHRMAN, J., 'Licensing Abroad under Patents, Trademarks, and Know-how by US Companies', *The Patent, Trademark and Copyright Journal of Research and Education*, Vol 2, No 2, June 1958, pp 181-277.

BEHRMAN, J., 'Foreign Licensing and Investment in US Economic Policy', *The Patent, Trademark and Copyright Journal of Research and Education*, Vol 4, No 2, Summer 1960, pp 150-172.

BELLI, R.D., 'Sales of Foreign Affiliates of US Firms 1961-5, 1967 and 1968', *Survey of Current Business*, October 1970.

BERENSON, M.L. & LEVINE, D.M., *Basic Business Statistics: Concepts and Application*, 2nd edn., Englewood Cliffs, N.J.: Prentice-Hall, 1983.

BERLE, A.A. & MEANS, G.C., *The Modern Corporation and Private Property*, New York: Macmillan, 1932.

BEVAN, T.H., 'Some Problems of International Bank Lending', *Barclays Review*, February 1983, pp 10-14.

BILLERBECK, K. & YASUGI, Y., *Private Direct Foreign Investment in Developing Countries*, World Bank Staff Working Paper, No 348, July 1979.

BINDON, K.R., *Inventories and Foreign Currency Translation Requirements*, Ann Arbor, Michigan: UMI Research Press, 1983.

BLACK, J.S., 'Work Role Transitions: A Study of American Expatriate Managers in Japan', *Journal of International Business Studies*, Vol 48, No 2, pp 277-293.

BLAKE, D., 'Banks on the Brink', *New Statesman*, 7 January 1983, pp 18-19.

BLALOCK, H.M., *Social Statistics*, 2nd ed, Tokyo: McGraw-hill, 1972.

BOISOT, M., *An Analysis of Technology Transfer in the South East Asian Chemical Industry*, Unpublished PhD thesis, Imperial College of Science and Technology, Universty of London, 1982.

BOISOT, M., 'Convergence Revisited: The Codification and Diffusion of Knowledge in a British and a Japanese Firm', *Journal of Management Studies*, Vol 20, No 2, 1983, pp 159-190.

BOISOT, M. 'Markets and Hierarchies in a Cultural Perspective', *Organization Studies*, Vol 7, No 2, 1986, pp 135-158.

BONIN, B., 'Contractual Agreements and International Technology Transfers: The Empirical Studies', Ch 5 in Safarian, A.E. & Bertin, G.Y. (eds), *Multinationals, Governments and International Technology Transfer*, London: Croom Helm, 1987.

BOUJU, A., Patent Infringement Litigation Costs: A Practical Worldwide Survey, London: Longman, 1987.

BRANDT COMMISSION (THE), North-South: A Programme For Survival, London: Pan Books, 1980.

BRANDT COMMISSION (THE), Common Crisis North-South: Cooperation For World Recovery, London: Pan Books, 1983.

BRERETON, B., 'US Multinational Companies: Operations in 1984', Survey of Current Business, September 1986, pp 27-38.

BUCKLEY, J.W., BUCKLEY, M.M. & CHIANG, H.F., Research Methodology and Business Decisions, US: National Association of Accountants & Society of Management Accountants, 1976.

BUCKLEY, P.J., 'New Theories of International Business: Some Unresolved Issues', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 34-50.

BUCKLEY, P.J., 'New Forms Of International Industrial Co-operation', Chap 3 in Buckley, P.J. & Casson, M., The Economic Theory of the Multinational Enterprise, London: Macmillan, 1985, pp 39-59.

BUCKLEY, P.J., 'The Limits of Explanation: Testing The Internalization Theory of Multinational Enterprise', Journal of International Business Studies, Vol 19, No. 2, Summer 1988, pp 181-193. (Originally presented at the annual conference of the Academy of International Business, London, November 1986).

BUCKLEY, P.J. & CASSON, M., The Future of The Multinational Enterprise, London: Macmillan, 1976.

BUCKLEY, P.J. & CASSON, M., 'The Optimal Timing of a Foreign Direct Investment', The Economic Journal, Vol 91, March 1981, pp 75-87.

BUCKLEY, P.J. & DAVIES, H., 'The Place of Licensing in the Theory and Practice of Foreign Operations', University of Reading Discussion Paper in International Investment and Business Studies, No. 47, November 1979.

BUCKLEY, P.J. & DAVIES, H., 'Foreign Licensing In Overseas Operations: Theory and Evidence From The U.K.', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer And Economic Development, London: JAI Press Inc., 1981, pp 75-89.

BUCKLEY, P.J. & PRESCOTT, K., 'The Structure of British Industry's Sales in Foreign Markets', Managerial and Decision Economics, Vol 10, 1989, pp 189-208.

BUSINESS INTERNATIONAL, International Licensing: Opportunities and Challenges in Worldwide Technology Management, New York: Business International Corporation, 1977.

BUSINESS WEEK, 'How the Debt Crisis is Battering Multinationals', Business Week International, July 25 1983, pp 52-54.

BYRNE, J.F., The Sale, Pricing and Management of the Transfer of Company Know-How in International Business, Unpublished PhD Thesis, Manchester Business School, January 1980.

CALVET, A.L., 'A Synthesis of Foreign Direct Investment Theories and Theories of the Multinational Firm', Journal of International Business Studies, Spring/Summer, 1981, pp 43-59.

CARSTAIRS, R.T. & WELCH, L.S., 'Licensing and the Internationalization of Smaller Companies: Some Australian Evidence', Management International Review, Vol 22, No 3, 1982, pp 33-44.

CASS, T., Statistical Methods in Management 2, London: Cassell, 1980.

CASSON, M., Alternatives To The Multinational Enterprise, London: Macmillan, 1979.

CASSON, M., 'Foreword' to Rugman, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981, pp 15-21.

CASSON, M., 'Transaction Costs and the Theory of the Multinational Enterprise', in Rugman, A.M. (ed.), New Theories of The Multinational Enterprise, London: Croom Helm, 1982, pp 24-43.

CASSON, M., 'Introduction: the Conceptual Framework', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 1-33.

CASSON, M., 'Multinationals and Intermediate Product Trade: A Computable Model', University of Reading Discussion Paper in International Investment and Business Studies, No 70, January 1983.

CASSON, M., 'General Theories of the Multinational Enterprise: A Critical Evaluation', University of Reading Discussion Paper in International Investment and Business Studies, No. 77, January 1984.

CATTELL, R.B., 'The Meaning and Strategic Use of Factor Analysis', in Cattell, R.B. (ed), Handbook of Multivariate Experimental Psychology, Chicago: Rand McNally, 1966.

CAVANAGH, J. & CLAIRMONTE, F., 'From Corporations to Conglomerates: A Review of Multinationals over the last Twenty Years', Multinational Monitor, January 1983, pp 16-19.

CAVES, R.E., 'International Corporations: The Industrial Economics of Foreign Investment', Economica, Vol 38, February 1971, pp 1-27.

CAVES, R.E., 'The Causes of Direct Investment: Foreign Firms' Shares in Canadian and UK Manufacturing Industries', Review of Economics and Statistics, Vol 56, August 1974, pp 279-293.

CAVES, R.E., Multinational Enterprise and Economic Analysis, Cambridge: Cambridge University Press, 1982.

CAVES, R.E., CROOKELL, H. & KILLING, J.P., 'The Imperfect Market for Technology Licences', Oxford Bulletin of Economics and Statistics, Vol 45, No 3, August 1983, pp 249-267.

CAWTHRA, B.I., Patent Licensing in Europe, London: Butterworths, 1986.

CHILD, D.C., The Essentials of Factor Analysis, London: Holt, Rinehart and Winston, 1970.

CLEGG, J., Multinational Enterprise and World Competition, London: Macmillan, 1987.

COASE, R.H., 'The Nature of the Firm', Economica, New Series, 4, November 1937, pp 386-405.

COASE, R.H., 'The Problem of Social Cost', Journal of Law and Economics, 3, October 1960, pp 1-44.

COCHRAN, W.G., 'Some Methods for Strengthening the Common X^2 Tests', Biometrics, Vol 10, 1954, pp 417-451.

COHEN, L. & HOLLIDAY, M., Statistics for Social Scientists, London: Harper & Row, 1982.

COHEN, Y. & PFEFFER, J., 'Organizational Hiring Standards', Administrative Science Quarterly, Vol 31, March 1986, pp 1-24.

COMMONS, J.R., Institutional Economics: Its Place in Political Economy, New York: Macmillan, 1934.

CONOVER, W.J., Practical Nonparametric Statistics, 2nd ed, Toronto: John Wiley & Sons, 1980.

COMREY, A.L., A First Course in Factor Analysis, New York: Academic Press, 1973.

CONTRACTOR, F.J., International Technology Licensing: Compensation, Costs and Negotiation, Lexington, Mass.: Lexington Books, 1981.

CONTRACTOR, F.J., 'The Role of Licensing in International Strategy', Columbia Journal of World Business, Vol 16, Part 4, 1981, pp 73-83.

CONTRACTOR, F. J., 'Technology Licensing Practice In US Companies: Corporate And Public Policy Implications', Columbia Journal of World Business, Fall 1983, pp 80-88.

CONTRACTOR, F.J., Licensing in International Strategy: A Guide for Planning and Negotiations, Westport, Conn.: Quorum Books, 1985.

CONTRACTOR, F.J. & LORANGE, P., 'Why should Firms Cooperate? The Strategy and Economics Basis for Cooperative Ventures' in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988. pp 3-28.

COOK, R.D. & WEISBERG, S., Residuals and Influence in Regression, New York: Chapman and Hall, 1982.

CREED, J.F. & BANGS, R.B., 'Know-how Licensing and Capital Gains', The Patent, Trademark and Copyright Journal of Research and Education, Vol 93, 1960, pp 93-107.

CROOKELL, H., 'Getting Along Without Multinational Firms', Academy Of International Business Annual Conference Proceedings, Hawaii, December 1982.

CRUISE O'BRIEN, R. & HELLEINER, G.K., 'The Political Economy of Information in a Changing International Economic Order', International Organization, Vol 34, No 4, Autumn 1980, pp 445-470.

CYERT, R.M. & MARCH, J.G., A Behavioural Theory of the Firm, Englewood Cliffs, N.J.: Prentice Hall, 1963.

DAHLMAN, C.J., 'The Problem of Externality', Journal of Law and Economics, Vol 22, April 1979, pp 141-162.

DANIELS, J.D. & RADEBAUGH, L., International Business: Environment and Operations, 4th ed, Reading, Mass.:Addison-Wesley, 1986.

DAVIDSON, W.H., Experience Effects in International Investment and Technology Transfer, Ann Arbor, Mi.: UMI Research Press, 1980.

DAVIDSON, W.H., 'Structure and Performance in International Technology Transfer', Journal of Management Studies, Vol 20, No 4, 1983, pp 453-465.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'International Technology Transactions and the Theory of the Firm', The Journal of Industrial Economics, Vol 32, No 3, March 1984, pp 253-264.

DAVIDSON, W.H. & MCFETRIDGE, D.G., 'Key Characteristics in the Choice of International Technology Transfer Mode', Journal of International Business Studies, Vol 16, No 2, Summer 1985, pp 5-21.

DAVIES, H., 'Technology Transfer Through Commercial Transactions', The Journal of Industrial Economics, Vol 26, No 2, December 1977, pp 161-175.

DAVIES, H., 'Marketing the Sale of Knowledge Abroad', Chap 3.3 in Brooke, M.Z. & Buckley, P.J. (eds), Handbook of International Trade, Brentford:Kluwer, 1982.

DAVIES, H. & ROSSER, N., 'International Trade in Technology: A Survey', in Lowe, J. & Crawford, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon Press, 1984, pp 187-209.

DEMSETZ, H., 'Information and Efficiency: Another Viewpoint', Journal of Law and Economics, Vol 12, No 1, April 1969, pp 1-22.

DEPARTMENT OF TRADE AND INDUSTRY (DTI), Intellectual Property and Innovation, White Paper presented to Parliament, Cmnd. 9712, London: HMSO, 1986.

DRAPER, N. & SMITH, H., Applied Regression Analysis, 2nd edn, New York: John Wiley, 1981.

DUN & BRADSTREET, Key British Enterprises 1984 - Britains's Top 20,000 Companies, London: Dun & Bradstreet Ltd., 1984.

DUNNING, J.H., American Investment in British Manufacturing Industry, London: Allen & Unwin, 1958.

DUNNING, J.H., 'Introduction' to Dunning, J.H. (ed), International Investment: Selected Readings, London: Penguin Books, 1972, pp 9-23.

DUNNING, J.H., 'The Determinants of International Production', Oxford Economic Papers, Vol 25, No 3, November 1973, pp 289-336.

DUNNING, J.H., 'Trade, Location of Economic Activity and the MNE: A Search for an Eclectic Approach', in Ohlin, B., Hesselborn, P.O. & Wijkman, P.M. (eds.), The International Allocation of Economic Activity, London: Macmillan, 1977, pp 395-418.

DUNNING, J.H., 'Multinational Business and the Challenge of the 1980's', Multinational Business, No. 1, 1978, pp 2-8.

DUNNING, J.H., 'Explaining Changing Patterns of International Production: In Defence of Eclectic Theory', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 269-295.

DUNNING, J.H., 'Recent Developments in Research on Multinational Enterprises: An Economist's Viewpoint', in Mattson, L.G., & Wiedersheim-Paul, F. (eds.), Recent Research on the Internationalisation of Business, Almqvist & Wiksell International, Sweden, 1979.

DUNNING, J.H., 'Alternative Channels and Modes of International Resource Transmission', in Sagafi-Nejad, T., Moxon, R.W. & Perlmutter, H.V. (eds), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 3-26.

DUNNING, J.H., 'Explaining The International Direct Investment Position of Countries: Towards a Dynamic or a Developmental Approach', Weltwirtschaftliches Archiv, Vol 117, No 1, 1981 pp 30-64.

DUNNING, J.H., 'Towards A Taxonomy of Technology Transfer And Possible Impacts on OECD Countries', in OECD, North/South Technology Transfer: The Adjustments Ahead, Paris: OECD, 1982, pp 8-24.

DUNNING, J.H., 'Non-Equity Forms of Foreign Economic Involvement and the Theory of International Production', University of Reading Discussion Paper in International Investment and Business Studies, No. 59, February 1982.

DUNNING, J.H., 'Changes in the Structure of International Production: The Last 100 Years', in Casson, M.C. (ed), The Growth of International Business, London: Allen & Unwin, 1983.

DUNNING, J.H., 'Market Power of the Firm and International Transfer of Technology', International Journal of Industrial Organization, Vol 1, 1983, pp 333-351.

DUNNING, J.H., 'The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions', Journal of International Business Studies, Vol 19, No 1, Spring 1988, pp 1-31.

DUNNING, J.H. & CANTWELL, J.A., 'Joint Ventures and Non-Equity Foreign Involvement by British Firms with Particular Reference to Developing Countries: An Exploratory Study', University of Reading Discussion Paper in International Investment and Business Studies, No. 68, 1981.

DUNNING, J.H. & PEARCE, R.D., 'Some Observations on the New Forms of International Resource Transfer', UNCTC Report, January 1982. (Mimeographed).

DUNNING, J.H. & RUGMAN, A.M., 'The Influence of Hymer's Dissertation on the Theory of Foreign Direct Investment', American Economic Review, Vol 75, No 2, May 1985, pp 228-232.

DURBIN, J. & WATSON, G.S., 'Testing for Serial Correlation in Least Squares Regression II', Biometrika, Vol 38, 1951, pp 159-178.

EITEMAN, D.K. & STONEHILL, A.I., Multinational Business Finance, 4th ed, Reading, Mass.: Addison-Wesley, 1986.

EMORY, C.W., Business Research Methods, 2nd ed., Homewood, Illinois: Richard D. Irwin Inc., 1980.

ERICKSON, B.H. & NOSANCHUCK, T.A., Understanding Data, Toronto: McGraw-Hill, 1977.

FAMA, E.F., 'Agency Problems and the Theory of the Firm', Journal of Political Economy, April 1980, pp 288-307.

FINNEGAN, M.B., Current Trends in Domestic and International licensing, New York: Practising Law Institute, 1976.

FISCHER, S., 'Long-Term Contracting, Sticky Prices and Monetary Policy: Comment', Journal of Monetary Economics, Vol 3, 1977, pp 312-314.

FORD, D. & RYAN, C., 'Taking Technology to Market', Harvard Business Review, March/April, 1981, pp 117-126.

FOX, B., 'Is The Day of the Patent Over?', New Scientist, 10 September 1981, pp 653-655.

FRAME, J.D., International Business and Global Technology, Lexington, Mass.: Lexington Books, 1982.

FRIEDMAN, M., 'The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance', Journal of the American Statistical Association, Vol 32, 1937, pp 675-701.

GABRIEL, P., 'Management of Public Interests by the Multinational Corporation', Journal of World Trade Law, Jan-Feb, 1977, pp 15-36.

GALBRAITH, C.S. & KAY, N., 'Towards a Theory of Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 3-19.

GALBRAITH, J.K., Economics and the Public Purpose, London: Andre Deutsch, 1973.

GALLAFENT, R., EASTAWAY, N. & DAUPPE, V., Intellectual Property Law and Taxation, London: Oyez Publishing, 1981.

GALLINI, N.T., 'Deterrence by Market Sharing: A Strategic Incentive for Licensing', American Economic Review, Vol 74, No 5, December 1984, pp 931-941.

GARDNER, P.L., 'Scales and Statistics', Review of Educational Research, Vol 45, No. 1, 1975, pp 43-57.

GIDDY, I.H. & RUGMAN, A.M., A Model of Trade, Foreign Direct Investment and Licensing, Research Working Paper No 274A, Graduate School of Business, Columbia University, December 1979.

GIRVAN, N.P., 'Transnational Corporations in a Changing World Economic Environment: Some Issues for Research and Policy', The CTC Reporter, Fall 1982, pp 6-7 & 33-35.

GOFFMAN, I., Strategic Interaction, Philadelphia: University of Pennsylvania Press, 1969.

GRAHAM, E.M., Oligopolistic Imitation and European Direct Investment in the United States, Doctoral Thesis, Harvard Business School, 1974.

GRAY, H.P., International Trade, Investment and Payments, Boston: Houghton Mifflin Co., 1979.

GRAY, R.H., 'Research and Development', in Tonkin, D.J. & Skerrat, L.C.L. (eds.), Financial Reporting 1983-84: A Survey of Published Accounts, London: ICAEW, 1983.

GROSSE, R., The Theory of Foreign Direct Investment, South Carolina Essays in International Business, No 3, December 1981.

GROSSE, R., 'An Imperfect Competition Theory of the MNE', Journal of International Business Studies, Vol 16, No 1, Spring 1985, pp 57-80.

GRUBER, W.D., MEHTA, D. & VERNON, R., 'The R&D Factor In International Trade and International Investment of United States Industries', Journal of Political Economy, Vol 75, February 1967, pp 20-37.

HARRIGAN, K.R., 'Strategic Alliances and Partner Asymmetries', in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988, pp 205-226.

HARRIS, C. & VICKERS, J., 'Patent Races and the Persistence of Monopoly', The Journal of Industrial Economics, Vol 33, no 4, June 1985, pp 461-481.

HEARN, P., International Business Agreements: A Practical Guide to the Negotiation and Formulation of Agency, Distribution and Intellectual Property Licensing Agreements, Aldershot: Gower, 1987.

HILL, C.W. & CHAN KIM, W., 'Searching for a Dynamic Theory of the Multinational Enterprise: A Transaction Cost Model', Strategic Management Journal, Vol 9, 1988, pp 93-104.

HILL, C.W., HWANG, P. & CHAN KIM, W., 'An Eclectic Theory of the Choice of International Entry Mode', Strategic Management Journal, Vol 11, 1990, pp117-128.

HIRSCH, S., 'An International Trade and Investment Theory of the Firm', Oxford Economic Papers, July 1976, pp 258-270.

HMSO, Intellectual Property Rights and Innovation, Green Paper presented to Parliament by The Prime Minister, Cmnd. 9117, London: HMSO, 1983.

HMSO, Annual Abstract of Statistics, London: Central Statistical Office. (Various issues).

HMSO, Business Monitor MA4: Overseas Transactions, and its predecessor M4, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MO4: Census Of Overseas Assets, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MQ10: Overseas Trade Analysed In Terms Of Industries, London: Business Statistics Office. (Various issues).

HMSO, Business Monitor MA20: Overseas Trade Statistics of the United Kingdom, London: Business Statistics Office. (Various issues).

HOAGLIN, D.C. & WELSCH, R.E., 'The Hat Matrix in Regression and ANOVA', American Statistician,, Vol 32, 1978, pp 17-22.

HOBBES, T., Leviathan, London: Penguin Books, 1968. (First published in 1651).

HOINVILLE, G., JOWELL, R. et al, Survey Research Practice, London: Heinemann Educational Books, 1978.

HOOD, N. & YOUNG, S., The Economics of Multinational Enterprise, London: Longman, 1979.

HORST, T., 'The Industrial Composition of US Exports and Subsidiary Sales to the Canadian Market', American Economic Review, Vol 62, March 1972, pp 37-45.

HYMER, S.H., The International Operations of National Firms: A Study of Direct Investment, Cambridge, Mass: MIT Press, 1960 (published 1976).

JACQUILLAT, B., & SOLNIK, B., 'Multinatonals are Poor Tools for Diversification', Journal of Portfolio Management, Winter 1978.

JENSEN, M.C., 'Organization Theory and Methodology', The Accounting Review, Vol 58, No 2, April 1983, pp 319-339.

JENSEN, M.C., 'Eclipse of the Public Corporation', Harvard Business Review, September-October 1989, pp 61-74.

JENSEN, M.C. & MECKLING, W.H., 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure', Journal of Financial Economics, Vol 3, 1976, pp 305-360.

JOHANSSON, J. & NEBENZAHL, I.D., 'Multinational Production: Effect on Brand Value', Journal of International Business Studies, Vol 43, No 3, Fall 1986, pp 101-126.

JOHANSON, J. & VAHLNE, J.E., 'The Internationalization Process of the Firm - a Model of Knowledge Development and Increasing Foreign Market Commitments', Journal of International Business Studies, Vol 8, No 1, Spring/Summer, 1977, pp 23-32.

JOHNSON, H.G., 'The Efficiency and Welfare considerations of the International Corporation', in Kindleberger, C.P. (ed.), The International Corporation, Cambridge, Mass: MIT Press, 1970.

JOHNSON, H.G., 'The State of Theory in Relation to Empirical Analysis' in Vernon, R. (ed), The Technology Factor in International Trade, New York: NBER, 1970.

JOHNSON, H.T., 'The Search For Gain In Markets and Firms: A Review of the Historical Emergence of Management Accounting Systems', Accounting, Organizations and Society, Vol 8, No 2/3, 1983, pp 139-146.

JONES, R.W., International Trade: Essays in Theory, Amsterdam: North-Holland, 1979.

JONES, G.R. & HILL, C.W., 'Transaction Cost Analysis of Strategy-Structure Choice', Strategic Management Journal, Vol 9, 1988, pp 159-172.

KAISER, H.F., 'The Varimax Criterion for Analytic Rotation in Factor Analysis', Psychometrika, Vol 23, 1958, pp 187-200.

KAISER, H.F., 'Computer Program for Varimax Rotation in Factor Analysis', Educational And Psychological Measurement, Vol 19, 1959, pp 413-420.

KAISER, H.F., 'An Index of Factorial Simplicity', Psychometrika, Vol 39, 1974, pp 31-36.

KAY, N.M., 'Multinational Enterprise: A Review Article', Scottish Journal of Political Economy, Vol 30, No 3, November 1983, pp 304-312.

KELLY, M.W., Foreign Investment Evaluation Practices of US Multinational Corporations, Ann Arbor, Michigan: UMI research Press, 1981.

KENDALL, M.G., Rank Correlation Methods, London: Griffin, 1948.

KENDALL, M.G., Time-Series, 2nd edn, London: Charles Griffin & Co., 1976.

KERLINGER, F.N., Foundations of Behavioural Research, 2nd ed., New York: Holt, Rinehart & Winston Inc., 1973.

KIM, J.O., 'Multivariate Analysis of Ordinal Variables', American Journal of Sociology, Vol 81, 1975, pp 261-298.

KIM, J.O. & MUELLER, C.W., Introduction to Factor Analysis: What it is and how to do it, London: Sage Publications Ltd, 1978.

KINDLEBERGER, C.P., American Business Abroad: Six Lectures on Direct Investment, New Haven, Conn.: Yale University Press, 1969.

KINDLEBERGER, C.P., Multinational Excursions, Cambridge, Mass.: The MIT Press, 1984.

KINGSTON, W., 'Patents and Market Power', The Inventor, Vol 23, No 4, Oct/Nov, 1983, pp 9-13.

KLEIN, R.W., 'A Dynamic Theory of Comparative Advantage', American Economic Review, Vol 68, 1973, pp 173-184.

KLEINBAUM, D.G., KUPPER, L.L. & MULLER, K.E., Applied Regression Analysis and Other Multivariable Methods, Boston, Mass.: PWS-Kent, 1988.

KNICKERBOCKER, F.T., Oligopolistic Reaction and Multinational Enterprise, Boston: Harvard University Press, 1973.

KNIGHT, F.H., Risk, Uncertainty and Profit, New York: Houghton Mifflin, 1921.

KOGUT, B., 'Foreign Direct Investment as a Sequential Process', Ch 2 in Kindleberger, C.P. & Audretsch, D. (eds.), The Multinational Corporation in the 1980's, Cambridge, Mass.: the MIT Press, 1983.

KOGUT, B., 'Joint Ventures: Theoretical and Empirical Perspectives', Strategic Management Journal, Vol 9, 1988, pp 319-332.

KOJIMA, K., Direct Foreign Investment: A Japanese Model of Multinational Business Operations, London: Croom Helm, 1978.

KOUTSOYIANNIS, A., Non-Price Decisions: The Firm in a Modern Context, London: Macmillan, 1982.

KWACK, S.Y., 'A Model of US Direct Investment Abroad: A Neoclassical Approach', Western Economic Journal, Vol 10, December 1972: 376-383.

LABOUR RESEARCH DEPARTMENT, 'Multinationals: Better at Exporting Jobs than goods', Labour Research, April 1983, pp 97-99.

LABOVITZ, S., 'Some Observations on Measurement and Statistics', Social Forces, Vol 46, No. 2, December 1967, pp 151-160.

LABOVITZ, S., 'The Assignment of Numbers to Rank Order Categories', American Sociological Review, Vol 35, No. 3, June 1970, pp 515-524.

LEIBENSTEIN, H., 'Allocative Efficiency Vs. "X-Efficiency"', American Economic Review, Vol 56, June 1966, pp 392-415.

LEONTIEF, W.W., 'Domestic Production and Foreign Trade: The American Capital Position Re-examined', Economia Internazionale, Vol 7, 1954.

LORD, F.M., 'On the Statistical Treatment of Football Numbers', American Psychologist, Vol 8, 1953, pp 750-751.

LOVELL, E.B. Foreign Licensing Arrangements: Evaluation and Planning, Studies in Business Policy, No 86, New York: National Industrial Conference Board, 1958.

LOVELL, E.B., Appraising Foreign Licensing Performance, Studies in Business Policy, No 128, New York: National Industrial Conference Board, 1969.

LOWE, J. & CRAWFORD, N., Innovation and Technology Transfer for the Growing Firm: Text and Cases, Oxford: Pergamon, 1984.

MACMILLAN, K. & FARMER, D., ' Redefining the Boundaries of the Firm', The Journal of Industrial Economics, Vol 27, No 3, March 1979, pp 277-285.

MADDISON, R., Patent and Patent Licensing Law in Europe: Recent Trends and Current Developments, Economist Intelligence Unit Special Report No 97, London: Economist Publications, 1981.

MAGEE, S.P., 'Multinational Corporations, the Industry Technology Cycle and Development', Journal of World Trade Law, July/August, 1977, pp 297-321.

MAGEE, S.P., 'Information and the Multinational Corporation: An Appropriability Theory of Direct Foreign Investment', in Bhagwati, J. (ed.), The New International Economic Order: The North-South Debate, Cambridge, Mass.: The MIT Press, 1977, pp 317-340.

MAGEE, S.P., 'The Appropriability Theory of the Multinational Corporation', The Annals of the American Academy of Political and Social Science, Vol 458, November 1981, pp 123-135.

MANSFIELD, E., 'How Rapidly does New Industrial Technology Leak Out?', The Journal of Industrial Economics, Vol 34, No 2, 1985, pp 217-223.

MANSFIELD, E. & ROMEO, A., 'Overseas Research and Development by US-Based Firms', Economica, Vol 46, May 1979, pp 187-196.

MANSFIELD, E. & ROMEO, A., 'Technology Transfer to Overseas Subsidiaries by US-Based Firms', Quarterly Journal of Economics, Vol 95, December 1980, pp 737-750.

MANSFIELD, E., ROMEO, A. & WAGNER, S., 'Foreign Trade and US Research and Development', The Review of Economics and Statistics, Vol 61, No 1, February 1979, pp 49-57.

MANSFIELD, E., SCHWARTZ, M. & WAGNER, S., 'Imitation Costs and Patents: An Empirical Study', The Economic Journal, Vol 91, December 1981, pp 907-918.

MARITI, P. & SMILEY, R.H., 'Co-Operative Agreements and the Organization of Industry', The Journal of Industrial Economics, Vol 31, No 4, June 1983, pp 437-451.

MARKOWITZ, H.M., 'Portfolio Selection', Journal of Finance, Vol 7, March 1952, pp 77-91.

MARKOWITZ, H.M., Portfolio Selection: Efficient Diversification of Investments, New York: Wiley, 1959.

MARRIS, R.L., The Economic Theory of Managerial Capitalism, London: MacMillan, 1964.

MASCARENHAS, B., 'The Coordination of Manufacturing Interdependence in Multinational Companies', Journal of International Business Studies, Vol 37, No 3, Winter 1984, pp 91-106.

MASON, E.S., 'Price and Production Policies of Large Scale Enterprises', American Economic Review Supplement, Vol 29, March 1939, pp 61-74.

MASON, R.H., 'Comments on J. Dunning's "Alternative Channels & Modes of International Resource Transmission"', in Sagafi-Nejad T., Moxon, R.W., & Perlmutter H.V. (eds.), Controlling International Technology Transfer: Issues, Perspectives and Implications, New York: Pergamon, 1981, pp 27-36.

McGREEVY, E.R., Some Effects of Environmental Changes on Strategic Plannning of US-Based Industrial Multinational Corporations, University of Arkansas, PhD Dissertation, 1978.

McMANUS, J.C., 'The Theory of the Multinational Firm', in Paquet, C. (ed.), The Multinational Firm and the Nation State, Toronto: Collier-Macmillan, 1972.

McMANUS, J.C., 'The Costs of Alternative Economic Organizations', Canadian Journal of Economics, Vol 8, No 3, 1975, pp 334-350.

MILLER, D. & DROGE, C., 'Psychological and Traditional Determinants of Structure', Administrative Science Quarterly, Vol 31, December 1986, pp 539-560.

MILLER, L.H., 'Table of Percentage Points of Kolmogorov Statistics', Journal of the American Statistical Association, Vol 51, 1956, pp 111-121.

MILLMAN, A.F., 'Technology Transfer in the International Market', European Journal of Marketing, Vol 17, No 1, 1983, pp 26-47.

MILLS, R.L., Statistics for Applied Economics and Business, New York: McGraw-Hill, 1977.

MICHALET, C.A., 'International Subcontracting: A state of the Art', in Germidis, D. (ed.), International Subcontracting: A New Form of Investment, Paris: OECD, 1980.

MICHALET, C.A. & DELAPIERRE, M., The Multinationalization of French Firms, Chicago: Academy of International Business, 1976.

MORSICATO, H.G., Currency Translation and Performance Evaluation in Multinationals, Ann Arbor, Michigan: UMI Research Press, 1980.

MOSTELLER, F.M. & ROURKE, R.E., Sturdy Statistics: Nonparametric and Order Statistics, Reading, Mass.: Addison-Wesley, 1973.

MOSTELLER, F.M. & TUKEY J.W., Data Analysis and Regression: A Second Course in Statistics, Reading, Mass.: Addison-Wesley, 1977.

NEWTON, D.J., Transnational Joint Ventures and Acquisitions in the EEC, paper presented at the annual conference UK Chapter of the Academy of International Business, University of Bradford Management Centre, April 1984.

NICHOLAS, S.J., Transactional Cost Approach To Institutional Change, Business History Unit Discussion Paper, London School of Economics, 1982. (Mimeographed).

NICHOLAS, S.J., 'Agency Contracts, Institutional Modes, and the Transition to Foreign Direct Investment by British Manufacturing Multinationals Before 939', Journal of Economic History, Vol 43, No 3, September 1983, pp 675-686.

NICHOLAS, S.J., The Choice Between Sales and Production Branches as Forms of Transacting Internationally: British Manufacturing Multinationals, 1870-1939', Paper presented at the annual conference of the Academy of International Business, London, November 1986.

NICHOLAS, S.J., 'The Theory of Multinational Enterprise as a Transactional Mode', Ch 4 in Hertner, P. & Jones, G. (eds.), Multinationals: Theory and History, Aldershot: Gower, 1986, pp 64-79.

NORUSIS, M.J., SPSS^X Advanced Statistics Guide, Chicago: SPSS Inc, 1985.

OECD, International Investment and Multinational Enterprises: Some Recent International Direct Investment Trends, Paris:OECD, 1981.

OMAN, C., 'New North-South Investment Strategies', The OECD Observer, September 1981, pp 13-15.

OMAN, C., New Forms of International Investment in Developing Countries, Paris: OECD, 1984.

OMAN, C., 'Cooperative Strategies in Developing Countries: The New Forms of Investment', in Contractor, F.J. & Lorange, P. (eds), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988, pp 383-402.

OUCHI, W.G., 'Markets, Bureaucracies and Clans', Administrative Science Quarterly, Vol 25, March 1980, pp 129-142.

OZAWA, T., 'International Investment and Industrial Structure: New Theoretical Implications From the Japanese Experience', Oxford Economic Papers, Vol 31, No 1, March 1979, pp 72-92.

PARRY, T.G., 'The Product Cycle and International Production: UK Pharmaceuticals', Journal of Industrial Economics, Vol 24, No 1, September 1975, pp 21-28.

PARRY, T.G., 'Methods of Servicing Overseas Markets: The UK-Owned Pharmaceutical Industry', University of Reading Discussion Paper in International Investment and Business Studies, No 27, May 1976.

PARRY, T.G., The Multinational Enterprise: International Investment and Host-Country Impacts, Greenwich, Conn.: JAI Press, 1980.

PARRY, T.G., 'Internalization as a General Theory of Foreign Direct Investment: A Critique', Weltwirtschaftliches Archiv, Vol 121, No 3, 1985, pp 565-569.

PARRY, T.G., The Multinational Enterprise and Restrictive Conditions in International Technology Transfer, Paper presented at the annual conference of the Academy of International Business, London, November 1986.

PARRY, T.G., 'The Multinational Enterprise and Restrictive Conditions in International Technology Transfer: Some New Australian Evidence', The Journal of Industrial Economics, Vol 36, No 3, March 1988, pp 359-365.

PINDYCK, R.S. & RUBINFELD, D.L., Econometric Models and Economic Forecasts, 2nd edn, London: McGraw-Hill, 1981.

POLK, J., MEISTER, W. & VEIT L., US Production Abroad And The Balance of Payments, New York: The National Industrial Conference Board, 1966.

PORTER, M.E., Competitive Strategy, New York: The Free Press, 1980.

PORTER, M.E. Competitive Advantage: Creating and Sustaining Superior Performance, New York: The Free Press, 1985.

PORTER, M.E. (ed), Competition In Global Industries, Boston, Mass.: Harvard Business School Press, 1986

PORTER, M.E. & FULLER, M.B., 'Coalitions and Global Strategy' in Porter, M.E. (ed.), Competition in Global Industries, Boston, Mass.: Harvard Business School Press, 1986.

PRASAD, S.J., 'Technology Transfer to Developing Countries through Multinational Corporations', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981, pp 193-218.

PRATTEN, C., Economies of Scale in Manufacturing Industry, Cambridge: Cambridge University Press, 1971.

REUBER, G.L., Private Foreign Investment in Development, London: Clarendon Press, 1973.

REVE, T., 'The Firm as a Nexus of Internal and External Contracts', in Aoki, M., Gustafsson, B. & Williamson, O.E. (eds) The Firm as a Nexus of Treaties, London: Sage Publications, 1990, pp 133-161.

RICHARDSON, J.D., 'On "Going Abroad": The Firm's Initial Foreign Investment Decision', Quarterly Review of Economics and Business, Vol 11, Winter 1971, pp 7-22.

ROFFE, P., 'Code of Conduct on the Transfer of Technology', The CTC Reporter, No 24, Autumn 1987, pp 39-40 & p 43.

ROOT, F.R., Entry Strategies for International Markets, Lexington, Mass.: D C Heath & Co, 1987.

ROOT, F.R., 'Some Taxonomies of International Cooperative Arrangements', in Contractor, F.J. & Lorange, P. (eds.), Cooperative Strategies in International Business, Lexington, Mass.: Lexington Books, 1988.

RUGMAN, A.M., International Diversification and the Multinational Firm, Lexington, Mass.: Lexington Books, 1979.

RUGMAN, A.M., 'Internalization as a General Theory of Foreign Direct Investment: A Re-Appraisal of the Literature', Weltwirtschaftliches Archiv, Vol 116, 1980, pp 365-379.

RUGMAN, A.M., Inside The Multinationals: The Economics of Internal Markets, New York: Columbia University Press, 1981.

RUGMAN, A.M., 'A Test of Internalization Theory', Managerial and Decision Economics, Vol 2, No 4, 1981, pp 211-219.

RUGMAN, A.M., 'Internalization and Non-Equity Forms of International Invovement', Ch1 in Rugman, A.M. (ed.), New Theories of the Multinational Enterprise, London: Croom-Helm, 1982.

RUGMAN, A.M., LECRAW, D.J. & BOOTH, L.D., International Business: Firm And Environment, New York: McGraw-hill, 1985.

RUMMELL, R.J. Applied Factor Analysis, Evanston: Northwestern University Press, 1970.

SAVAGE, R.S., 'Nonparametric Statistics', Journal of the American Statistical Association, Vol 52, No. 279, September 1957, pp 331-344.

SCAPERLANDA, A.E. & MAUER L.G., 'The Determinants of US Direct investment in the EEC', American Economic Review, Vol 59, September 1969, pp 558-568.

SCHELLING, T.C., The Strategy of Conflict, Cambridge, Mass.: Harvard University Press, 1960.

SHAPIRO, A.C., Multinational Financial Management, 2nd ed, Newton, Mass.: Allyn & Bacon, 1986.

SHARPSTON, M., 'International Subcontracting', Oxford Economic Papers, March 1975, pp 94-135.

SHEPHERD, D., SILBERSTON, A. & STRANGE, R., British Manufacturing Investment Overseas, London: Methuen & Co, 1985.

SIEGEL, S., Nonparametric Statistics for the Behavioural Sciences, New York: McGraw-Hill, 1956.

SIMON, H.A., Administrative Behaviour: A Study of Decision-Making Processes in Administrative Organization, 2nd edn, New York: Macmillan, 1957.

SIMON, H.A., Models of Man: Social and Rational Mathematical Essays on Rational Human Behaviour in a Social Setting, New York: Wiley, 1957.

SKELTON, R., 'Negotiating and Pricing Licences', Ch 4 in Lowe, J. & Crawford, N., Technology Licensing and the Small Firm, Aldershot: Gower, 1984, pp 43-50.

SMITH, A., An Inquiry into the Nature and Causes of the Wealth of Nations, Books 1-3, Skinner, A. (ed.), Harmondsworth: Penguin Books, 1970. First published, 1776.

SPENCE, A.M., 'The Economics of Internal Organization: An Introduction', The Bell Journal of Economics and Management Science, Vol 6, No 1, Spring 1975, pp 163-172.

SPICER, B.H. & BALLEW, V., 'Management Accounting Systems and the Economics of Internal Organization', Accounting, Organizations and Society, Vol 8, No 1, 1983, pp 73-96.

SPRENT, P., Quick Statistics: An Introduction to Non-parametric Methods, Harmondsworth, Middlesex: Pengiun, 1981.

STEVENS, S.S., 'On The Theory of Scales of Measurement', Science, Vol 103, 1946, pp 677-680.

STEVENS, S.S., 'Measurement, Statistics, and the Schemapiric View', Science, Vol 161, No. 3844, 30 August 1968, pp 849-856.

STOBAUGH, R.B., The Product Life Cycle, US Exports and International Investment, Unpublished DBA Thesis, Harvard Business School, 1968.

STOBAUGH, R.B., 'The Neotechnology Account of International Trade: the case of petrochemicals', Journal of International Business Studies, Fall 1971.

STOCK EXCHANGE PRESS, London Stock Exchange Yearbook 1983-84, Basingstoke, Hants.: MacMillan, 1984

STOPFORD, J.M., 'The Origins of British-Based Multinational Manufacturing Enterprises', Business History Review, Vol 48, Autumn 1974, pp 303-335.

STOPFORD, J.M., HABERICH, K.O. & DUNNING, J.H., The world Directory of Multinational Enterprises, London: Macmillan, 1980.

STOPFORD, J.M. & WELLS, L.T., Managing the Multinational Enterprise: Organization of the Firm and Ownership of Subsidiaries, London: Longman, 1972.

SUDERSANAM, P.S., 'How Homogeneous Are The London Stock Exchange Industry Groups?', The Investment Analyst, Vol 72, April 1984, pp 24-31.

TANSUHAJ, P.S. & GENTRY, J.W., 'Firm Differences in Perceptions of the Facilitating Role of Foreign Trade Zones in Global Marketing and Logistics', Journal of International Business Studies, Vol 44, No 1, Spring 1987, pp 19-33.

TAYLOR, C.T. & SILBERSTON, A., The Economic Impact of the Patent System: A Study of the British Experience, Cambridge: The University Press, 1973.

TEECE, D.J., Technology Transfer by Multinational Firms, Cambridge, Mass.: Ballinger, 1976.

TEECE, D.J., 'Technology Transfer by Multinational Firms', Economic Journal, Vol 87, June 1977, pp 242-261.

TEECE, D.J., 'Economies of Scope and the Scope of the Enterprise', Journal of Economic Behaviour and Organization, Vol 1, September 1980, pp 223-248.

TEECE, D.J., 'The Multinational Enterprise: Market Failure and Market Power Considerations', Sloan Management Review, Vol 22, Spring 1981, pp 3-17.

TEECE, D.J., 'The Market For Know-How and the Efficient International Transfer of Technology', The Annals of the American Academy of Political and Social Sciences, Vol 458, November 1981, pp 81-96.

TEECE, D.J., 'Technology Transfer and R&D Activities of Multinational Firms: Some Theory and Evidence', in Hawkins, R.G. & Prasad, A.J. (eds.), Research In International Business and Finance: Technology Transfer and Economic Development, London: JAI Press, 1981, pp 39-74.

TEECE, D.J., 'Towards An Economic Theory of the Multiproduct Firm', Journal of Economic Behaviour and Organization, Vol 3, 1982, pp 39-63.

TEECE, D.J., 'A Transactions Cost Theory of the Multinational Enterprise', University of Reading Discussion Paper in International Investment and Business Studies, No. 66, September 1982.

TEECE, D.J. 'Technological and Organizational Factors in the Theory of the Multinational Enterprise', in Casson, M. (ed.), The Growth of International Business, London: George Allen & Unwin, 1983, pp 51-62.

TEECE, D.J., 'Multinational Enterprise, Internal Governance, and Industrial Structure', American Economic Review, Vol 75, No 2, May 1985, pp 233-238.

TEECE, D.J., 'Transactions Cost Economics and the Multinational Enterprise', Journal of Economic Behaviour and Organization, Vol 7, 1986, pp 21-45.

TELESIO, P., Technology Licensing and Multinational Enterprises, New York:Praeger, 1979.

THOMPSON, R.S. & WRIGHT, M., Markets to Hierarchies and Back Again: The Implications of Management Buy-outs for Factor Supply, October 1985. (Mimeographed).

TILTON, J.E., International Diffusion of Technology: The case of Semiconductors, Washington, DC: Brookings Institution, 1971.

TUKEY, J.W., Exploratory Data Analysis, Reading, Mass.: Addison-Wesley, 1977.

TWISS, B., Managing Technological Innovation, 3rd ed, London: Longman, 1986.

UNITED NATIONS, Multinational Corporations in World Development, New York: UN Department of Economic and Social Affairs, 1973.

UNITED NATIONS, Transnational Corporations in World Development: A Re-Examination, New York: UN Economic and Social Council, 1978.

UNITED NATIONS, Transnational Corporations In World Development: Third Survey, New York: United Nations Centre on Transnational Corporations, 1983.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO), Guidelines for Evaluation of Transfer of Technology Agreements, Development and Transfer of Technology Series, No 12, New York: United Nations, 1979.

VEBLEN, T., The Theory of the Leisure Class: An Economic Study of Institutions, London: George Allen & Unwin, 1925. (First published in 1899).

VELJANOVSKI, C.G., 'The Coase Theorems and the Economic Theory of Markets', KYKLOS, Vol 35, 1982, pp 53-73.

VERNON, R., 'International Investment and International Trade in the product cycle', Quarterly Journal of Economics, Vol 80, May 1966, pp 190-207.

VERNON, R., Sovereignty at Bay: The Multinational Spread of US Enterprises, New York: Basic Books, 1971.

VERNON, R., 'The location of Economic Activity', in Dunning, J.H. (ed.), Economic Analysis and the Multinational Enterprise, London: George Allen & Unwin, 1974, pp 89-114.

VERNON, R., Storm over the Multinationals: The Real Issues, London: Macmillan, 1977.

VERNON, R., 'The Product Cycle in a New International Environment', Oxford Bulletin of Economics and Statistics, Vol 41, November 1979, pp 255-267.

VICKERY, G., 'A Survey of International Technology Licensing', STI Review, No 4, December 1988, pp 7-49.

VOSS J. & STOLL J., 'The World Bank Group and Foreign Direct Investment in Developing Countries', The CTC Reporter, Fall 1982, pp 47-49.

WELCH, L.S. & CARSTAIRS, R.T., 'Some International Marketing Implications of Outward Foreign Licensing', Journal of International Marketing, Vol 1, No 3, 1983, pp 177-185.

WHICHARD, O.G. & SHEA, M.A., '1982 Benchmark Survey of US Direct Investment Abroad', Survey of Current Business, December 1985, pp 37-45.

WILLIAMSON, O.E., The Economics of Discretionary Behaviour: Managerial Objectives in a Theory of the Firm, Englewood Cliffs, N.J.: Prentice-Hall, 1964.

WILLIAMSON, O.E., Markets and Hierarchies: Analysis and Antitrust Implications - A Study in the Economics of Internal Organisation, New York: Free Press, 1975.

WILLIAMSON, O.E., 'Transaction-cost Economics: The Governance of Contractual Relations', Journal of Law and Economics, Vol 22, October 1979, pp 233-261.

WILLIAMSON, O.E., 'The Economics of Organization: The Transaction Cost Approach', American Journal of Sociology, Vol 87, No 3, 1981, pp 548-577.

WILLIAMSON, O.E., 'The Modern Corporation: Origins, Evolution, Attributes', Journal of Economic Literature, Vol 19, December 1981, pp 1537-1568.

WILLIAMSON, O.E., The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, New York: The Free Press, 1985.

WILLIAMSON, O.E., Economic Organization: Firms, Markets and Policy Control, Brighton: Harvester Press, 1986.

WILLIAMSON, O.E., 'The Firm as a Nexus of Treaties: an Introduction', in Aoki, M., Gustafsson, B. & Williamson, O.E. (eds), The Firm as a Nexus of Treaties, London: Sage Publications, 1990.

WILLIG, R., 'Multiproduct Technology and Market structure', American Economic Review, Papers and Proceedings, May 1979, pp 346-350.

WILSON, R.W., The Sale of Technology Through Licensing, Unpublished PhD thesis, Yale University, May 1975.

WILSON, R.W., 'The Effect of Technological Environment and Product Rivalry on R&D Effort and Licensing of Inventions', The Review of Economics and Statistics, Vol 59, No 2, May 1977, pp 171-178.

WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO), General Information, Geveva: WIPO, 1983.

WRIGHT, M., 'The Make-Buy Decision and Managing Markets: The Case of Management Buy-outs', Journal of Management Studies, July 1986.

YOUNG, S., HAMILL, J., WHEELER, C. & DAVIES, J.R., International Market Entry and Development: Strategies and Management, Hemel Hempstead, Herts.: Harvester Wheatsheaf, 1989.

YUNKER, P.J., Transfer pricing and Performance Evaluation in Multinational Corporations: A Survey Study, New York: Praeger, 1982.

ZENNOF, D.B., 'Licensing as a Means of Penetrating Foreign Markets', The Patent, Trademark and Copyright Journal of Research and Education, Vol 14, No 2, Summer 1970, pp 292-308.