SPECIFICITY AND OPACITY AS RESOURCE-BASED DETERMINANTS OF CAPITAL STRUCTURE: EVIDENCE FOR SPANISH MANUFACTURING FIRMS

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In this work we develop an analytical framework to examine the effects of strategic investments on the financial policy of the firm. From the resource-based approach of the firm, nontradable and difficult-to-copy assets are the basis of a sustainable competitive advantage. However, imperfections in the resource markets can also be interpreted as sources of costs and/or restrictions from a financial point of view. Specificity and opacity are the features of strategic resources that enable us to identify the financial implications of the resource-based strategy.
We have tested our theoretical framework using a sample of Spanish nonfinancial firms. Our results show that highly specific and opaque resources limit the borrowing capacity of the firm, while other transparent strategic assets affect financial leverage positively. Our findings suggest two main implications for strategy formulation and implementation: (1) there are unobservable financial costs that must be considered for a correct evaluation of a sustainable competitive advantage based on strategic resources; and (2) the financial policy of a 'resource-driven' firm is partially determined by the features of its strategic resource bundle. Copyright © 2001 John Wiley & Sons, Ltd.

INTRODUCTION

The resource-based view of the firm (RBV) claims that our understanding about the strategy and performance of the firm is better when we explore the distinctive and idiosyncratic characteristics of a firm's resources rather than environmental factors (Barney, 1986; Peteraf, 1993; Prahalad and Hamel, 1990; Wernerfelt, 1984). Under this perspective, nonimitable and difficult-to-copy assets and capabilities enhance the sustainability and appropriability of above-normal returns (Grant, 1991). The RBV also shares the common logic of the traditional economic assumption that 'extraordinary profits' reveal some kind of (resource) market failure (Yao, 1988).

However, this optimistic view of 'resource-driven strategies' often ignores the cost of developing and implementing strategic resources and capabilities (Montgomery, 1995). Path-dependent processes, uncertainty, specificity and long-run terms of maturation are usually considered features of strategic resources (Dierickx and Cool, 1989). But these characteristics impose unavoidable (and often unobservable) costs and restrictions. Actually, many of those asset characteristics that add value to the firm are, essentially, the same ones that limit its imitation or substitution by competitors. Moreover, the choice of strategies based on resources with imperfect markets does not only suppose '*ex ante*' restrictions (such as those faced by competitors lacking strategic resources) but also '*ex post*' conditions to

the feasible set of strategies for those firms *after acquiring* a profitable bundle of strategic resources. The aim of this paper is to examine this question by analyzing the financial implications of some imperfections in resource markets.

There are at least three major reasons to believe that this effort is not a mere 'translation' of the results from the market failures already studied in output markets (Bain, 1956; Porter, 1980). First, the structure and features of one relevant market can condition the firm's behavior not only in such a market but also in strategies and policies regarding every market in which the firm operates. Second, there are no broadly accepted definitions and taxonomy of resources and capabilities, which makes the theoretical debate difficult (Peteraf, 1993). Finally, some of these conceptual constructs are not easy to translate into operative measures that assure accurate empirical tests. This work attempts to undertake these three major questions of the RBV approach by (i) analyzing the potential links between the strategic decision-making process and the financial policy of the firm, (ii) selecting and defining precisely the features of strategic resources able to explain the strategy–finance link, and (iii) proposing and testing the propositions resulting from the theoretical discussion.

To the extent that we identify the 'strategic content' of an asset with several market frictions (nontradable, specific, and/or complementary productive factors) we can conclude that some kinds of imperfections in resource markets can affect the financial policy of the firm. Our purpose in this paper is to analyze the interactions between some features of resources and capabilities that guarantee their value and the financial policy of the firm. We develop a theoretical framework founded on the recent research in corporate finance and strategy to explore the financial effects of a 'resource-driven strategy.' Finally, we test the resulting propositions using a sample of Spanish firms.

The remainder of the paper is organized as follows. The next section reviews the seminal literature of this research. The following two sections describe the specific and opaque dimension of the firm's resources as sources of value and explore their financial implications. Then we examine the degree of internalization of strategic resources accumulation as an indirect but observable measure of specific and opaque assets. The following two sections review previous empirical research on capital structure and characterize the sample and methodology. Finally, the two last sections present and discuss the results.

THE ROLE OF A FIRM'S DISTINCTIVENESS IN FINANCE RESEARCH

Notwithstanding the differences between finance and strategic research, both approaches have reciprocally benefited from a closer look at market imperfections as a relevant context. In this vein, strategy researchers have achieved attractive reinterpretations of traditional research fields such as those related to diversified firms or governance modes (Kochhar, 1996; Hitt and Smart, 1994; Jensen, 1986; Williamson, 1988).

In his influential paper, Bettis (1983) stated clearly the main points of controversy between finance and strategy as research fields. As he notes, practitioners and strategy researchers are essentially concerned with firm-specific risk management resulting from events which distinctively affect a particular company, such as a wildcat strike, the actions of competitors, or revolutionary technological changes. Nonetheless, financial theory attributes no value to these efforts since unsystematic risk may be diversified in an optimal portfolio.

Bettis (1983) also revealed a crucial conflict between management and financial research when dealing with the role and implications of information management. The financial asset pricing models proposed are strongly sensitive to the efficiency axioms of financial markets. Assets and liabilities require a symmetric distribution of relevant information among investors to be accurately evaluated. Thus, managers should make public any good news about the prospects of the firm's ventures in order to meet favorable conditions for funding. But the disclosure of critical information on product improvement or modification, hypothetical alliances, customer and worker contracts and the like may severely weaken the competitive position of the company.

Bettis' first 'conundrum,' the 'irrelevance' of firm-specific risk management, has been largely revisited under new theoretical proposals focused successfully on the common ground of finance,

economics, and strategy (see Harris and Raviv, 1991). A distinguished insight is provided by Williamson (1988), who claims that traditional financial theories (signaling, resource constraints and bonding) ignore the role of assets characteristics in financing ventures when they assume that the firm's capital is a composite (undifferentiated) good. From his point of view, equity and debt contracts may be interpreted as alternative governance structures over the firm's assets. Thus, managers would economize on transaction costs when choosing debt for financing projects with redeployable investments, easily and costlessly traded in second-hand markets. Conversely, projects with firm-specific assets and/or increased contractual hazards would require a more adaptable governance structure (i.e., equity financing) since their value is highly sensitive to bankruptcy.

Empirical support for Williamson's hypothesis is provided by a growing body of empirical research which shows robust negative correlations between assets intangibility and a firm's leverage. Despite this regularity, Balakrishnan and Fox (1993) add two remarkable (and distinctive) findings in their empirical study. First, firm-idiosyncratic characteristics are by far the most explanatory factor of leverage (more than 50% of the total variability) compared to the 'industry effect' (over 10%) and the 'year effect' (less than 2%). Second, they found significant, albeit weak, positive correlation between leverage and advertising intensity. Since the latter usually approximates low-redeployable assets (reputational), other explanations different from firm specificity must apply.[1] The authors argue that the informational role of reputational assets can reasonably counterbalance the 'nonredeployability effect' on leverage.

Financial research has also corroborated the relevance of firm-specific factors in their consolidated research mainstreams after overcoming the *dogmatic belief*[2] in the classical axioms of Modgliani and Miller (1958, 1963). Perfect financial markets entail two major implications: (i) every asset price contains all relevant information for investors to make rational decisions (efficient markets) and (ii) financial policy does not affect the firm's value (investment and finance decisions are independent). Regarding the former hypothesis, recent empirical findings in finance research suggest that financial markets are *limitedly efficient* to the extent that firm-specific factors show greater explanatory power of the firm value than those usually proposed by traditional assets pricing models (Daniel and Titman, 1997; Fama and French, 1992, 1996). Concerning the second hypothesis, there is broad agreement within financial corporate research that (idiosyncratic) financial variable proxies are, at least, potentially determinant of the firm's investment pattern in a wide contextual variety.[3]

CREATING VALUE THROUGH STRATEGIC INVESTMENTS: SPECIFIC AND OPAQUE RESOURCES

Researchers in strategy have devoted much time and effort to defining and describing the features of assets capable of generating sustainable rents. Unique assets are the source of scarcity (Ricardian) rents[4] (Mahoney and Pandian, 1992; Peteraf, 1993). But uniqueness is not a sufficient condition for a resource to be valuable (i.e., a source of rents). Scarce resources have higher productivity but also higher costs, due to '*ex ante*' competition, than nonscarce ones. Thus, the resource ability to sustain above-normal profits (its strategic content) should arise from other concurrent features of resources different from their scarcity.[5]

In other cases, the assets considered as individual items do not justify their value inside the firm. Specific assets generate quasi-rents (Klein, Crawford, and Alchian, 1978). Complementary and cospecialized assets enhance the value of the firm as a whole (Teece, 1986). In other words,

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[1] Williamson (1988) points out that *contractual hazard* as well as assets specificity are determinant of the selected mode of financing.

[2] See Stiglitz (1988: 122).

[3] Empirical research for US firms is found in Vogt (1994), Fazzari, Hubbard, and Petersen (1988), Whited (1992), and Bond and Meghir (1994). Similar results were obtained by Hoshi, Kashyap, and Scharfstein (1990) and Devereux and Schiantarelli (1990) for Japan and the United Kingdom, respectively.

[4] We use 'scarce' to refer to resources with fixed or quasi-fixed supply (Peteraf, 1993).

[5] Ricardian rents resulting from a scarce resource are appropriated by their owner only if the resource became scarce *after* acquiring it. Thus, the ultimate source of extraordinary profits is the capacity to identify future scarce resources and exploit the resulting 'first mover' advantage.

the key to a sustainable competitive advantage may not be a single resource but the way resources work together adding value to the firm by improving the core capabilities of the company (Prahalad and Hamel, 1990).

Despite the great number of definitions and classifications of resources and capabilities, we will focus on two main characteristics which are commonly regarded as defining strategic assets: specificity and opacity. This choice is not arbitrary. For the purpose of this work, most of the seemingly different concepts can be categorized into these two basic dimensions.

The specific dimension of strategic resources

Firm-specific assets have been broadly recognized as a clear example of the straightforward connection between resources and competitive advantage. Specific resources are, in essence, a source of 'quasi-rents' when the shadow price of an asset is substantially higher than its market price or the opportunity cost for its owner (Klein *et al.*, 1978). Although most of the references available in the literature interpret 'specificity' as 'firm specificity', the former term admits an extended meaning. Actually, specificity can be considered a 'relational' concept. An asset is not specific by itself but in relation to 'something.' There may be 'firm-specific' or 'activity-specific' resources depending on whether their deployment inside a particular firm or applied to a distinctive activity, respectively, yield 'quasi-rents.'[6] Therefore, 'firm-specific' or 'activity-specific' assets are valuable as long as the firm survives, or as far as the activity is feasible, respectively. Otherwise, 'quasi-rents' dissipate and the asset loses its value. Thus, we can conclude that specificity is a characteristic of resources which enhances the value of the firm. Defining specificity as 'the loss of value of a firm asset when it is used by outsiders', we can consider 'complementary' or 'cospecialized' assets as synonymous with 'speci-

fic' assets to the extent that the former concepts reflect gains of value when assets are owned and deployed by a single and distinctive decision unit.

The opaque dimension of strategic resources

The uniqueness of an asset bundle can be due to several resource-based phenomena such as path-dependent processes or supply restrictions (for example, a particular location or innate human skills) but also can arise from the absence of information to outsiders willing to exploit it to achieve their purposes. This is what we define as *opacity*. In more precise terms, an opaque asset is one that, *due to its nature or to the firm's actions, eludes its imitation by impeding the leakage of any related information to outsiders.* This related information might range from the expected value of exploitation of a given resource to the way of acquiring, accumulating, or deploying a certain resource or capability. In this context, the competitive advantage of a 'resource-driven' firm is not based on specific or complementary resources but is the result of a 'transfer barrier' which precludes strategic assets from imitation or substitution. The nature of these barriers can be institutional as in the case of patents and licenses. Nevertheless, the strategic content of certain 'knowledge assets' (Winter, 1987) can be threatened if they are easy to identify, transparent, and have well-defined property rights, so they can be transferred in a competitive market.

As shown in Figure 1, resources easy to identify, transparent and with well-defined property rights have a limited ability to sustain a durable competitive advantage. Therefore, when a privileged competitive position of a firm is based on a given asset or resource bundle, we can conclude that any or several of the above features do not apply for a given 'strategic' resource. It could

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[6] An investment can be considered specific when there is a significant difference between its current use and its 'second best' use (Klein *et al.*, 1978). This definition would correspond to the 'activity-specific' concept. A slightly different term is 'firm specificity,' which reflects differences in the value of a given resource when used by different firms, even if exploited in similar activities. Both definitions are equivalent as long as it is assumed that the use of an 'activity-specific' asset *inside* a particular firm is imperfectly replicable by others.
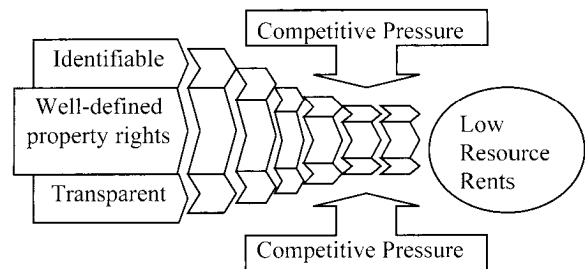

Figure 1.   The limited ability of normal resources to generate and sustain rents

happen that the resources are easy to identify but not transparent. Clear examples of such resources are trade secrets and data banks. These kinds of items are clearly defined and they can be valuable resources for competitors (thus, not specific), and, due to their nature, they are hardly protectable once they have been disclosed. In such cases, an obvious way to preserve the value of such 'knowledge assets' is to keep them away from competitors' sight. Actually, secrecy can be considered as an *artificial* opacity to the extent that the firm attempts to prevent undesired leakage of information about the key to its competitive advantage. In other words, artificial opacity arises when the firm knows clearly what its strategic resource bundle is and how it works, and, consequently, is able to replicate and transfer it to other organizations. The rent-earning potential of such 'resource-driven' firms results from the firm's *deliberate* effort to achieve and maintain the scarcity of its resource bundle. Evidently, the competitive advantage based on easy-to-identify but secret assets will be durable depending on two forces: (1) the effectiveness of the procedures assuring the secrecy and (2) the willingness of competitors to acquire the critical information.

But opacity can also arise from phenomena difficult to understand even for insiders, unable to identify the devices and resources that sustain its competitive position. The complexity of interaction among existing assets and the 'tacit knowledge' embedded in human resources entail 'causal ambiguity' and 'uncertain imitability' (Lippman and Rumelt, 1982), which preserves the key of a competitive advantage from imitation because current and potential competitors cannot identify the sources of the competitive advantage and, hence, they are not able to erode it. Clear examples of such opaque resources are those arising from 'social complexity' as well as human resources deployment and configuration: networks, relationships, culture and values, 'social capital'. In the same vein, random and chaotic processes are often behind valuable resources and strategic capabilities such as the search, adaptation, and implementation of new ideas and procedures. These activities can only be partially controlled and imperfectly predicted by the firm's manager (Thiétart and Forgues, 1995; Koput, 1997). In our terms, this absence of systematic procedures for acquiring or substituting some of the strategic resources derives into a situation of

natural opacity. Whatever the source and features of the opacity are, the limited information about the strategic resource bundle will positively affect the appropriation of rents by the firm as it eliminates the 'externalities' of information as a strategic asset.[7]

THE RESOURCE-BASED STRATEGY AND THE FINANCIAL POLICY OF THE FIRM

So far we have examined how specific and opaque resources can be a source of above-normal returns. The firm's competitive advantage based on specific resources will be sustainable as long as the firm continues the activities in which these resources are valuable. Unfortunately, markets and technologies often evolve in unpredictable ways. This uncertainty makes specific investments riskier and, hence, more expensive to finance. The other strategic dimension of strategic resources, opacity, is an obvious barrier to imitation but also contributes to limiting the available funds when financial investors do not have access to the critical information of the future use of their funds. Thus, our examination of the financial implications of specific and opaque resources offers some insight into the crucial ideas advanced by Bettis (1983) when suggesting that strategic management (and financial) research should be aware of the dual perspective of the firm's behavior as source of advantages and restrictions.

Financial implications of specific investments

Assets characteristics play an important role in the theory of capital structure because the costs of both financial distress and liquidation depend on the nature of a firm's assets. In the case of financial distress, firm-specific assets will suffer large losses of value when the corporation is reorganized or liquidated. Thus, theory suggests that equity financing is optimal for assets whose value is sensitive to the financial condition of the firm (Myers, 1977; Williamson, 1988). Since

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[7] Information-based resources such as those resulting from R&D activities have spillover effects as they produce positive externalities over the knowledge stock of other firms (Griliches, 1992).

highly specific assets have a limited capacity to insure lenders against bankruptcy, debt holders will react by charging a risk premium to debt cost, enforcing an inverse relationship between specific resources and financial leverage.[8] This conclusion can be summarized in the following proposition:

> *Proposition 1: The degree of asset specificity is negatively related to the financial leverage of the firm.*

Examining the relation between asset characteristics and capital structures is, however, complicated by the fact that a firm's vulnerability to financial distress costs is unobservable. Researchers have dealt with this problem by using accounting variables such as fixed-to-total assets (Friend and Lang, 1988), R&D, and advertising expenses (Bradley, Jarrell, and Kim, 1984; Kale, Noe, and Ramírez, 1991; Opler and Titman, 1994), and the market-to-book assets ratio (Smith and Watts, 1992; Barclay and Smith, 1995a, 1995b) to proxy the value of growth options, which are assumed to have a high degree of exposure to the costs of both financial distress and liquidation. Fixed assets are used in empirical corporate finance studies to proxy assets-in-place. Firms with high fixed assets are presumed by most financial researchers to have relatively few growth options and hence low liquidation costs. Intangible assets proxy for growth options of firm-specific assets and, thus, are presumed to have high liquidation costs. Advertising and R&D expenditures are believed to create growth options and/or firm-specific assets. High expenditures on these items are therefore associated with high liquidation costs.

Strategy literature generally agrees with the interpretation of intangible investments as valid proxies for 'firm-specific' resources, but its perspective is slightly different. While corporate finance researchers interpret these investments as revealing higher costs of liquidation, strategy researchers tend to see investments in R&D, advertising, and human resources practices as

observable measures for the stock of strategic resources such as innovative capabilities, corporate reputation, and human capital. All those resources and capabilities fulfill the conditions to be 'strategic' as they (i) are valuable (i.e., specific, opaque) and (ii) have imperfect markets. Under such an 'optimistic bias', the positive and robust link between the above variables and accounting measures of performance is often viewed as evidence of the higher rent-earning potential of the approximated strategic resources, ignoring that this relationship may reflect a risk premium or higher shadow prices of investment due to financial restrictions.

Financial implications of opaque investments

As we have previously stated, resources might be valuable because they are based on complex and ambiguous processes difficult to identify even by insiders. But these opaque resources are also more difficult to manage because they are only partially controllable and verifiable. On the other hand, nonspecific and identifiable resources can be protected from imitation by obscuring any activity which could reveal critical information to outsiders. In this situation, firm managers or insiders are assumed to possess private information about the characteristics of the firm's return stream or investment opportunities, and capital structure is designed to avoid the costs of external financing imposed by public investors (Myers and Majluf, 1984; Myers, 1977). The resulting 'pecking order' theory of financing states that capital structure will be driven by the firm's desire to finance new investments, first internally, then with low-risk debt, and finally with equity only as a last resort. Thus, we can conclude that:

> *Proposition 2: The degree of opacity (transparency) of a firm's resources restricts (enhances) the access to external financing and, particularly, to debt financing.*

If Propositions 1 and 2 are verified, investments in specific and opaque resources will be negatively related to the firm's debt ratio because of the higher cost of debt if the firm owns specific and riskier assets, and owing to restrictions in borrowing capacity when exploiting opaque resources (Figure 2). Furthermore, this two-

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[8] These phenomena lead to an increase in the average cost of the firm's funds if we assume that debt financing is cheaper than equity financing. Tax effects (Modigliani and Miller, 1963) and agency costs (Jensen and Meckling, 1976) are potential explanations for higher costs of equity financing.
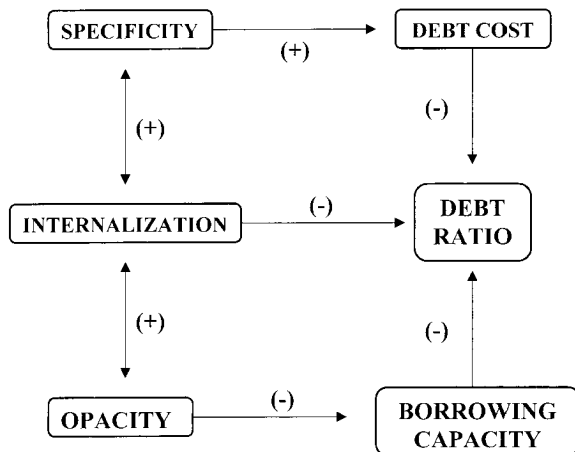
Figure 2. Interaction scheme of strategic features of resources and its financial implications

dimensional approach appears to be consistent with some previous evidence of positive effects of specific but transparent investments on financial leverage (Balakrishnan and Fox, 1993).

Once Propositions 1 and 2 are formulated there are no clear methods to measure the specific and opaque degree of a firm's resources. This situation is complicated by the fact that as, a resource view scheme states, firms are configured by unique resource bundles and a given resource may be specific to one firm but not to others. Both features (specificity and opacity) are unobservable and, thus, an indirect measure is needed to achieve testable propositions (Godfrey and Hill, 1995). In the following subsection, the *internalization* of processes leading to strategic resources accumulation is proposed to approximate the specific and opaque degree of a firm's resources.

THE INTERNALIZATION OF STRATEGIC INVESTMENT AS A MEASURE OF SPECIFIC AND/OR OPAQUE RESOURCES

From the transaction costs approach, firms vertically integrate when the share of rents resulting from transaction-specific investments cannot be guaranteed by 'ex ante' contracting (Williamson, 1975, 1985, 1991; Klein et al., 1978; Grossman and Hart, 1986). Because of its idiosyncratic application, a potential supplier of strategic resources (i.e., an independent lab or research organism, distributors, suppliers, employees, etc.)

will be exposed to the opportunistic behavior of the buyer (the firm) and therefore specific investment and further transaction will not be undertaken, even though such exchanges would be profitable to both parties. Thus, it is reasonable to infer that internal accumulation of strategic resources reflects higher levels of specific investment than subcontracted activities or external acquisition. Consequently:

Proposition 3^s: the internalization level of the accumulation process of strategic resources is positively related to the degree of specificity of such resources.

A review of empirical results on vertical integration research broadly confirms the transaction cost logic in determining the strategies and boundaries of the firm in a broad range of sectors and institutional contexts.[9] Particularly, asset specificity plays a major role in the empirical research of internalization with regard to production processes (Monteverde and Teece, 1982; Lyons, 1995), distribution (John and Weitz, 1988; Klein, Frazier, and Roth, 1990), sales force (Anderson, 1985; Anderson and Schmittlein, 1984) and R&D activities (Robertson and Gatignon, 1998).

But internalization processes can also be due to informational motivations. When the knowledge involved in certain activities is not firm specific, vertical integration allows the firm to minimize the exposure of proprietary knowledge to competitors (Teece, 1986). At this point, it is noticeable that transaction cost logic does not forego informational issues when assuming that contractual costs between agents with bounded rationality are positively related to the uncertainty involved in transactions. Although uncertainty has usually been represented by a great number of contingencies it can also be based on the limited ability of agents to build accurate and verifiable performance measures. But the RBV offers deeper insight into the sources of this 'contractual hazard.' The inability to find suitable performance measures might arise from the tacitness of knowledge and causal ambiguity which typically define the strategic content of resources and capabilities.

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[9] For a detailed discussion and review of empirical research derived from transaction economics approach, see Shelanski and Klein (1995).

In this vein, Chi (1994) claims that information asymmetry and moral hazard context are intimately related to causal ambiguity and the tacitness of knowledge, respectively.

If in a first stage transaction cost logic has benefited the RBV (e.g., when considering specificity as a feature of strategic assets), the latter is now suggesting alternative explanations to the boundaries of the firm. From the resource-based perspective, opportunistic behavior of agents is no longer required for organizations to exist if it is assumed that a firm's boundaries are determined by efficiency gains in managing knowledge—a nonmobile and imperfectly substitutable resource (Conner and Prahalad, 1996). Poppo and Zenger (1998) have undertaken a recent comparative test between resource-based and transaction cost explanations for make-or-buy decisions which supports the latter, albeit they acknowledge measurement problems in their study. Conversely, in a case study of a high-technology firm, Argyres (1996) found that specific assets are the most common reason to internalize but also suggests that the choice for in-house production of some activities is the firm's response to the threat of knowledge appropriation by competitors. These arguments support the following proposition:

Proposition 3°: The internalization level of the accumulation process of strategic resources is positively related to the degree of opacity of such resources.

Although the available empirical support for this proposition is scarce, evidence related to R&D outsourcing and joint ventures is consistent with this knowledge-based hypothesis. Actually, the analysis of knowledge transfer (by means of strategic alliances or licensing) has shifted its view from traditional linear schemes to integrated models in which firms are considered knowledge-producing and knowledge-using agents (Veugelers, 1997). Production of knowledge has been given special attention by economics because a perfect market fails to allocate socially efficient quantities of a 'public good' (knowledge) with positive externalities (Arrow, 1962). But 'knowledge assets' might also be firm-specific if it results from the innovation or improvement of existing firm-specific assets or activities (Helfat, 1994). The RBV might provide a comprehensive explanation of the divergent interpretations above.

If the information is not firm specific and, hence, potentially profitable for competitors, it should be protected against imitation by patents if possible and by secrecy otherwise. Conversely, firm-specific knowledge requires additional assets or expertise to be successfully acquired and deployed, and therefore it is secure even after disclosure (Pisano, 1990; Gambardella, 1992; Szulanski, 1996).

Reasons other than the transaction costs rationale might be claimed for firms to choose to perform the activity in-house such as acquiring growth options or gaining market power.[10] Nonetheless, these explanations do not provide clear reasons for firms to choose vertical integration instead of other contracting devices to achieve their goal (Argyres, 1996). This criticism has favored the empirical research in testing transaction cost rationale without even considering alternative hypotheses. Only recently the RBV approach has raised new proposals to explain the boundaries of the firm as a result of knowledge-based factors that deserve further empirical research (Conner and Prahalad, 1996). In the meantime, Proposition 3° does not claim a causal but only a positive relationship between opacity and the internalization degree of the firm's resources.

EMPIRICAL REGULARITIES ON CAPITAL STRUCTURE: EVIDENCE FROM THE UNITED STATES AND SPAIN

Different aims and methodological approaches have characterized the testing strategies for dealing with the complex scenario derived from the market failures in financial markets. Consequently, the theory of capital structure has resulted in a very vast body of empirical research with heterogeneous methodologies and purposes which are difficult to sort under a single systematic criterion. Since this task exceeds the aim of this paper, we will restrict our effort to providing a point of reference from which to propose a number of potential determinants of the capital structure of the firm. This discussion will serve as a comparative assessment of alternative theo-

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[10] This point is acknowledged to a referee.

retical approaches in explaining the capital structure as well as for suggesting control variables with well-proven empirical performance.

After surveying a number of empirical financial research works on the capital structure of U.S. companies, Harris and Raviv (1991) concluded that leverage increases with fixed assets, nondebt tax shields, and firm size and decreases with investment opportunities, advertising expenditure, the probability of bankruptcy, profitability, and uniqueness of the product. These empirical regularities support a wide range of theoretical explanations. Collateral assets appear to reduce agency costs of debt as lenders are less exposed to the risk-seeking behavior of shareholders. Conversely, transaction costs logic meets consistent evidence in the inverse relationship between leverage and discretionary investments (growth options, intangible investments). Creditors will supply debt in worse conditions to firms with higher bankruptcy costs (directly proxied by cash flows volatility and default probability). Finally, the negative correlation between profitability and the debt ratio is claimed to validate the pecking order theory of financing resulting from information asymmetries.

These empirical findings seem to be consistent with institutional differences among developed countries. Rajan and Zingales (1995) found that four of the above factors (tangibility, growth options, size and profitability) showed similar effects on financial leverage across the G-7 countries (United States, Japan, Germany, France, Italy, United Kingdom, and Canada). Although they recognize that differences in taxation and bankruptcy laws as well as ownership structure might contribute to increase the heterogeneity in capital structure across countries, their general results coincide with those of Harris and Raviv (1991), supporting the fact that tangibility and size are positively related to leverage while growth options and profitability show opposite effects.[11]

Three major differences can be stated between the U.S. and the Spanish financial market (Saá-Requejo, 1996). Just as in many other countries of continental Europe (Germany, France, Italy), the Spanish financial system can be accurately defined as bank oriented. Second, Spanish security markets are less developed with low capitalization, small transaction volumes and less major players. Third, the Spanish bankruptcy law is more restrictive with incumbent managers than U.S. bankruptcy law, since in the former the manager is inexorably removed from control over the firm after bankruptcy has been declared.

These facts (mainly the second) can be claimed as a caveat against assuming a direct extrapolation of known findings in the Spanish financial markets. However, the available evidence suggests that previous regular empirical findings in capital structure research for U.S. companies are also applicable to the Spanish context. In particular, nondebt tax shields and cash flow variability negatively affect the preference of Spanish firms for debt financing (Saá-Requejo, 1996) while collateral assets are positively related to financial leverage (Mato, 1990).

Moreover, the Spanish evidence does not add incompatible or trivial evidence on capital structure. The higher ownership concentration of Spanish firms (Galve and Salas, 1996) may justify a lower relevance of agency costs due to the concentrated voting rights and softer financial restrictions when banks are acting as privileged informed lenders. Regarding the peculiarities of Spanish bankruptcy law, managers will be very reluctant to forego safe and profitable investment in favor of risky projects since they lack the other legal alternatives derived from the U.S. bankruptcy law which allows managers to retain the control over the firm and propose reorganization plans during the post-bankruptcy period.[12]

METHODOLOGY AND DATA

We have tested our resulting propositions using panel data techniques (Hsiao, 1988). This methodology provides consistent estimates of coefficients when unobservable individual effects exist. In such cases, cross sectional OLS estimates using pooled data are biased and panel methods including individual effects must be considered to

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[11] The estimates, when significant, support the previous evidence for the remaining G-7 countries. There is only one exception to that regularity—Germany—in which size and leverage are significantly and inversely related.

[12] In this aspect, the Spanish bankruptcy law shares common legal principles with its European counterparts. As argued by Rajan and Zingales (1995), the British and continental European legal systems are more concerned with protection of creditors' interests than U.S. bankruptcy law.

achieve consistency. The individual effects can be considered fixed or random, and their specifications are as follows:

Fixed effects model (FE)	Random effects model (RE)
$y_{it} = \alpha_i + \beta\, x_{it} + u_{it}$	$y_{it} = \theta_i + \beta\, x_{it} + u_{it}$

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where y_{it} and x_{it} are the dependent variable and independent variable, respectively. Individual effects are α_i when fixed, and θ_i when random and normally distributed. Finally, u_{it} is the random disturbance.

The fixed-effects model is viewed as one in which the researcher makes inferences on the effects that are in the sample. The random effects model is viewed as one in which researchers make unconditional inferences with respect to a larger population. Obviously, that question is important when the estimates differ widely between the two models. This difference is testable through the Hausman χ^2 test.

The advantages of market-based measures over their accounting counterparts in approximating the real economic value of the firm has been extensively debated (Fisher and McGowan, 1983). We have considered the financial leverage computed from accounting and market-based magnitudes as dependent variables in our regressions in order to provide more complete evidence. Independent variables are grouped into two classes: (i) control variables suggested by previous empirical regularities in capital structure research and (ii) proxies for technological capabilities, reputational assets, and specific human capital. Those resources have been traditionally considered as strategic owing to their ability to generate above-normal rents and their limited transferability.

The data for empirical analysis were obtained from the Spanish stock market (Bolsa de Madrid). We excluded financial firms from our sample given the peculiarity of their activity. We started from 119 nonfinancial firms quoted in the Spanish stock market, from 1990 to 1994. The accounting data of sales, total assets, debt, and equity in books were extracted from the annual reports sent to the 'Comisión Nacional del Mercado de Valores' (CNMV, analogous to the U.S. SEC) by the quoted firms. The market value of equity

was computed from data collected in the annual 'Boletín de Cotizaciones'.[13] Unfortunately, the information contained in the annual reports of quoted firms does not include data on R&D, advertising and human resources so we addressed a postal survey (with successive phone recalls) to these 119 firms to gather additional data. The following raw data on expenses were requested: (1) total expenses per year of R&D internally developed, (2) total expenses per year of R&D externally bought or subcontracted, (3) total expenses in advertising per year, and (4) total expenses in personal training. We also asked for data on the structure and qualification of the firm's human resources: (1) the classification of employees by functional areas (CEO members and top executives; clerical staff, professional and technical staff; sales force and sellers) and (2) the educational level of human resources (bachelors, engineers, and architects; medium-college degree; specialized and unspecialized blue-collar workers).

We received a total of 58 questionnaires and excluded those with three or more empty fields[14] as well as those whose answers on assets, sales, and number of employees differed more than 10 percent from the data reported to the CNMV. After considering the above criteria, the size of our final sample was 260 observations of 52 nonfinancial firms quoted in the Spanish stock market from 1990 to 1994.

The following variables were constructed using the raw data:

Dependent variable

Financial leverage (LEVB; LEVM)

We have considered two traditional measures of financial leverage. LEVB is the ratio of the book value of total debt with explicit cost—long-term and short-term debt—to the book value of total debt plus the book value of total equity (Titman and Wessels, 1988). LEVM is the analogous ratio when using the market value of total equity (Balakrishnan and Fox, 1993).

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[13] In English terms, *Bulletin of Quotations.*
[14] We computed our estimates of unbalanced panel data in order to gain degrees of freedom. Alternative estimates using the subsample with balanced panel data (185 observations, 37 firms) provided similar results.

Proxies for strategic resources

Specific and/or opaque R&D intensity (IR&D)

In order to test Propositions 1 and 2, we have approximated the specificity and opacity level of R&D investment by the ratio of internally expended R&D to total sales. As we discussed above, technological knowledge acquired through internally developed activities is likely to be highly firm specific and opaque. This interpretation would imply that IR&D will be robustly and negatively related to the firm's debt ratio. Previous studies have used the ratio of R&D to net sales as proxy for intangible assets which are assumed to be more specific than tangible assets (Balakrishnan and Fox, 1993; Bradley *et al.*, 1984; Titman and Wessels, 1988). The negative relationship between R&D intensity and the firm's debt position is a broadly accepted regularity (Baysinger and Hoskisson, 1989; Hoskisson, Johnson, and Moesel, 1994).

Non-specific and/or transparent R&D intensity (ER&D)

This ratio is analogous to ER&D when using *external* R&D expenditures. This category includes R&D acquired by contracting with other parties: firms, universities, or research institutions. According to our previous argument, such investments are less specific and/or more transparent due to outsiders' collaboration. Therefore, the expected effect on leverage should be weaker (positive or less negative) than that resulting from the IR&D estimate.

Advertising intensity (ADV)

The ratio of advertising expenses to net sales, as well as R&D intensity, has been used as a proxy for firm-specific assets (Titman and Wessels, 1988; Bradley *et al.*, 1984). This interpretation would justify a negative effect of this variable on financial leverage but, as Balakrishnan and Fox (1993) point out, this investment may represent the reputational assets of the firm as its purpose consists of transmitting information about the firm and its products to current and potential customers. Hence, advertising expenses should be considered a transparent investment which could facilitate the firm's access to external funding.

Thus, the effect of the advertising ratio will depend on the dominant effect (specificity vs. transparency) over the debt ratio.

Specific human resources (SHC)

The financial structure cannot only be affected by the specific dimension of assets owned by the firm. As Titman (1984) states, if a certain worker or supplier needs to make specific investments, his collaboration will be more sensitive to the firm's bankruptcy probability and, hence, the financial leverage will be negatively related to the specificity level of such a collaborator's investment. Among the several measures useful for proxying human specific capital, employee turnover and tenure have often been used. Tenure was discarded because we needed an aggregate measure of human capital per firm. We also assumed that the answer rate would be lowered if turnover was requested as it would force those surveyed to spend time computing this variable from their raw data base. Hence, we considered that a suitable alternative would be to request data easily available to the human resource managers and then to compute an aggregate measure of human specific capital by factor analysis techniques. The specific human capital proxy is represented by a factor positively correlated with the proportion of personnel with college studies (COLL), technical staff (TECH), and training expenses per employee (TRE). This factor shows negative correlations with the proportion of clerical staff (CLER) and the proportion of temporary (TEMP) over total number of employees (Table 1).

Control variables

Growth options—tangible investments (GROWTH)

Rajan and Zingales (1995) approximate growth options by the market-to-book equity ratio but this approach ignores potential endogeneity problems as suggested by previous findings (Fama and French, 1992; Bhandari, 1983). Alternatively, Titman and Wessels (1988) claim that growth options are partially represented by our proxies for strategic resources, R&D, and advertising expenditures. More traditional measures of growth options are sales growth (Slater, 1996; Barton

Table 1. Correlation matrix of the variables related to the human resources and the loading factor of the specific human capital index

	COLL	TRE	TEMP	COM	TECH	CLER	SHCI[a]
COLL	1	–	–	–	–	–	0.6453
TRE	0.449**	1	–	–	–	–	0.7221
TEMP	−0.030	−0.302**	1	–	–	–	−0.3728
COM	−0.392**	−0.144	0.0199	1	–	–	0.1132
TECH	0.573***	0.296*	−0.078	−0.293*	1	–	0.6154
CLER	0.119	0.075	0.051	−0.123	−0.103	1	−0.5342

Industry effects are eliminated by computing the correlation matrix over the differences of each variable and its industry mean.
*Significant at 10% level; **significant at 5% level; ***significant at 1% level
[a]Extracted factor after 'varimax' rotation of the correlation matrix. Cronbach's α is 0.62.

and Gordon, 1988), and different ratios of investment in fixed assets (Balakrishnan and Fox, 1993; Titman and Wessels, 1988). We propose a version of the latter (net capital investment expenditure over total assets) since it appears to reflect long-term growth opportunities. In addition, this ratio is homogeneous to R&D and advertising ratios and, therefore, allows comparative analysis of the effects of tangible (fixed assets) and other intangible investments (R&D and advertising) on financial leverage.

Collateral assets (COLLAT)

Most empirical research on capital structure considers that tangible assets serve as collateral to obtain better credit conditions from lenders. In addition, tangible assets appear to be negatively related to liquidation costs (Alderson and Betker, 1996). These explanations are widely supported by regular positive correlations between leverage and the fixed to total asset ratio, commonly used to proxy assets tangibility (Bradley *et al.*, 1984; Titman and Wessels, 1988; Harris and Raviv, 1991; Rajan and Zingales, 1995). A similar proposal is selected in this work when using the ratio of inventory plus net plan and equipment to total net assets.

Non-debt tax shields (NDTAXSH)

Depreciation and investment tax credits are considered substitutes for the tax benefits of debt financing, allowing firms to reduce their debt without incurring additional costs. This interpretation would justify negative correlations between nondebt tax shields and financial lever-

age. Nevertheless, empirical findings are mixed and even contradictory (Harris and Raviv, 1991). Since fixed assets are highly correlated to depreciation, the latter does not capture the effect of tax shields on leverage but rather the collateral dimension of the firm's assets (Balakrishnan and Fox, 1993). Titman and Wessels (1988) propose an alternative measure of nondebt tax shields (NDT) easily computable from accounting data and based on the following expression:

$$T = \tau(\text{OI} - i - \text{NDT})$$

where T is the income tax payment, τ is the corporate tax rate during our sample period, OI is the operating income, and NDT is the estimated amount of nondebt tax shields. The variable is defined as the ratio of NDT over total net assets.

Profitability (PROFIT)

Adverse selection phenomena and the resulting 'pecking order theory' of financing predicts that profitability will be negatively related to leverage because of the absolute advantages of internal financing (Myers and Majluf, 1984). A great majority of empirical research finds support for that prediction (Titman and Wessels, 1988; Harris and Raviv, 1991; Barton and Gordon, 1988). Although some authors propose ROE to measure profitability, this indicator is computed by subtracting interest payments from operating income, and therefore might be subject to endogeneity problems. The selected proxy is the operating income over total net assets.

Cash flow variability (BKRPROB)

Previous studies state an inverse relationship between leverage and default probability (Castanias, 1983; Marsh, 1982). Several dispersion indicators of cash flows have usually been considered as proxy for bankruptcy probability in a large number of empirical studies with mixed results (Balakrishnan and Fox, 1993; Barton and Gordon, 1988; Titman and Wessels, 1988). A potential source of disparity might be measurement problems. Within the reviewed studies, those using absolute deviation measures such as the standard deviation of the percentage change of operating income or cash flows (Titman and Wessels, 1988; Balakrishnan and Fox, 1993) showed weaker explanatory power than those using size-normalized measures of volatility (Barton and Gordon, 1988). This fact would satisfactorily be explained by heteroskedasticity problems. To overcome this caveat we proposed the approach carried out by Ocaña, Salas, and Valles (1994) when computing the bankruptcy probability according to the following formula:[15]

Ownership structure (FAMDUM, BANKDUM)

As discussed previously, concentrated ownership is a distinctive feature of Spanish firms. To control for the effects of ownership structure we include two dummy variables, FAMDUM and BANKDUM, which take value 1 when 5 percent or more of total equity is owned by a single family or bank, respectively, and zero otherwise. These data were extracted from CNMV files and 'Maxwell Espinosa' (1990/1993) reports. The empirical justification for considering ownership and financial structure as related phenomena is still a research question. Rajan and Zingales (1995) did not find systematic differences between bank-oriented and market-oriented financial systems across the G-7 countries, while Berglof (1990) obtained opposite empirical findings. Chaganti and Damanpour (1991) found that the size of institutional stockholdings is negatively related to the debt ratio, while the volume of familiar stockholdings shows the opposite effect, even though the overall effect of external stockholdings as a whole (familiar and

Event	Definition	Upper boundary for probability
Bankruptcy	$\text{Prob}\{OI \leq -EQ\}$	$\text{Min}\left\{1, \left(\dfrac{\text{STD}_{\text{OI}}}{E\{OI\} + EQ}\right)^2\right\}$

Bankruptcy is declared when loss (negative OI) exceeds the amount of total equity (EQ). Note that the standard deviation of operating income (STD_{OI}) is normalized by measures of size, the average operating income ($E\{OI\}$), and the total equity (EQ). Mean and standard deviation of annual OI are calculated from the longitudinal sample for each firm.

institutional) on debt ratio was negative. They suggested this fact reveals that families are less efficient than institutional investors in monitoring managerial actions.

Size and Industry (LSAL; SEC)

Both control variables have been extensively used in the empirical analysis of the financial structure. A number of authors have suggested that leverage ratios may be related to firm size. Some evidence supports that direct bankruptcy costs appear to constitute a larger proportion of a firm's value as that value decreases (Warner, 1977; Ang, Chua, and McConnell, 1982). The Spanish evidence weakly supports this hypothesis (Ocaña *et al.*, 1994). We use the natural logarithm of sales (LSAL) as the indicator of size. Previous litera-

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[15] This result follows from the Chebychev inequality, which holds that

$$\text{Prob}\{|X - \mu| > \varepsilon\} \leq (\sigma/\varepsilon)^2$$

where μ and σ are the mean and standard deviation of the random variable X, respectively, and ε is a given constant. The above formula is obtained by assuming that OI is a random variable and choosing $\varepsilon = (E\{OI\}+EQ)$.

ture indicates that firms within an industry are more similar than those in different industries. We control the industry effects by their corresponding dummy variables (SE1–SE5).[16]

RESULTS

OLS estimates provide references for comparative analysis with panel data results and they allow to test the relevance of time, industry, and dummy variables for ownership. These results are presented in the first two columns of Table 2. As far as industry effects are concerned, only the 'Electric Utilities' group shows a significantly higher leverage than the omitted sector ('Food'). Ownership structure variables provide mixed results. According to previous studies in Spain (Galve and Salas, 1996), we find that family-controlled firms are less leveraged than firms with a more disperse ownership. This partially supports agency theory when predicting that a closer scrutiny of management behavior substitutes debt financing as a disciplining device. But the same argument should apply for bank-controlled firms and no significant effect of BANK on leverage is detected. Furthermore, the low significance of PROFIT estimate in Table 2 led us to reject information asymmetry as a relevant factor, which clearly differs from previous evidence in the U.S. case (Vogt, 1994; Whited, 1992). A potential explanation of this finding is that banks may act as privileged stockholders as well as lenders and, therefore, they can mitigate the effects of adverse selection because they have common interests (maximizing the firm's value) with less informational restrictions than other stockholders. As a result, the negative relationship between profitability and leverage should be weak for firms with banks as stockholders. As shown in Table 3, after considering the interaction term, FAMY-DUM * PROFIT, the profitability and the 'dummy' variable FAMYDUM became negative and significant. These findings suggest that stockholders' identity and roles are at least as important as ownership concentration in determin-

ing capital structure (Chaganti and Damanpour, 1991).

Regarding the proposed control variables, estimates from Tables 2 and 3 appear to be roughly consistent with previous evidence. Nondebt tax shields provide significant and negative effects supporting the importance of taxes in the capital structure design. Other control variables such as tangible assets and bankruptcy probability show the predicted signs for their coefficients but they do not achieve significance. Since bankruptcy probability is significant only in the model with leverage in books, it could be argued that market value reflects the default risk. An additional explanation for this fact is that the proportion of tangible assets and earnings volatility can be considered sectoral features and, therefore, captured by their corresponding sectoral dummies.[17]

Regardless of the individual effect model considered (fixed or random), the specific dimension of human capital (SCHI) is negatively related to the market value of financial leverage. However, this relationship is not significant when leverage is computed from book values, perhaps due to the inability of accounting data to capture the firm's value.

The covariate of internal R&D ratio (IR&D) shows negative and significant effects on financial leverage. This effect remains significant for both measures of financial leverage (LEVB and LEVM) and supports previous empirical findings (Bradley *et al.*, 1984; Baysinger and Hoskisson, 1989; Balakrishnan and Fox, 1993; Hoskisson *et al.*, 1994). In contrast, external R&D (ER&D) had no significant effect on the borrowing ratio. This fact corroborates Propositions 1 and 2 insofar as innovative resources and capabilities acquired from external agents are less firm specific and more transparent, and hence they have less strategic content than those developed internally. Additional evidence favoring Proposition 2 is provided by positive and significant effects of advertising intensity on market-valued leverage. This evidence supports previous findings (Balakrishnan and Fox, 1993) and confirms that firm-specific resources (reputational assets) may improve the

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[16] After aggregating those sectors including fewer than four firms, we obtained the following sectors: Electric and Gas Utilities (SEC1), Machinery, Chemical and Mining (SEC2), Food (SEC3), Construction and Highways (SEC4), and Manufacturing (SEC5).

[17] Alternative estimates not shown in this work confirm this hypothesis. When omitting sectoral dummies, the bankruptcy probability is negatively related to leverage at the 5 percent level. The opposite effect is detected for tangibility at a 10 percent level of significance.

Table 2. Resulting estimates from the subsample including the questionnaires with three or fewer missing values (52). Total number of observations, 52 firms × 5 years = 260 observations

	Pooled data		Fixed effects		Random effects	
	LEVM	LEVB	LEVM	LEVB	LEVM	LEVB
CONS.	0.42***	0.31***	--	–	–	–
	(3.76)	(4.32)	–	–	–	–
SHCI[a]	−15.74**	−8.47	−14.27**	−3.03	−16.04*	−3.36
	(−1.82)	(−0.42)	(−1.87)	(−1.39)	(−1.76)	(−0.31)
ADV	0.24*	0.31	0.28*	0.29	0.31*	0.24
	(1.72)	(1.01)	(1.76)	(0.52)	(1.81)	(0.61)
IR&D	−0.63*	−0.38**	−0.74***	−0.58**	−0.48**	−0.32**
	(−5.83)	(−2.23)	(−4.08)	(−2.11)	(−1.90)	(−2.06)
ER&D	−0.05	0.26	0.81	−0.32	0.24	−0.28
	(−0.32)	(0.55)	(0.19)	(−1.36)	(0.53)	(−0.98)
GROWTH	−0.21*	−0.18**	−0.12*	−0.54	−0.17*	−0.42
	(−1.77)	(−1.91)	(−1.78)	(−0.53)	(−1.81)	(−0.61)
TANGIB	1.64	−2.45	1.96	3.46	1.66	−3.15
	(1.48)	(−0.33)	(1.03)	(0.14)	(0.51)	(−0.35)
NDTAXSH	−1.87*	−0.94**	−1.64*	−0.82**	1.31	−1.54**
	(−1.79)	(−1.83)	(−1.75)	(−1.91)	(1.26)	(−1.92)
PROFIT	−2.76	0.74	−0.53	0.94	−1.39*	−0.32
	(−1.09)	(1.03)	(−1.56)	(0.81)	(−1.68)	(−0.05)
BKRPROB	−8.34	−13.04*	−5.16	−11.53	6.28	−16.21*
	(−0.21)	(−1.82)	(−0.65)	(−1.24)	(1.06)	(−1.79)
FAMDUM	−0.63**	−0.15*	–	–	–	–
	(−1.79)	(−1.81)	–	–	–	–
BANKDUM	0.79	0.34	–	–	–	–
	(1.32)	(1.48)	–	–	–	–
LSAL	−0.18	1.05	0.12	0.43*	−0.51	0.68
	(−0.93)	(1.22)	(0.31)	(1.72)	(−0.84)	(1.37)
SECTORAL EFFECTS[b]	0.47** (SEC1)	0.34* (SEC1)	–	–	–	–
Adj. R^2	0.34	0.28	0.88	0.53	0.72	0.35
χ^2	–	–	–	–	20.32**	16.24*
F-stat.	16.56***	11.28***	1.57[c]***	0.38[c]	–	–

t-statistics in parentheses.
[a]SHCI: specific human capital index.
[b]Only significant estimates of sectoral dummies are shown.
[c]F-statistic of equal intercepts (null hypothesis: irrelevance of individual effects).
χ^2 : Hausiman test (null hypothesis: equal coefficients between the fixed and the random effects model).
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

Table 3. Resulting estimates after including interaction terms of ownership structure. Total number of observations, 52 firms $\times$ 5 years = 260 observations

	Fixed effects		Random effects	
	LEVM	LEVB	LEVM	LEVB
SHCI[a]	−16.03**	−9.37	−14.04**	−2.61
	(−1.87)	(−1.39)	(−1.87)	(−0.31)
ADV	0.19**	1.23	0.46*	1.72
	(1.96)	(1.02)	(1.78)	(0.43)
IR&D	−0.51***	−0.26**	−0.82***	−0.31**
	(−3.67)	(−2.32)	(−4.18)	(−2.45)
ER&D	−0.43	−0.28	−0.54	0.11
	(−0.05)	(−0.64)	(−0.13)	(0.72)
GROWTH	−0.19*	0.14	−0.27*	−0.38
	(−1.71)	(0.22)	(−1.69)	(−0.17)
TANGIB	−1.72	4.04	−2.03	−1.78
	(−0.53)	(0.13)	(−0.88)	(−0.62)
NDTAXSH	−0.41*	−0.30**	−0.28	−0.62*
	(−1.67)	(−2.21)	(−1.09)	(1.73)
PROFIT	−2.18***	−1.52**	−2.47**	−0.74*
	(−4.61)	(−2.05)	(−2.91)	(−1.66)
BKRPROB	3.06	−1.88	7.82	−9.21
	(0.25)	(−0.91)	(1.24)	(−0.07)
(BANKDUM)	0.83	−0.41	−0.13	0.35
$\times$ (PROFIT)	(0.07)	(−0.10)	(−0.42)	(0.47)
(FAMYDUM)	−0.17**	−0.31***	−0.24*	−0.26**
$\times$ (PROFIT)	(−1.94)	(−4.12)	(−1.68)	(−1.89)
LSAL	−2.72	1.34	−1.13	2.02
	(0.51)	(0.76)	(0.44)	(0.15)
Adj. R^2	0.88	0.71	0.74	0.38
χ^2	−	−	19.06*	16.34
F-stat.	1.43[b]*	0.21[b]	−	−

t-statistics in parentheses.
[a]SHCI: specific human capital index.
[b]F-statistic of equal intercepts (null hypothesis: irrelevance of individual effects).
χ^2: Hausman test (null hypothesis: equal coefficients between the fixed and the random effects model).
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

borrowing capacity of the firm due to its informative content.

According to previous empirical studies, estimates of GROWTH coefficients are mostly negative and with stronger significance in those models with market-valued leverage as an endogenous variable. But, as mentioned previously, this variable can also serve as a comparative basis to explore the validity of our propositions. Under this view, technological resources and capabilities internally developed (proxied by IR&D) should be considered more specific and opaque than physical resources since the latter show a weaker impact on leverage (see Tables 2 and 3). This result agrees with the idea that physical assets are more flexible (less specific) than intangible assets (Chatterjee and Wernerfelt, 1991). Nevertheless, under a similar logic, it can be argued that physical assets are less specific than other strategic resources such as ER&D and ADV and therefore similar effects should be expected. This reasoning becomes weakened because it ignores, firstly, the informative dimension of each class of assets, and secondly, because the 'tangible/intangible breakdown is a very incomplete measure of asset specificity' (Williamson, 1988: 588). These questions suggest further research in order to find a typology or measurement procedures able to evaluate the degree of specificity and opacity (or any other strategic features) of the

resource bundle.[18]

Some differences are found when using market vs. book values of leverage as dependent variables. As the *F*-test shows, the null hypothesis of equal intercepts across firms is rejected when using LEVM. These results suggest potential biases when using 'pooled data' and more consistent estimates when using individual effects models. Conversely, *F*-tests for the models with book value of leverage (LEVA) as a dependent variable do not provide significant heterogeneity. Similar results are provided by the χ^2-statistic of Haussman when testing significant differences between the estimates from the fixed and the random effects models. These differences are only statistically significant on LEVM. Again, these results confirm the severe limitations of book values in approximating the economic value of strategic resources.

The random effects specification provides weaker effects of internal R&D and advertising on the financial leverage, while the specific human resources index (SHCI) shows a greater impact (although lower significance). The different nature and statistical properties of the specific capital human index and the remaining proxies for strategic resources justify these differences. Actually, the factor used to proxy the specific human resources shows lower cross-sectional and longitudinal variability than the R&D and advertising ratios. Thus, we should expect a high correlation between SHCI and the unobserved individual effects and, consequently, a negative bias in estimates (Huselid and Becker, 1996). This explanation favors fixed effects against random effects specification since the latter assumes that the individual effects are not correlated to regressors.

Finally, we provide some evidence on the relative explanatory power of traditional and resource-based determinants of capital structure. The answer to this question becomes important because it would help us to assess the relative importance of strategic-related variables usually ignored in the traditional theory of capital struc-

ture. The variance analysis results of the fixed effect model (Table 4) show that: (i) environmental variables (GROWTH, COLLAT, NDTAXSH, PROFIT, BKRPROB, LSAL, and sectoral dummies) have a better performance than strategic variables (SCHI, ER&D, IR&D, and ADV) in explaining the capital structure when using book values; (ii) when leverage is computed from market value of equity, strategic proxies have more explanatory power than traditional determinants; and (iii) the test of omitted variables (*F*-test) indicates that both groups of variables are relevant in explaining the capital structure.

DISCUSSION AND FURTHER RESEARCH

Although the resource-based view of the firm has contributed substantially to understanding the devices that maintain and enhance the competitive advantage, the underlying conceptual framework allows a more comprehensive interpretation of heterogeneity in firms' behavior and outcomes. Our insight into the RBV assumptions proves that frictions in resource markets should also be viewed not only as a source of rents but also as costs and restrictions to the feasible set of strategies for those firms lacking strategic resources. Obviously, imperfectly imitable and substitutable resources and capabilities are valuable for the firm to the extent that its competitors have few opportunities to acquire and deploy them. Moreover, phenomena that restrict, at least during a long time period, the acquisition of valuable and difficult-to-copy resources not only state '*ex ante*' limits but also '*ex post*' conditions to the feasible corporate and business strategies. This 'dual perspective' of the resource-based approach has straightforward implications not much explored in strategy research.

In this research we have addressed this question by translating some kinds of market imperfections into terms of resource features. Specific assets entail sustainable rents as there exists a substantial difference between their productivity as a part of a particular firm and their market price or development cost. Opaque resources prevent imitation or substitution through intentional actions (secrecy) or when transparent and identifiable assets belie uncertain and complex capabilities. Both dimensions, specificity and opacity, add stra-

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[18] In a first stage of this research, we attempted to measure the specificity and opacity of each type of strategic resource by its level of internalization. Unfortunately, this approach was only successful for R&D activities. Advertising activities are commonly outsourced and the questionnaire items able to indicate the internalization degree of training activities were too scarce for any statistical purpose.

Table 4.   Explanatory power of strategic proxies vs. other determinants of capital structure

	R^2		δR^2		Relative explanatory power[a]	
	LEVM	LEVB	LEVM	LEVB	LEVM	LEVB
Complete model	0.88	0.62	–	–	100%	100%
Model including only strategic 'proxies'	0.57	0.33	0.31*	0.29**	64.7%	53.2%
Model including only other determinants	0.39	0.41	0.49***	0.21*	44.3%	66.1%

Data based on the fixed model 'within' estimates. Strategic proxies are SHCI, ADV, IR&D and, ER&D. Other determinants are the remainder of the variables in Table 3.
$\delta R^2 = R^2_{\text{(complete model)}} - R^2_{\text{(restricted model)}}$
*Significant at 10% level; **significant at 5% level; ***significant at 1% level

tegic content to resources and capabilities but also shape the financial policy of the firm and, in particular, its capital structure. Actually, the financial approach to these market imperfections prescribes higher risk and cost of financing as well as restricted availability of external funds when opaque resources are deployed.

The results of our empirical study with Spanish data confirm that the usual proxies for strategic resources such as reputational assets, technological capabilities, and specific human capital affect the firm's debt ratio in different ways in spite of the fact that they are expected to have similar implications as intangible assets and nondebt tax shields. Actually, essentially specific and opaque resources such as internally made R&D and specific human capital are inversely linked to financial leverage. Alternatively, reputational assets, although specific, reveal a positive and robust correlation with the borrowing ratio consistently explained by their informational purpose. Obviously, further research in other institutional contexts is required to claim general validity for these findings. But in the meantime there are no reasons to conjecture that these approaches have a limited scope since the peculiarities of Spanish financial systems and institutions do not provide evidence contradictory to previous empirical regularities observed in other developed countries.

It is noteworthy that our resource-based approach predicts that not only the nature and objective of investments but also their modes of acquisition can affect the capital structure of the firm. The evidence provided in this work confirms that financial structure is partially determined by

'make-or-buy' decisions related to R&D activities. When specificity is the basic motivation for internalizing technological investments, debt cost will include a risk premium due to the higher losses of value when financial distress occurs. If internal development of R&D attempts to preserve critical information, credit suppliers will restrict the volume of debt offered to the liquidation value of the firm's assets, in order to hedge their investment. As a result, internalization of R&D investments would be negatively related to the borrowing capacity of the firm. This hypothesis is supported by the evidence resulting from this research. The ratio of internal R&D investments to total net sales is significant and negatively correlated with the financial leverage, while external R&D intensity does not significantly affect the borrowing decision.

These findings suggest interesting implications. First, firms exploiting resources with a high strategic content (highly opaque and specific) face more restrictive financial scenarios. To the extent that equity is more expensive than debt (due to agency costs and tax effects) resource-driven strategies can increase the cost of the firm's financial structure. Second, young and small firms lacking a critical mass of strategic resources will face serious limitations to growth as their financial choices are fewer than those for large and mature companies. Third, the design and implementation of a 'resource-based' strategy must be compatible with the financial policy of the firm. This implication is specially interesting when analyzing financially distressed firms. Fourth, the different effects of external and inter-

nal R&D on leverage justify a more disaggregated treatment of R&D investments. Otherwise, biased estimated effects of R&D may lead to different interpretations and inconclusive findings. Such an argument is supported by the recent empirical research that detects no significant or even positive relationships between R&D and access to financial markets (Hundley, Jacobson, and Park, 1996). From a dynamic point of view, a firm characterized by a resource-driven strategy must take into account that the features of its strategic resource bundle will determine its future financial policy. The proposed two-dimensional approach of strategic resources allows us to understand the matching between the managerial processes of selection and implementation of business strategies and the feasible and desirable path of financial decisions.

Although our empirical analysis does not allow an accurate generalization, it becomes clear that the main findings and ideas of this work suggest a more general framework in which to integrate resources, strategy, and capital structure. Chatterjee and Wernerfelt (1991) find that less redeployable resources appear to be a source of related diversification. On the other hand, leverage decreases as the degree of relatedness increases (Barton and Gordon, 1988; Taylor and Lowe, 1995). This reasoning, supported by our findings, suggests a negative relationship between debt ratio and those resources that lead to related diversification.

As concluding remarks we can anticipate some promising directions for future research derived from these results. From a theoretical point of view, opacity and specificity reduce borrowing capacity due to different causes. Opacity generates restrictions on the available amount of debt, while specificity increases the cost of debt financing. Unfortunately, our research design does not allow us to distinguish between these distinctive effects. Further work on the impact of the nature and features of strategic resources on other financial instruments (equity, convertible debt, long-term and short-term debt) could help to clarify this issue. The two-dimensional approach described above is not exhaustive and other market imperfections such as complementarities, path-dependent explanations, or different kinds of informational asymmetries should be examined to complete this elementary approach to comprehending the firm's success in assuring the com-

patibility of its financial needs and availability of funds with the features of its targeted strategic bundle.

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