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UNIVERSITY OF CALIFORNIA

Los Angeles

Intercorporate Influence and Industrial Growth:

Business Groups in Korea's Automobile and Semiconductor Industries

A dissertation submitted in partial satisfaction of the requirements for

the degree Doctor of Philosophy

in Sociology

by

Gihong Yi

2002

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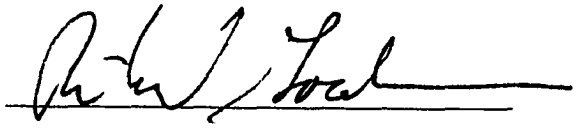

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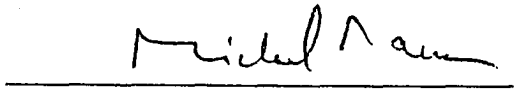

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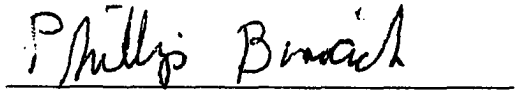

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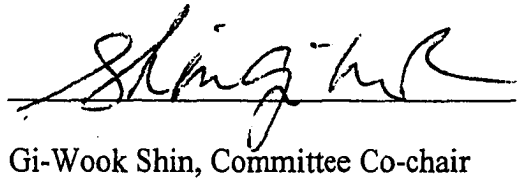

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University of California, Los Angeles

2002

To

Sue, Kyoung-Won J., Jong-Won J.,

Mahn-Yol and Ewija Yi,

and

Linsu and Susie Kim

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ABSTRACT OF THE DISSERTATION

Intercorporate Influence and Industrial Growth:

Business Groups in Korea's Automobile and Semiconductor Industries

by

Gihong Yi

Doctor of Philosophy in Sociology

University of California, Los Angeles, 2002

Professor Gi-Wook Shin, Co-chair

Professor Phillip Bonacich, Co-chair

How do unsuccessfully implemented industrial policies influence corporations and industrial growth? How do firms influence one another in the course of industrial growth? This dissertation discusses these two issues, quite neglected in previous explanations of Korea's industrial growth due to the dominance of statism, utilizing historical and network data on multinational business groups in the automobile and semiconductor industries. It constructs an alternative

argument stressing intercorporate influence from economic sociology and network perspectives.

Historical analysis of unsuccessfully implemented industrial policies regarding both industries reveals that corporate initiatives are key in understanding important stages of product development (passenger cars and memory chips) before or without government intervention. To discuss intercorporate influence, my network analysis considers the structure of a multinational business group an intra-corporate and inter-subsidiary network, and employs graph theory-based variables. Examinations of business groups' structural globalization find that 1) leaders influence each other in both industries, and; 2) intercorporate influence is more detectable in the semiconductor industry.

Suggestions for future study of Korea's industrial growth are 1) more rigorous discussion of unintended consequences of political intervention, and; 2) adopting industries as the unit of analysis to elaborate on previous research.

Chapter One

Rethinking Industrial Growth

Introduction

This dissertation takes up two neglected issues in discussions of Korea's industrial growth—How do unsuccessfully implemented industrial policies influence corporations and industrial growth? How do corporations influence one another in the course of industrial growth? I address these with historical and network data from the automobile and semiconductor industries, focusing on multinational business-group activities between 1980 and 1999.

Answering the first question requires supplementing dominant explanations for Korea's late industrialization—which primarily stress the positive impact of state intervention—with more diverse arguments. The inefficiency of political stimulus and the reaction of the industrial sector thereto in East Asian development have been understudied, yet failed policy implementation also affects the course of industrial growth, often with unintended consequences. In social science, statism mainly denotes the political economy-based idea that credits economic growth and development to political leadership. Statism gained intellectual popularity in explaining the regional uniqueness of East Asian development by recognizing the

coexistence of relatively strong state[1] intervention and rapid economic growth during the latter half of the 20th century, a phenomenon mainstream economics routinely overlooked. Statism and its concept of the developmental state help describe Korea's industrialization from the early 1960s until the late 1970s: The Korean government actively implemented policies to build a broad infrastructure and pushed heavy-chemical industrialization. The Korean state was strong and relatively effective in achieving intended economic goals.

However, recent phenomena such as economic globalization and rapid private sector growth compel scholars to generate a more nuanced understanding of the role and efficiency of state intervention in economic change. This dissertation reviews major state intervention efforts in the history of Korea's automobile and semiconductor industries to address how not only successful state policy implementation, but also unintended and ineffective policy outcomes, affect industrial growth.

The second question stems from the fundamental stress in economic sociology on the importance of mutual influence[2] in explaining economic action—in contrast to the emphasis mainstream economics places on individual rationality (for comparison of sociology and economics in this regard, see Smelser and Swedberg 1994: 3-8).

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[1] Strong states can show various characteristics. Here, by "strong," I mean that a state has both despotic and infrastructural power (Mann 1984: 188-189) and capabilities to transform the national economy and structure (Migdal 1988: 269).

[2] Sociological traditions view action as a social phenomenon. For instance, Weber succinctly states that action is of interest to sociology insofar as its meaning "takes account of the behavior of other individuals and is thereby oriented in its course (Weber 1978: 4)."

Economic sociology views economic actors as members of a group or society whose interdependence goes far to explain socioeconomic phenomena. Among economic actors, firms figure large in contemporary capitalist economies as they account for a great portion of their economic activities. Theorists have neglected this mutual influence among corporate actors and its bearing on industrial growth. Political economy has focused on how firms react to political stimulus, and economics has cast firms as rational, individual actors who respond to market factors. In contrast, I will show that firms can be relatively independent of political input and that industrial growth may be attributable in large part to firms' influence on one another.

Central to this dissertation is the view that the internal structure of economic organizations is best explained by the network concept. (Chapter Three presents the theoretical and methodological properties of this network perspective in greater detail.) Most existing literature about firms uses network concepts to empirically measure *inter*corporate strategic alliance. However, my analysis (Chapters Four and Five) of multinational business groups engaged in two industries—Hyundai, Daewoo, and Kia in the automobile industry; and Samsung, LG, and Hyundai in the semiconductor industry—views firms as intra-corporate, inter-subsidiary networks. My analyses statistically examine their internal network structures to discuss the relationship between intercorporate influence and industrial growth. This network analysis explores similarities and differences between the two industries and what they imply vis-à-vis previous research. In the process, economic globalization figures more

importantly than previous explanations of Korea's industrial growth—based on the growth of business groups—allow.

Previous Explanations of Korea's Industrial Growth: The Dominance of Statism

Industrial growth has been a frequent topic in the study of development as it is central to economic change. Accordingly, discussions often portray East Asia as a regional success based on its massive industrialization during the latter half of the 20th century. However, the power of modernization, dependency, and world-system mega-theories to illuminate Western national economies was lost with regard to East Asian economic change. East Asian economic modernization showed closer government-business relationships. Moreover, it appeared independent of Western economies and not peripheral in the structure of the world economy. As economists and political economists renewed debate over East Asian industrial growth, mainstream economics stressed a variety of market factors, while political economy highlighted government intervention. Historical data suggested that the latter—political economy-based statism—better explained the region's rapid industrial transformation.

Statism refers to the group of explanations that emphasize the positive effect of political leadership on economic development. It views political leadership as critical to the overall process of economic change (see review Barkey and Parikh 1991; see Evans, Rueschemeyer and Skocpol 1985; Hirschman 1971). Statism has dominated explanations for East Asian late industrialization mainly due to effective, consistent consideration of the historical coexistence of strong state intervention and rapid

economic development following World War II (Amsden 1989; Bello and Rosenfeld 1990; Cumings 1984; Evans 1995; Haggard 1989; S. Hong 1998; Johnson 1982; E. Kim 1997; Migdal 1988; A. So 1996; Weiss 1998). Drawing on political economy theory (e. g., see Biggart 1991), statists stress that East Asian economies such as Japan, Singapore, Taiwan, and Korea historically experienced rapid economic expansion through late industrialization under authoritarian political leadership. Japan's Liberal Democratic Party, Taiwan's *Kuomintang*, Singapore's Lee Kuan Yew administration, and Korea's Park and other administrations—headed by ex-military presidents enjoying either one-party rule or unusually strong administrative power by Western standards—presided over record economic growth.

This view concentrates on and the long-standing coexistence of strong political intervention and economic growth and tends to attribute economic/industrial growth to state intervention, particularly in East Asia where the authoritarian states were long-lived and strong. It cites the executive role of certain government institutions (Friedman 1988; Johnson 1982; Johnson 1987) as structural evidence. For instance, Japan's Ministry of International Trade and Industry (Johnson 1982) is cast as state proxy in guiding planned development. Statists hold that strong state leadership and government policies that systematically implemented import-substitution followed by export-orientation were key to late Korean industrialization (Amsden 1989; Bradshaw, Kim and London 1993; Cumings 1984; Evans 1995; Evans 1996; E. Kim 1997; Woo 1991; Woo-Cumings 1999). More specifically, effective leadership from government authorities such as the Economic Planning Board (*Kyóngje kihoegwón*) and the

government-sponsored Korea Trade Promotion Corporation (*Taehan muyók chinhúng kongsa*)—launched in the early 1960s to develop a series of economic development and export promotion plans—implemented industrial policies that secured decades of state-coordinated industrial growth.

Statists, in sum, concentrate on two endemic regional characteristics. First, most East Asian economies experienced rapid economic growth in the presence of interventionist states. Some historicize this similarity as the common legacy of colonial experiences under pre-WWII Japan (e. g., Korea and Taiwan, Woo-Cumings 1999: xi). In the Korean instance, they detect colonial modernization under Japanese Imperialism, gainsaying the nationalist view that exploitation prevented development. They find significant historical continuity between the colonial era and post-WWII period in that both exhibited a relatively harmonious concurrence of strong political intervention and rapid growth (see review Haggard, Kang and Moon 1997; e. g., Kohli 1994).

Second, East Asian economies achieved this politically guided rapid economic growth in a unique manner almost unfound elsewhere, even in economies where state intervention is thought to have brought some positive effects. Recent findings suggest that Latin American economies show significantly variation in degree of political integration and its impact on economic results (Schneider 1999). In ASEAN economies, state intervention is relatively ineffective (Hill 1994), and in some countries, it eventually fails in the economic sector (e. g., in India, see Herring 1999).

Understanding how statism became the dominant explanation for East Asian economic growth requires recalling its relative strength vis-à-vis mainstream (or neoclassical) economics that failed to explain East Asian development as fully market-driven. Relying on methodological individualism— which assumes equal rationality among economic actors primarily reacting to market factors (see Hodgson 1994: 60; Nelson 1994: 110-111; Stinchcombe 1986)—mainstream economics claims that conditions such as non-intervention in both domestic markets and international trade, free labor flow, and competitive market structures are critical to economic development in contemporary capitalism (see Gereffi and Fonda 1992: 422-423; see Wade 1990a: 16-22). Methodological individualism assumes that economic actors—consumers, households, firms, countries, and so forth—are mutually uninfluenced as they respond to market-based economic conditions. This market-oriented approach characterized most early literature on East Asian development with its stress on domestic factors such as high saving rates, a well-educated work force, and reasonable interest rates and view of the state mainly as a market supporter and advocate (see Hong 1998: 24; e. g., Little 1979).

But mainstream economics had to retreat when it failed to empirically reconcile state intervention-related factors with market-related prerequisites for explaining sustained development—mainly because of its nearly exclusive emphasis on market forces (for discussion of the Korean case based on mainstream economics, see Balassa 1981; Balassa 1988; Krueger 1979). Methodological individualism too often excluded the influence of political stimulus. In time, even some economists

explicitly concurred with statists that, in Korea, selective government intervention enhanced sustained economic growth (e. g., Westphal 1990: 41). Recently, as concerns East Asia and Korea, economists have stressed financial deregulation policies and their effect on newly emerging industrial sectors such as telecommunications (e. g., in the Korean case, Kang 2000) and increased international capital flow (Ito and Krueger 2001). This appears quite compatible with the emergent so-called market-enhancing government view (see brief introduction, Rowen 1998: 8), which might forge a new link between political economy and mainstream economics when further elaborated.

Institutionalists offer a more fundamental sort of criticism of neoclassical economics besides the failure to sufficiently consider the effect of political input in East Asia. Biggart (1991; 1992) explicitly criticizes neoclassical economic roots in the developmental experience of the West, limiting its relevance to the non-West. For instance, Balassa (1988) contends that the coupling of capital and labor markets efficiency with minimal government intervention is fundamental to successful national economic growth. This belies the reality that Korean development exploded with Park Chung Hee's military uprising in 1961 and flourished under his autocratic and authoritarian regimes until his death in 1979.

Such historical evidence empirically challenges the basic neoclassical economist logic that political intervention distorts the laws of the ideal capitalist market to hinder economic growth. The Korean phenomenon seems to maximize the explanatory power of statist claims for the positive role of the developmental state,

especially in its relationship to the market. For instance, Wade (1990b) uses the concept of the 'governed' market to contend that the state—generally in East Asia and including Korea—leads market changes at important stages of development. Furthermore, Amsden (1989: 139-56) maintains that the Korean government intentionally distorted adjusted prices to advance planned economic goals. Woo (1991) credits the Korean state's abnormally strong control of the financial sector with continuous economic growth. These statists present empirical evidence they interpret as showing the effect of strong state intervention on economic/industrial growth to unequivocally charge that neoclassical economics cannot explain Korean development. It would seem that statism indeed better accommodates the clear presence of strong Korean state intervention in the 1960s and 1970s. Statists have historically, therefore, most frequently cited Korea to demonstrate that state intervention can expedite economic development even as it may violate basic market principles.

Statism, despite its merits, has recently occasioned renewed debate even among political economists—in my view because of its narrow focus on political factors, just as mainstream economics confined itself to market-related elements. Several political economists are now dubious of conventional statist descriptions of the relationship between the state and economic performance in East Asia.

Moon and Prasad (1994) point out that developmental state concepts not only cannot explain East Asian economic performance, but neglect intra-state dynamics and inadequately depict state-society relations. Yet, as remedy, they revert to the usual statist focus on politics, institutions, and leadership.

Clark and Chan's critical review of previous statist explanations of East Asian development (1994) offers more direct remedies for constructing a non-statist explanation. Since neither the state nor the market alone explains developmental outcomes, society must figure in the equation. However, their purpose remains to better explain the operation of political economies, the usual statist focus. Their critical review fails to explore how to theoretically or empirically "bring society back in" for a more comprehensive explanation of, for instance, East Asian economic change. Their criticism is theoretically self-contained and excessively centers on political factors despite evidence of non-political influences on development and industrial growth. I agree that bringing society back in is requisite, but in so doing I suggest an examination of the internal industrial sector dynamics.

According to S. Hong (1998: 22), statist concentration on state-related factors—such as the intention of the government intentions, policy tools, and policy implementation—not only assumes state control of non-state sectors, but ignores industrial sector influences on which economic actors—such as firms and individuals—engage in activities that directly determine economic performance. His empirical research on East Asian industrial growth, in contrast, focuses on industrial policies as the strongest factor driving economic outcomes.

In sum, political economists use statist concepts to show that political factors best explain economic outcomes, consistently ignoring

1) the likelihood that nonpolitical elements may similarly influence industrial growth and

2) instances in which government policies fail to achieve intended objectives.

The common internal logic of statist studies is that extra-industrial factors causally influence intra-industrial situations. This dissertation traces the fundamental weakness of statism to its exclusion of the impact of intra-industrial dynamics on industrial change and constructs an alternative perspective for discussing Korean industrial growth.

Limitations of Previous Statist Research on Korea's Industrial Growth

Review of statists' recent major works on Korean industrial growth discloses more specific limitations and suggests what alternative explanations must address to advance study. E. Kim and Evans are prominent statists whose respective original empirical research discusses the symbiotic relationship between the government and chaebol[3] groups and its impact on industrial growth (E. Kim 1997), and the state's positive role in development of the information technology (IT) industry (Evans 1995). Unlike other statists who concentrate on more general aspects of economic development, E. Kim scrutinizes business groups and their relationship with the government as important actors in the process of Korea's industrial transformation; Evans zeroes in on IT.

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[3] *Chaebol*, which literally means *capital clan*, refers to a group of closely linked big businesses in diversified areas with a traditional emphasis on manufacturing, owned and managed mostly by family members or relatives in Korea. *Kióp chiptan* and *taegióp*, respectively meaning *corporate group* and *big corporation*, also refer to the same type of corporate organizations although less used in English literature. The Korean word *chaebol* shares the etymological root with *zaibatsu* (pre-WWII Japanese

E. Kim stresses that, throughout the three decades spanning from the early 1960s, the state continuously and deeply participated in the rise and growth of Korea's large business groups (E. Kim 1997: Chapters 4, 5, and 6). Evans' discussion of the positive effect of state intervention on Korea's IT industry is a renowned derivation from the statist paradigm as it establishes the theory's relevance to development of the high-tech industry in developing economies (Evans 1995: Chapter 6), not just to the growth of less technology-intensive manufacturing sectors such as the textile, shipbuilding, and automobile industries (e. g., Amsden 1989). However, research limitations that the two statists themselves attribute to their work serve as my starting point for constructing an alternative explanation of industrial growth.

Evans' discussion of Korean IT development introduces the concept of embedded autonomy (see Evans 1995: 12-13) in a noteworthy departure from conventional statist distinctions between the political and non-political sectors, e. g., the market (e. g., Wade 1990b) or financial sector (e. g., Woo 1991). Though the concept is a major theoretical modification, it preserves statist conventional causality assumptions—again political intervention is key and explains the growth of Korea's IT industry. Still, Evans' self-reflective discussion provides provocative clues that point the way to surmount the limitations the statist view imposes on in his research. After painstakingly establishing the positive impact of state intervention (politics) on Korean IT (socioeconomics) in the 1970s and 1980s via the concept of the embedded

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business group). It is misleading to understand that *chaebol* is a direct translation of *keiretsu* (e. g., Fligstein and Freeland 1995: 38-39).

economy, Evans admits that globalization of the IT sector renders the state "less politically able to pursue transformative ends" and "forces us to think anew about the political roots and economic consequences of the state's role" (Evans 1995: 206). The recent phenomenon of economic globalization mitigates the impact of political leadership on economic outcomes.

E. Kim (1997) similarly points out that state influence on industrial growth waned in the 1980s. She finds a strong correlation between decline of the developmental state and the continuous rise of chaebol as she seeks to explain the changing roles of the state diachronically. Her presentation of the importance of the 1980s is consistent with Kong's (1993) empirical conclusion that Korea's capitalist class became significantly more independent of state support during the decade. E. Kim thus implies that private sector growth weakens both the state's developmental influence and the explanatory power of statism. More recently, she contends that the Kim Young Sam administration's *segyehwa* (globalization) policy in the 1990s could not actively facilitate Korean chaebols' direct foreign investment although it eliminated many state prohibitions of overseas investment (E. Kim 2000). That is, even from the statist perspective the Korean government was not the moving force behind economic/corporate globalization, which supports Evans' point.

Further, recent comparative research empirically suggests that Korea is increasingly straying from the statist profile. For instance, in Weiss' depiction of the state's transformative capacity in defense of statism (c.f., the preface of *The Myth of the Powerless State*), Korea most recently shows atypical ungoverned interdependence,

unlike the typical statist governed interdependence evident in Japan, Germany, and Taiwan (Weiss 1998: xi, 81, and 82). S. Hong's (1998: 147-159) discussion of the impact of state policy on industrial change finds the Korean state more decentralized and with less coordinating power than Taiwan. Such anomalies pose empirical challenges to the relevance of even recently revised statist paradigms to Korea, where the state increasingly appears peripheral to growth.

The limitations of statism discussed above suggest the following points, which this dissertation addresses.

1. Even statists increasingly admit that the explanatory power of their perspective is empirically ebbing due to a variety of factors particularly evident in Korea, such as private sector expansion and economic globalization. This implies that research that uses such limitations of statism as a point of departure promises an alternative, more comprehensive explanation of Korea's development.

2. Economic globalization weakens statist arguments. Again, Korea particularly illustrates this, as Evans' and E. Kim's discussions of the 1980s and afterwards find. Although the activity of multinational corporations (MNCs) is central to discussing economic change today, statism has yet to incorporate its effect on national economies in its paradigm. This attenuates statists' ability to explore the relationship between corporate globalization and industrial growth.

3. As mentioned above (E. Kim 2000), because the Korean government benefited from keeping corporate entities local, under its control, it demanded involuntary compliance from corporate actors when they pursued globalization

through increased overseas investment. Therefore explanations for corporate globalization—specifically, the growth of MNCs—must look to corporate initiative, not government support.

To transcend the limitations of statism in describing Korea's industrial growth I propose a focus on corporate actors, particularly the large corporations in Korea's economic structure. As some modernization scholars have generally discussed (Kerr et al. 1964: 21; Rostow 1990: 9-11, 40), large economic organizations figured centrally in contemporary capitalist economies in the management of technology and economic activity. Korea presents uniqueness in this respect. Within the East Asian newly industrialized economy, it is exceedingly large business group-centered. Taiwan has small- to mid-sized firms in most industries actively engaged in international trade (for comparative analysis on this issue, see Fields 1995). And, although Japan's *keiretsu* and Korea's chaebol may appear similar in corporate size and internal diversity—structurally both are groups of large corporations with subsidiaries/affiliates positioned in diverse areas—the two corporate forms differ in the highly important aspects of the structure of internal governance and inter-subsidiary alliances, and their relationship to financial institutions (for organizational characteristics of keiretsu, see Fligstein and Freeland 1995; Lincoln, Gerlach and Ahmadjian 1996; Lincoln, Gerlach and Takahashi 1992; Ozawa 1980). Accordingly, though statism may describe phenomena elsewhere, chaebol and their impact are peculiar to Korea's industrial structure to the extent of transcending statist explanations. I concur, however, with the comparative institutionalist conclusion that

the social organization unique to a country is a resource for action, not an obstacle (Biggart and Guillén 1999; Guillén 2001b: 13; Portes 1997).

As I consider the proclivity of Korean industries to operate through large business groups, multinational business groups figure as the primary economic actors: They—particularly in the automobile and semiconductor industries—most significantly impact overall Korean industrial growth and international trade. As with most Korean industries, major chaebol group subsidiaries in these two industries—such as Hyundai, Samsung, and LG—account for most corporate activity.

Globalization and Korea's Development

Globalization has of late been one of the most discussed and contentious intellectual issues regarding large-scale social change. Generally, Castells (1996), Held and colleagues (1999), Gilpin (2000), and others argue for its recent, ongoing empirical reality, while Hirst and Thompson (1996), Wade (1996), Doremus and colleagues (1998), and others dispute its presence. Regarding its tangible consequences, Meyer and colleagues (1997), J. Williamson (1996), and others detect increasing convergence of various institutional and organizational structures, which Berger and Dore (1996), Guillén (2001b), among others, dispute. Such general impasses suggest alternative approaches are necessary. Globalization and economic development are closely related (Giddens 1990: 63-65) and some recent scholarship recognizes that study of the former must be rooted in debate about the latter (e. g., Guillén 2001b: 3-5). This suggests our sought alternative: explore their mutual

connection, especially with regard to Korean development and, more specifically, industrial growth.

Specific debates concerning economic globalization dispute its empirical novelty. Naysayers claim that in the West and Japan the present degree of economic globalization echoes or continues the past (e. g., Hirst and Thompson 1996: 31). Weiss finds that post-1910s export records show no significant export growth as a proportion of GDP in advanced capitalist economies. Therefore, "the international economy was much more open in the pre-1914 era than at any subsequent time" (1998: 171). Drawing on research by Feenstra (1998) and Obstfeld (1998), Rodrik concludes that different data lead to different views. He contends that trade flows "loom much larger if they are compared against industrial production" (1998: 4).

In my view, then, Weiss' conclusion describes the economic history of the West and Japan based on GDP, but Korea differs from such early-industrialized economies. Economic globalization might figure more strongly in its industrial growth due to its late development. Thus, although economic globalization may be empirically irrelevant to general economic growth of advanced economies, the relationship in developing economies may warrant further attention. Below I examine historical evidence that establishes the critical link between economic globalization and Korea's industrial transformation.

Korea's economy soared in the last half of the twentieth century relative to that of the US and general world. By 2000 GDP had grown by about 23 times since the

outset of Korea's "late industrialization" around 1970 (see Figure 1.1 for the deflator index). During the same period, US GDP grew about 2 1/2 times, as did world GDP[4].

Korea's rapid expansion coincided with radical structural economic change. After 1970, with capitalist industrialization the proportions of agriculture, forestry, and fishing in national GDP (Figure 1.2) and of agricultural households (Figure 1.3) steadily fell as manufacturing and finance-related sectors flourished (Figure 1.2). In 1960 and 1965, more than half—54% and 52%—of Korean households were agricultural[5]. In the 1970s, the figure dropped below 40%, and, by 2000, below 10% (Figure 1.3). The contribution of agriculture to GDP showed similar decline. After the mid-1970s, it plummeted to 15% by 1980 and further dropped to 5% by the late-1990s. Over roughly the same period, manufacturing moved from about a quarter or less of GDP to stabilize at around 30% in the mid-1980s (Figure 1.2). Finance grew from about 10% or less of GDP in the mid-1980s to about 20% in the late-1990s. In contrast, the proportion of public administration and defense industry over the three-decade period varied little from slightly below 5% (Figure 1.2).

Of particular note is similar growth in exports and imports since 1970. In 1970, exports accounted for about 15% of GDP, in 1975 nearly 30%, and in 2000 close to

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[4] This is according to the Real GDP historical table presented by the Bureau of Economic Analysis, the US Department of Commerce and the World Trade Organization, respectively available online as of January 2002 at the following URLs:
http://www.bea.doc.gov/bea/ARTICLES/2001/08august/0801GDP.pdf and
http://www.wto.org/english/res_e/statis_e/longterm_e.xls.

[5] Source: The Republic of Korea Ministry of Agriculture and Forestry. Its URL as of January 2002 is http://www.maf.go.kr/html/pds/pds01_02.htm.

50% (Figure 1.3). Imports show an N-shape fluctuation with greater variance (Figure 1.3). In 1970, about a quarter of Korea's GDP was imports, and in 1980 about 45%. They declined to around 30% in 1990 and 1995 and recovered to about 45% in 2000. Figure 1.4, which uses the basic rate of the Korean won (FIFA 11) to adjust for the influence of currency exchange rates on export and import statistics, still more clearly depicts Korea's increasing engagement in international trade since 1970. Also, significant changes in Korea's overseas investment are evident. Figure 1.5 shows that since 1980 overseas investment as a percentage of GDP grew exponentially. Outstanding overseas investments were less than 1% in 1990, but late in the decade measured above 5%. Similarly, net investment gradually increased, especially in and after the late 1980s.

In sum, Korea's late 20th century industrialization and economic globalization experiences of the late 20th century were new phenomena. GDP showed record growth and industrial structure replaced agriculture increasingly with manufacturing, finance, and exports/imports. Overseas investment noticeably burgeoned, indicating unprecedented overseas expansion of Korean businesses, especially since the 1980s. Such empirical data supports the need to examine Korea's industrial change/growth in tandem with its international economic expansion, and especially the role of corporate actors.

I accordingly contend that a new perspective, if it is to transcend the limitations of previous explanations of Korean industrial growth, must actively address the following points elaborated below.

First, statist shortcomings caused by myopic focus on state authority demand appropriate shifts that consider intra-industrial elements, such as corporate activity and growth.

Second, the relationship between Korean economic globalization and concomitant growth of corporate actors is critical. The leadership of MNCs, specifically chaebol groups, must figure prominently in any alternative explanation of Korean industrial growth.

Corporate Globalization, Intercorporate Competition, and Industrial Growth

Although MNCs are indisputably important actors in the current international economy (Castells 1996; Clegg 1996; Dicken 1998; Garrett 1998; Held et al. 1999; Hirst and Thompson 1996; Perraton et al. 1997; Petrella 1996; Robinson and Harris 2000) and most Korean chaebols became multinational in the 1970s (based on the definition of multinational enterprise, Wilkins 1994: 24-5), statist explanations of Korea's industrial growth have yet to present a comprehensive account of corporate globalization and its relevance to that growth. As indicated above, corporate globalization—corporate expansion through foreign subsidiaries—magnifies the limitations of statism in excessively concentrating on domestic factors.

As shown above, economic globalization came late to Korea relative to the West and Japan, even as had industrial growth. This indicates that understanding the latter in Korea involves considering globalization influences not present when the West and Japan first developed. As Guillén (2001b: 17) contends, globalization

heightens mutual awareness among actors. Thus, the relationship between corporate globalization and intercorporate influence is important. Further, corporate demography generally concludes that globalization intensifies intercorporate competition (see Carroll and Hannan 2002: 9-11; see summary of classical competition theory from the perspective of population ecology in the context of discussing organization-environment relations Hannan and Freeman 1977), and social psychology finds that rivalry increases cohesion and cooperation within a group, leading to greater organizational motivation (see Ingram and Inman 1996: 638). I therefore consider MNC growth—critical in economic globalization—fundamental to developing a non-statist explanation of economic growth, which involves multiple MNCs. Three multinational business groups account for Korea's automobile industry, and three for semiconductor enterprises. I thus maintain that intercorporate influence must figure in examining the two sectors' growth grounded in corporate globalization, so to elaborate on statist limitations.

Despite the importance of corporate globalization, statism is not effectively, if at all, attentive to why or how structural expansion of MNCs began or proceeded in Korean development. Statism cannot adequately address economic globalization in recent Korean industrial growth—although globalization is a central structural change involved in that development—due to a focus on political factors that limits the unit of analysis to the level of governments or national economies. Statist discussion of MNCs tends to stress their maintenance of a national base (E. Kim 2000; e. g., see Weiss 1998: 184-187), rather than examine their structural expansion beyond national

boundaries. This is because statist logic understands corporate activity mainly as the reaction to or effect of state leadership, not an independent factor capable of explaining other phenomena. More important, as analysis is fixed at the level of governments and national economies, statism offers no illumination as to why fates vary among industries despite similar state intervention and operating within one national economy. This dissertation compares Korea's automobile and semiconductor industries in this regard using network approaches. It asks whether network characteristics of corporate structure might be variables explicating industrial growth.

Also, statist research on Korea tends to contend that corporations benefited from remaining local due to state provision of favorable business environments. Evans (1995) repeatedly describes Korea's business environment as the "greenhouse" that protected firms, and autocratic Korean regimes from the early 1960s for three decades indeed served that purpose: Beyond planning and executing various economic agenda, they repressed labor and other pro-democracy movements inimical to corporate interests. The statist perspective thus can serve as fodder to justify undemocratic political practices as it overemphasizes the positive economic impacts of state intervention. Additionally, such emphasis on the state's protective role would appear to contradict E. Kim's finding (2000) that the government sought to restrict corporate attempts to structurally globalize. Clearly, the role of the Korean interventionist state requires further review even by statist perspectives.

The recent public discussion of *kióp imin* (corporate emigration) in Korea provides the alternative non-statist perspective with reasons to reevaluate the

conceptual validity of the developmental state and the greenhouse. For instance, the 06 June 2001 issue of *Chosun Ilbo*, one of Korea's most widely-read dailies, offers an extensive presentation on the issue (Ch'a and Chóng 2001; Cho and Hó 2001) that criticizes various business-hostile elements in the Korean economy, many of them government-related. The report alleges that heavy-handed government regulation of corporations, strong labor unions, and anti-corporation public sentiment have driven major subsidiaries of leading business groups (e.g., Samsung and LG) and many mid- and small-sized firms in both traditional and high-tech industries to shift significant human resource and production facilities abroad. Such corporate emigration, it claims, is likely to persist indefinitely. It additionally reports that as of late April 2001, LG Electronic employees outside Korea exceeded 33,000, almost 2,000 more than on shore. Similarly, Samsung electronics subsidiaries employ in excess of 60,000 abroad and about 70,000 in Korea. The report cites claims by some Samsung executives that corporate headquarters should also emigrate to the US to obviate unreasonable government regulation, Korean taxes, informal shakedowns for political contributions, and the like. Likewise, a research institute Ph.D. describes Korea's economic policy as overly-regulated.

I conducted interviews about corporate globalization and industrial growth from October 2000 to September 2001 in Tijuana, Los Angeles, San Diego, and Seoul. More than twenty current and former employees of Korea's major multinational business groups engaged in the automobile, semiconductor and color picture-tube

industries participated. Some of the responses most relevant to the issues discussed here follow.

First, no interviewees granted that state intervention or policies (*kukka úi kaeip* or *chóngch'aek*) or government support (*chóngbu úi chiwon*) were a main cause (*chudoen wónin*) for overall Korean industrial growth or that of their companies or industry. All clearly concurred that government control and regulation in Korea's business environment have been excessive.

In addition, the Korea Business Environment Survey (February 2002) by the American Chamber of Commerce in Korea[6], which compares Seoul, Hong Kong, Shanghai, Singapore, and Tokyo, ranks Korea last in terms of overall business environment. It specifies tax, foreign currency regulation, immigration policy, and labor laws—all directly government-related—as major areas to improve. Surveyed MNC executives led the report to conclude that Korea is unattractive to business. Empirically, such opinions cast further doubt on the relevance of statism to explaining Korean industrial growth. Chapter Two, below, shows that such descriptions of Korea's business environment apply not only recently, but also to the past.

Second, interviewees responded about the relationship between corporate globalization and corporate or industrial growth. To a person they stated that *kukche* or *haewoe chinch'ul* (international or overseas advancement), *segyehwa* or *kukchehwa*

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[6] Its URL is http://www.amchamkorea.org/main/business_environment_survey.pdf as of March 2002.

(globalization or internationalization), or *haewae chikchóptúja* (overseas direct investment) were essential for their industries' growth.

With the 1970s, major Korean automobile and semiconductor business groups launched overseas subsidiaries despite attendant unprecedented exposure to various risks in the international environment. The automobile and semiconductor sectors were more technology- and capital-intensive than traditional, labor-intensive industries such as apparel, toys, and simple electric machinery in which Korea's domestically low wages provided comparative advantage vis-à-vis foreign competition. Domestic MNCs lacked both the advantages of mature domestic traditional operations and security abroad, yet chose international venture as the lesser risk.

How can this uncharted plunge into structural globalization be explicated when the forthcoming growth and success were anything but certain? I propose that mutual influence among economic actors (MNCs) explains much Korean industrial growth. This draws on one of the most basic propositions about economic action in economic sociology (Smelser and Swedberg 1994: 4-5). (Chapters Four and Five take up intercorporate influence on the structural expansion of MNCs in network terms to compare and further analyze the growth of the automobile and semiconductor industries.)

I understand the theoretical impact of state intervention maintained by mainstream economics, but as it is based on methodological individualism that discounts clear evidence of influence among economic actors, I deem a sociological alternative more apropos. Mutual influence allows to make sense of local

corporations' structural expansion abroad in the automobile and semiconductor industries despite the vagaries. Similarly, mimetic isomorphism theory states that organizations facing uncertainty tend to mimic other organizations that appear effective, as DiMaggio and Powell (1983a: 151-2) succinctly contend—which is to say in uncertain situations they influence mutually.

Some institutionalists have contributed significantly to the study of East Asian business organizations and their characteristics from comparative perspectives. In part they maintain basic propositions of economic sociology that view economic activity as a social process in institutional change. Though they basically disidentify with statism and political economists (see Biggart 1991; Guillén 2001b: 9), their perspective shares some statist limitations—from using states as the usual analytical unit (Orrù 1991; Orrù 1993; Orrù 1997) to emphasizing state leadership in creating structural and cultural environments for institutional legitimacy. Most also provide short shrift to the issue of economic globalization.

As the introduction to their research on several East Asian business organizations, Orrù, Biggart, and Hamilton (1991) trace the theoretical evolution that spawned institutionalism. They maintain that their perspective and theory emerged as an alternative to resource dependence theory and population ecology, respectively focused on environmental constraints that organizational interdependence generates and the survival of organizational forms given various environmental conditions. Despite the different foci and analytical units the two employ, both are in my view excessively concerned with technical environments as they both seek to explain

organizational efficiency. The new institutionalism shares their interest in the development of nation-specific economic organizational form. Enlisting DiMaggio and Powell's isomorphism concept (1983b), they conclude that organizations exhibit competitive isomorphism in response to their given environment (Orrù, Biggart and Hamilton 1991: 361).

Yet, institutionalists' main interest lies in the link between institution and isomorphism. They describe how institutions shape organizations to be similar through social pressure as institutional isomorphism (Orrù, Biggart and Hamilton 1991: 362). This slant leads some of them to use a rudimentary network approach that concludes that each country of East Asia fosters its own typical corporate structure through isomorphic processes driven by the unique institutional environment it provides (e. g., Orrù, Biggart and Hamilton 1991: 386-389). With respect to Korean business groups, overall organizational structure is patrimonial and intragroup networks show a similar rigid hierarchy from the top, a departure from most East Asian business organizations.

Although institutionalists officially distinguish their theoretical position from political economy, their explanation of similarities between Japan and Korea in terms of strong state leadership (see Orrù, Biggart and Hamilton 1991: 387) is quite compatible with statist perspectives and their usual unit of analysis is national economies. Thus, despite disclaimers, they too at core seem prey to the dominance of statism in explaining East Asian economic issues. Still, departing from the statist stress on characteristics East Asian economies share, institutionalists specify how each

nation's economy differs—a move that significantly advances the study of organization and development.

Most recently, similar isomorphism findings appear in Guillén's comparison of Argentina, Korea, and Spain's automobile industries (2001b: 159-182). His study elaborates on a previous work by Biggart and Guillén (1999) by exploring globalizing forces neglected in previous statist and institutionalist explanations of industrial growth. Characterizing differences among the three nations' automobile industries, he maintains national economies as the analytical unit to conclude that Korea concentrated on finished cars, Argentina components, and Spain both. Interestingly, he cites government failure in explaining Argentina's course, but adheres to conventional statist protocol in choosing not to examine possible government failure Korea. Indeed, his engagement in globalization-related issues stops with a generally positive evaluation of the Korean state's intervention, i. e., export-oriented industrial growth strategy, a point that this dissertation further examines.

In contrast to most, S. Han discusses isomorphism in economic activity at the corporate (1994) and industrial (2000) rather than national level. Empirically he detects inequality and behavioral homogeneity in the American audit services market that indicates mutual influence through isomorphism among firms of similar status, differential outcomes of inter-organizational influence across industries, and associations among firms' structural conditions. This suggests that because my research design affords comparison between industries it also can assist ongoing efforts to forge links between organizational research and developmental studies.

As reviewed above, previous organizational research has responded to the mutual influence thesis of economic sociology by generating isomorphism-focused arguments typified by DiMaggio and Powell (1983a). Most stop with findings of isomorphism or its lack within institutional boundaries such as national economy and industry, mainly because isomorphism is more conspicuous and thus easier to detect than other organizational change. My research goes further to suggest that organizational convergence is not due alone to structural change that inter-organizational influence causes. Statistical tests of network measures among multiple actors (explained in Chapter Three and presented in Four and Five) reveal that even when mutual influence does create homogeneity or convergence, its presence or absence can be empirically detectable and relates to other consequences. In Mill's methodological terms (1875), isomorphism-focused organizational research practices the method of agreement/difference. This indirect method, well summarized by Ragin (1987) and useful in discussing how un/common origins or their combination lead to different/similar results, also provides a means to elaborate on the mutual influence thesis. My analysis thus uses network data to discuss both mutual influence and isomorphism that can be detected among corporate actors by industry.

In sum, I ask whether the institutionalist characterizations of Korea's business organizations and industrial growth based on the isomorphic perspective serve across industries. Research that discovers cross-industrial differences in network structure would require critical review and modification of previous conclusions. Development literature formerly cast Korea as an underdeveloped or developing economy. Yet,

recently scholars such as Granovetter (1994: 457) have dubbed Korea an advanced capitalist economy. Comparative study of the development of Korea's automobile and semiconductor industries comparatively may thus advance study of development and industrial growth from the organizational research perspective.

Sociological perspectives have already conducted some structural study of mutual influence among corporate actors that explains corporate activity outcome and industrial growth in terms of network characteristics. Mizruchi and Bunting's (1981) method of sampling American firms in 1904 showed that network measures help explain historical accounts of the period. Mizruchi's (1989) cross-sectional research on large American manufacturing firms based on a 1980 data set cites the importance of network factors to elucidate why some firms in similar industries show similar political behavior depending on headquarter location, market constraints, and relationship to financial institutions. Gerlach's (1992) blockmodel method takes up the relationship between network and corporate characteristics in Japanese firms. D. Chang (1999) scrutinized isomorphism in the equity structure of Korean business groups between the mid-1980s and the early-1990s to conclude that corporate network and structural characteristics tend predict certain patterns. Such studies used corporations as the unit of analysis. In consequence, adopting network analysis that emphasizes inter-industrial difference to explain the relationship between intercorporate influence and industrial growth is needed, as the following chapters show. Chapter Three plumbs the network concept as a theoretical and methodological

tool for understanding mutual influence among economic actors that Chapters Four and Five elaborate.

Summary

This dissertation furthers development study by exploring Korea's industrial growth from a new perspective that blends economic sociology and network approaches. Statism dominated discussion of East Asian industrial growth, including Korea, ever since it trumped mainstream economics in providing a relatively strong explanation of rapid economic growth by stressing development's regionally unique co-existence with the strong state. However, due to its confined research focus on political factors with the paradigmatic assumption that they lead to positive economic results, the theoretical structure of statism is ineffective in explaining economic performance (see Moon and Prasad 1994) and other non-political elements, such as corporate activities, that are more directly relevant to industrial growth.

Additionally, as the unit of analysis of statism is governments or national economies, statism, in its explanation, often avoids or discounts the impact of economic globalization on industrial growth. Particularly in discussing Korea's industrial growth, this tendency leads to an insufficient consideration of the important fact that Korea's rapid industrial transformation coincided with rapid economic globalization led by major multinational business groups since the 1980s or before. Furthermore, corporate activities are more important in explaining Korea's industrial growth than other economies as the country's industrial structure is very large

business group-centered. For instance, in each of Korea's automobile and semiconductor industries, three multinational business groups account for the most growth of the industry. Institutionalists, who claim to be of different intellectual heritage than statism or political economy, share similar tendencies and conclusions on the Korean case with statism, in the sense that their unit of analysis is national economies and their evaluation of state intervention is generally positive although they focus more often on corporate activities in terms of institutional legitimacy. Thus, the research that this dissertation proposes can contribute to the study of development and industrial growth by comparing the two industries.

To construct a non-statist, alternative explanation of Korea's industrial growth that transcends the limitations of explanations from the economic sociology camp, I examine intra-industrial dynamics and borrow from corporate demography and social psychology in maintaining that globalization abets the inter-corporate competition that creates corporate and industrial growth. I draw on basic assumptions of economic sociology to hypothesize that mutual influence in product development and structural expansion among MNCs in their respective industries explains industrial growth. More generally, intra-industrial inter-corporate dynamics spur industrial growth.

Figure 1.1. Korea's GDP Deflator Index, 1970-2000 (Source: The Korea National Statistical Office)

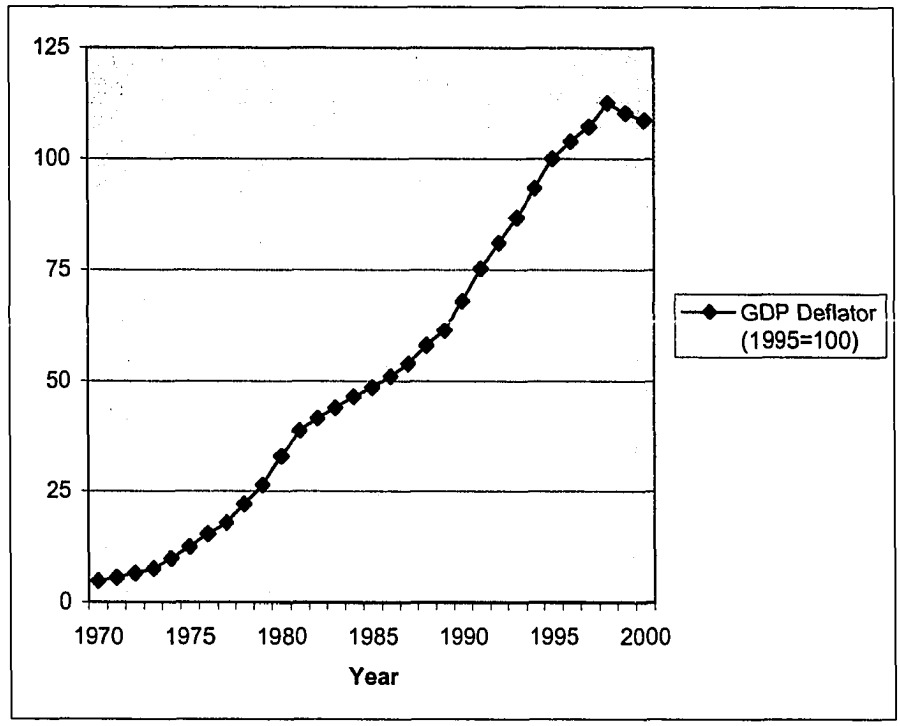


Figure 1.2. Some Industries as a Percentage of Korea's GDP, 1970-1999 (Source: The Korea National Statistical Office)

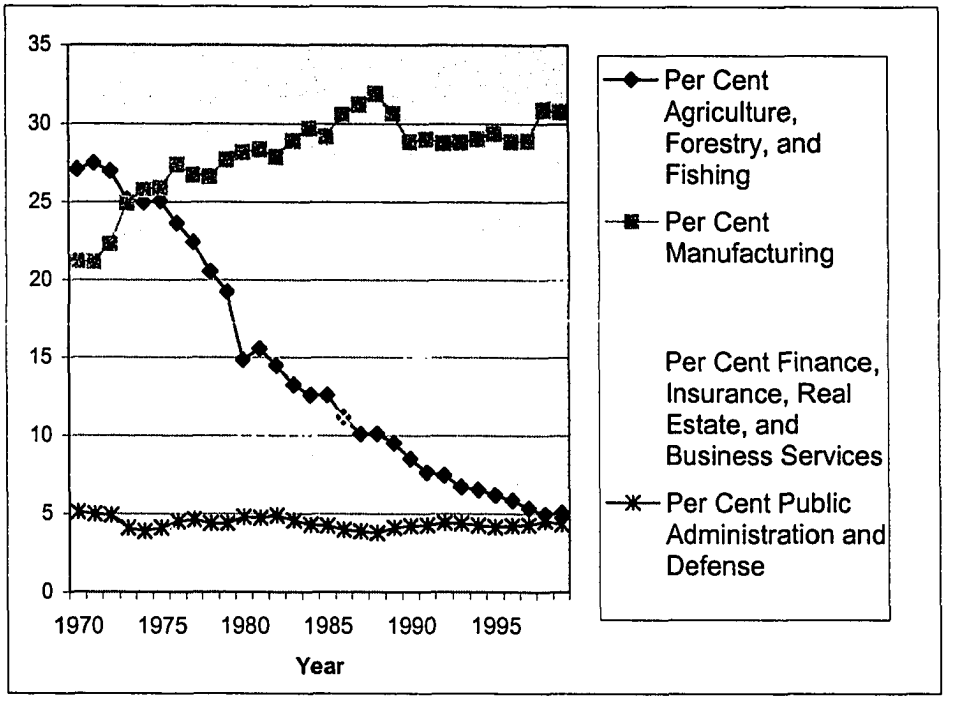


Figure 1.3. Per Cent Exports, Per Cent Imports, and Per Cent Agricultural Household, Korea, 1970-2000 (Source: The Korea National Statistical Office and the Ministry of Agriculture and Forestry)

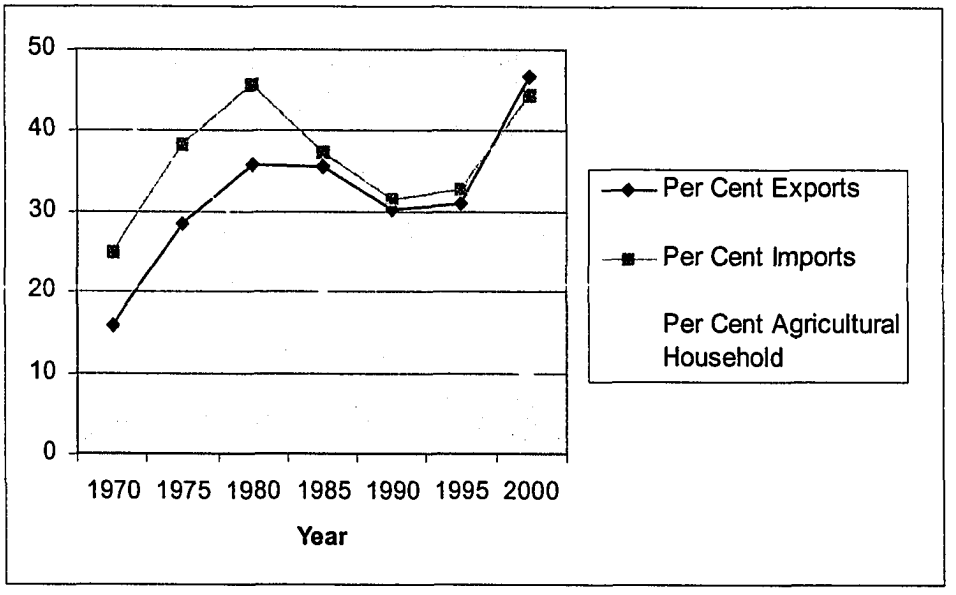


Figure 1.4. Per Cent Exports and Imports Adjusted, 1970-2000 (Source: Korea National Statistical Office and the Bank of Korea)

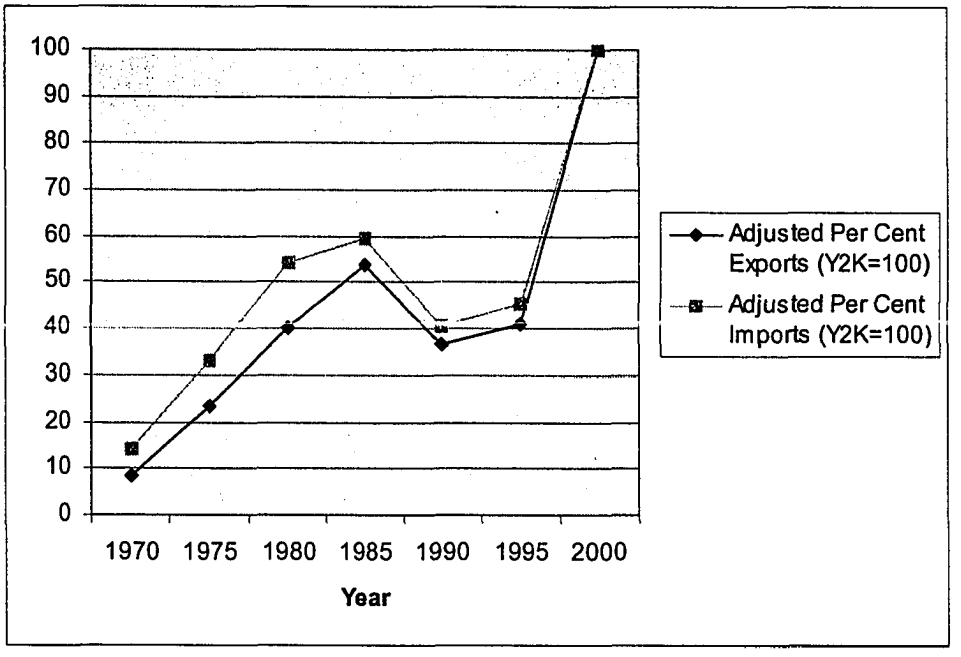
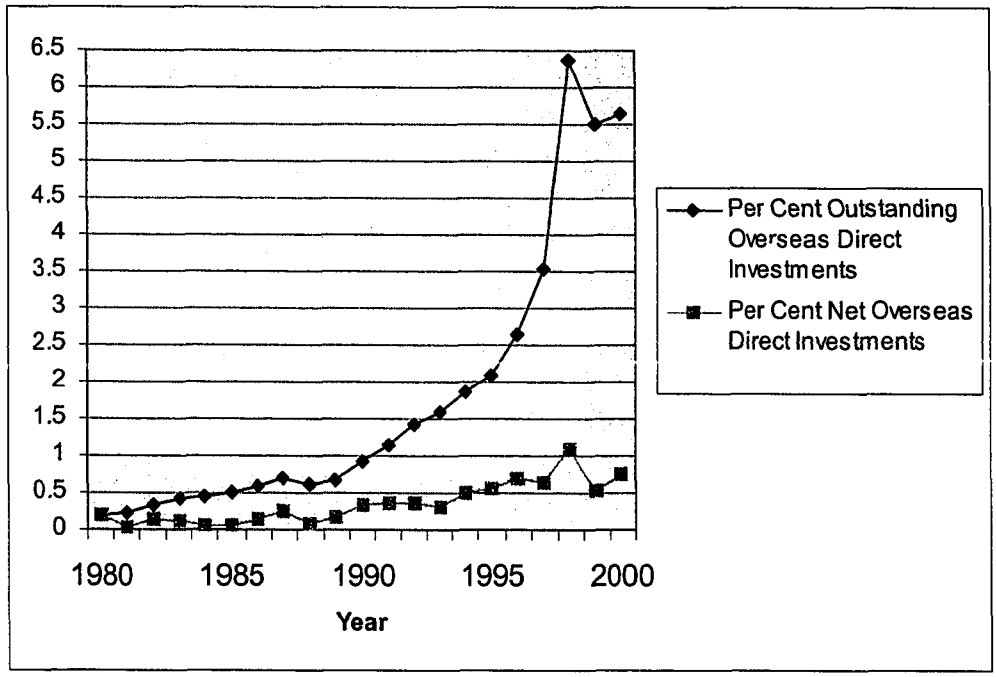


Figure 1.5. Korea's Overseas Investment as a Percentage of GDP, 1980-2000.



Chapter Two

Development of the Automobile and Semiconductor Industries in Korea

This chapter examines growth of the Korean automobile and semiconductor industries to empirically challenge the main argument of statism that political intervention propels positive economic outcomes.

I reveal that firms in the two industries influence one another to develop and produce similar products and achieve major risk-ridden but eventually growth-facilitating innovations before or without government intervention. Indeed, government intervention often fails in its original goal. I also show that globalization—even when domestic operations were immature—was from the outset a key corporate strategy competitively pursued to reach a larger multinational market or acquire advanced technologies despite potential risks.

Comparability of Korea's Automobile and Semiconductor Industries

By the 1970s both industries had become equipped with domestic production capabilities through some involvement in chaebol. In the automobile industry, Hyundai and others began to mass-produce finished cars around the mid-1970s; in the semiconductor industry, Samsung and LG initiated wafer fabrication later in the decade.

Since then, especially between 1980 and 1999, primarily three business groups (or their ancestral companies) accounted for each industry: Hyundai, Daewoo, and Kia

comprised automobile concerns, and Samsung, LG (formerly Lucky-Goldstar), and Hyundai, semiconductor. Firms in each industry are isomorphically simplex in terms of basic product orientation. Korea's automobile industry concentrates on finished cars—small- or mid-sized passenger in particular—as opposed to the focus on parts in other countries (see Guillén 2001b); semiconductor work involves memory chips, (e. g., random access memory) rather than non-memory products (e. g., central processing units) (see J. Kim 1996).

With the mid-1990s, Korea enjoyed international major producer status in both memory chips and passenger cars. Since early in the decade Korean memory chips regularly garnered the largest world market share. In contrast, passenger-car market share, quality, and customer satisfaction clearly lagged behind that other leaders such as the US, Japan, and Europeans boasted. In sum, Korea's semiconductor industry has outpaced its automobile industry in successful international competition.

Korea's Automobile Industry Before the 1980s

Until 1945, colonial policies meant Korean automobile concerns mainly offered sales and services for Japanese and Western models but lacked finished car production capabilities (Cho and Chu 1998: 7). Since the late 1930s Isuzu, Toyota, and Nissan had sponsored parts factories in colonial Korea (Cho and Chu 1998: 10). Underdeveloped nations such as India, Mexico, Spain, and Brazil, in contrast, hosted Ford and GM finished car production facilities since the 1920s.

Primitive finished-car production began in 1945 in Korea, as small workshops started rebuilding abandoned US Army trucks and jeeps. By 1954, they had grown into such factories as the Ha Dong Hwan Industrial Company, Shinjin Industrial Company, and Kukje Industrial Company. In 1955, the Choe Musóng brothers manually produced the Shibal—a jeep/sedan hybrid—for Kukje, capturing an industrial exhibition award. It soon afterwards flourished as the standard vehicle for taxicab services—which paid nearly forty times initial retail for a completely converted licensed cab—and automobile production won the interest of Korea's general public.

Hyundai (discussed in greater detail below) was the legacy of Chung Ju-Yung, who launched a small automobile repair business in 1940 that expanded as he acquired previously Japanese-owned property upon liberation in 1946. However, he shifted focus the next year and established a construction company. Not until the late 1960s did Hyundai reenter the automobile market to eventually become a major producer. Even so, Ford initially passed over it as a potential partner as it remained mainly known for construction (Chung 1991: 169).

In the early 1960s, relatively small companies with no chaebol affiliation emerged to dismantle and import-assemble Japanese car models. Nissan's Blue Bird by Saenara was one outcome. However, in May 1962, Korea promulgated the Automobile Industry Protection and Promotion Law (*Chadongch'a kongóp poho yuksóng póp*) to prohibit foreign car import and enhance domestic production. Soon after December 1967, the Park administration changed course and invited Korean-

Japanese businessmen to manage Saenara. The Japanese Blue Bird sold at import-assembly prices significantly lower than the Korean Shibal and was even allowed to make taxicab conversions. Such changes devastated Shibal owners who emphasized conversion. Blue Bird drove Shibal out of business and itself folded when the foreign exchange situation deteriorated in 1963, upon which the national assembly investigated the Park administration's foreign-car friendly policy as a scandalous abrogation of the 1962 law to protect and promote the domestic automobile industry.

Two points are noteworthy regarding the Shibal/Blue Bird competition. First, the Blue Bird import-assembly business model showed potential profitability. As elaborated below, in the late 1960s, newcomers with large-business group affiliations chose to import-assemble foreign cars rather than work on their own models as Shibal attempted. Not until the mid-1970s was a Korean automobile producer able to mass-produce its own model.

Second, the way Park intervened in the automobile industry eviscerated Korea's only automobile production base, creating a lose-lose outcome: Blue Bird production by Saenara also ended after Shibal folded to its pressure. Thus, contrary to fundamental statist theory, state intervention in the 1960s generated adverse effects.

In the late 1960s and early 1970s, more firms began to engage in automobile enterprise through import-assembly and technological transfer. Some later became important subsidiaries of Korea's major business groups, including Ford's Cortina, New Cortina, and 20M by Hyundai; Toyota's Corona, Crown, and Publicar by Shinjin; Fiat's 124 by Asia; and Mazda's Brisa by Kia. Mimetic isomorphism aptly

illuminates such development—uncertainties faced by newcomers encouraged mimicry of what had already reaped profit. The prior defeat of the Korean Shibal taught companies new to the business in the late 1960s to 1) tether their fortune to knockdown and import-assembly of foreign models and 2) create and maintain large business group ties. During this period, Hyundai and Shinjin were the two major competing passenger car producers, but they later pursued markedly different corporate strategies.

Hyundai gradually changed corporate strategy to win technological independence. As the 1970s opened, Hyundai was became interested in furthering ties with Ford through a joint-investment firm based on its production experience with the above mentioned Ford models. But in 1973, Ford headquarters judged the Korean market unworthy of expanded investment and Hyundai financially unstable, ending the strategic alliance against Hyundai's desire.

Hyundai immediately contacted European automobile-related businesses and businessmen to develop its own model for mass-production and export. Chung explains this risk-ridden decision to develop and export its own car even before production for domestic markets as stemming from Shinjin's state-assisted attempt to prevent Hyundai from entering the automobile industry (Chung 1991: 173). He recalls pressure to shutdown his factory, ensuing harassment and threats against his technicians and employees, and even summonses of him and his employees from state authorities (Chung 1991: 174). That is, Hyundai forged a global market strategy despite uncertainties to surmount a corrupt government-business alliance between the

Park administration and Shinjin. State treatment discriminated among firms to prevent competition against industry allies. Considering that Hyundai eventually came to leader in the automobile industry, statist stress exclusively on the positive impact of state intervention (even through political coercion) seems inappropriate. It actually worked against industrial growth and had to be surmounted.

More specifically, in 1967—six years before the Automobile Industry Long-Term Promotion Plan took effect or one year before the Overseas Assembler Agreement with Ford—Hyundai created a task force to study and acquire automobile production ability by recruiting Hyundai Construction employees with strong management and engineering backgrounds (Kim 1997b: 110). That is, crucial corporate decisions regarding production preceded relevant government policies.

From the late 1960s to the early 1970s, Shinjin not only enjoyed much closer government ties than Hyundai as the Shibal political favor showed, but also followed a greatly different corporate strategy. Financially and technologically, Shinjin heavily depended on Toyota. From 1966 until 1971, Toyota loans to fund production facilities and parts totaled at least $20 million. When Toyota dropped Shinjin to expand in China in the early 1970s, Shinjin developed a technological transfer relationship with GM to produce the Rekord 1900 and the Chevrolet 1700 in 1972, continuing to rely on foreign automakers. This led to the establishment of GM Korea in 1973, equally owned by Shinjin and GM. That is, around the time that Hyundai started work toward its own production, Shinjin continued to lean on a major foreign firm as safer than its competitor's attempt at domestic production aimed toward export.

In 1976, Hyundai introduced the Pony (a subcompact sedan by current Western standards), the first Korean mass-produced car. That same year, as planned, Hyundai exported more than a thousand (Kim 1997b: 123). This move to develop, mass-produce, and export an original model was novel and risky in the Korean automobile industry, but Hyundai deemed technological independence crucial to future success, despite previous dependence on other firms, given current state policy.

Large business groups' initial involvement in the automobile industry in the late 1960s continued as Hyundai succeeded in mass-producing its own model. In addition to Hyundai and Kia—already players in the late 1960s—the Daewoo group launched an automobile subsidiary in 1978 by purchasing Saehan (the Korea Development Bank's share of GM Korea), which Shinjin had co-established with GM after terminating relations with Toyota in 1972. Thus, by the end of the 1970s, Korea's automobile industry comprised participation by three major chaebol—Hyundai, Kia, and Daewoo. The three continued as Korea's Big Three until the late 1990s.

Korea's Semiconductor Industry Before the 1980s: Packaging and Wafer Fabrication

In the 1960s and early 1970s, Japanese and Unites States capital funded most ownership investment in Korea's semiconductor industry. LG Electronics and Anam Semiconductor entered as the only Korean-invested companies in 1970 (see Cho 1995: 104). Commy, Control Data, Fairchild, Motorola, Signetics, and Toshiba,

among others, were the major foreign industry-backers before then. Korean semiconductor participation at that time involved simple assembly—mainly packaging—and most such low-wage, hence cost-effective, production by small factories was exported through a network of foreign marketers (Cho 1995: 104; Kim 1997b: 151; Lee, Oh and Kim 1999: 248).

In the mid-1970s, Korean large business groups became interested in the production aspect of the industry, in part through acquisitions. In 1974, to produce CMOS (complementary metal-oxide semiconductor) chips for electronic watches and other simple electronic products, Integrated Circuit International established Korea Semiconductor as an unprecedented technology-intensive undertaking in the Korean semiconductor industry. That same year, Samsung bought half of Korea Semiconductor. The company initially reaped great profit. Soon funding difficulties arose due to intense price competition in the CMOS market as other producers witnessed its success (Lee, Oh and Kim 1999: 249). In 1978, Samsung more completely joined the semiconductor industry by acquiring the rest of Korea Semiconductor and Fairchild and importing more assets for a complete production line. In 1979, LG absorbed Taehan Semiconductor to acquire a genuine semiconductor subsidiary, Kúmsóng Semiconductor, and began wafer fabrication with AT&T to strengthen its position (Cho 1995: 105; Lee, Oh and Kim 1999: 249).

By the end of the 1970s, then, Samsung and LG boasted industry subsidiaries equipped with wafer-fabrication know-how and capacity. Few other Korean business groups showed investment interest in semiconductors. In 1966, all semiconductor

goods finished in Korea were valued at $2,000. Korean semiconductor production in Korea soared to $32 million in 1970, $231 million in 1975, and $424 million by 1980 (Kim 1997b: 150).

Unlike its policy toward the automobile industry in the 1960s, the state intervened little in the semiconductor industry as it was quite underdeveloped and unknown in Korea. Only in 1976, a decade after packaging and two years after wafer fabrication began, did the government nominally designate the industry as a strategic industry (*chóllyak sanóp*). No supporting laws/policies or funded projects followed. The US funded semiconductor industry development from the 1950s. By 1980, it outsourced at least five major military projects including the Minuteman II missile defense system to Texas Instruments and the Apollo aerospace defense computer to Fairchild (Ryu 1994: 25-26). From the late 1940s, the Japanese, government and state-owned companies jointly created a number of laws, policies, and specific projects to advance the semiconductor industry. By 1980, the Japan Electric Computer Corporation, development of the 3.75 Series computer, and other projects were underway (see Ryu 1994: 31-35). Thus, relative to other nations in semiconductor-related industries, Korea clearly lagged in government assistance.

Korea's Economic Situation in the 1980s

As the previous chapter empirically established, the 1980s were crucial in Korea's industrial growth and globalization as large Korean firms then initiated unprecedented international investment. It is useful to recall the assassination of

President Park Chung Hee in October 1979 as the end of militaristic, authoritarian state intervention to promote rapid development. The international oil shock of the 1970s had so boosted energy costs that Korean production expenses soared. After the assassination, Chun Doo Hwan's new military faction (*shin 'gunbu*) inherited political power through a December 12 coup. Soon after, the Kwangju Uprising of May 1980 challenged Chun's legitimacy and vainly sought a civilian regime. More than two thousand Korea Army Special Forces fell, but it seemed more political turmoil was inevitable. Before Park's assassination, authoritarian politics at least provided an stable environment for economic growth, especially of large business groups. Such beneficial stability evaporated after Park fell. The new regime not only violently suppressed moves toward a civil society, but sought to restructure the private sector through extreme political action to alter large business group ownership—particularly in the broadcasting, automobile, and heavy industries. Statist examinations virtually ignore such harmful state intervention.

In broadcasting, Chun forced Samsung's release of *Tong'yang* Broadcasting Corporation (TBC) to the government-owned Korea Broadcasting System (KBS) in November 1980 through the Mass Media Company Abolition and Consolidation Measure (*Ónronsa t'ongp'yehap choch'i*). At that time, KBS, TBC, and Munhwa Broadcasting Corporation (MBC) were major broadcasting companies. As smallest, in the general public's eyes, MBC seemed the strongest merger candidate, but TBC was targeted because the new regime was uncomfortable that Samsung also had newspaper (the *Chung'ang Ilbo*) and other subsidiaries besides broadcasting. As

Korea's political situation was highly unstable due to nearly daily student and opposition force street rallies that impugned the regime's legitimacy and connection to the Kwangju Massacre, the autocratic administration moved to wrest TBC from Samsung to advance media control. The state was issuing the so-called reporting guide (*podo chich'im*) to all Korean media to instruct what could and could not be reported and how to report politically sensitive matters. Most companies were forced to obey to avoid political punishment. As a result, the state managed to depict civilian participators in the Kwangju Uprising and opposition leaders as puppets of North Korean communists. It also censored foreign media. State agencies tore out pages and struck lines critical of the regime from Western magazines before delivery to Korean subscribers.

In the automobile and heavy industries, the new military faction wanted either Hyundai or Daewoo's automobile subsidiaries to absorb the other and let the one that forfeited acquire or keep Hyundai's heavy industry subsidiary. The regime offered to let Chung decide and Chun personally lied that GM had agreed to release its 50% share of GM Korea—the other half of which was already Daewoo's—to comply with his restructuring plan. When Chung declined the exchange offer, the state individually summoned key Hyundai employees to press Chung (Chung 1991: 188). Chung soon released Ch'ang'wŏn heavy industry facilities to Daewoo in order to keep its automobile presence. Hyundai never received GM's half of GM Korea, so Daewoo remained in automobiles in addition to acquiring Hyundai's heavy industry. In 1983, as revisited below, it was Daewoo that assumed GM's share of GM Korea through

political favor. Later, interestingly enough, the state had to assume the heavy industry facility due to financial problems.

In addition to such politically-forced industrial restructuring, major financial scandals, such as the Lee Chul Hee and Chang Young Ja fiascos, must be examined to understand the Korean economy of the 1980s and afterwards. In the early 1980s until their May 1982 arrest, the Lee-Chang couple cashed for personal gain an astronomical amount of private company drafts reaped by providing political assistance in major business loan deals. Lee had gained strong political influence through his Korean Central Intelligence Agency and other government service. He was close to former military politicians including President Chun. Chang was a "big hand" madam in the booming private loan (*sach'ae*) market that provided funds at high interest rates for companies of all sizes, as loan approval from major banks and financial institutions was procedurally complex, time-consuming, and often required political gamesmanship. The early 1980s' extreme political uncertainty drove still more companies to private loan sources, making userpers such as Chang that much more powerful.

The media branded the scandal an egregious instance of the historically corrupt ties between politics and businesses. Disgraced firms and banks previously deemed strong and promising faced bankruptcy. The economic fallout was enormous, prompting public discussion of mandatory regulations of financial transactions that in 1993 became law.

In 1983, soon after the Supreme Court of Korea sentenced the Lee-Chang couple to 15 years in prison, another major economic scandal involving the Myung Sung business group erupted. Myung Sung thrived in the relatively underdeveloped tourism business even as other big concerns stagnated in the uncertain economic climate. This was explained when it came out that Myung Sung in fact exploited the instability by bribing government officials and politicians for unlawful development and construction permits for new resort facilities. Myung Sung took down many other large and small companies as its collapse, deepening the Korean economic malaise visited by the Lee-Chang scandal. Prosecutors established that the two scandals involved at least 650 billion Korean won, more than 7% of Korea's 1983 domestic revenue. Many politicians and businessmen were driven to resign or sent to prison.

In the early 1980s, the official Chun regime slogan, "Just Society Materialization (*Chóng'úi sahoe kuhyón*)" was ubiquitous in Korea. However, the above discussed financial scandals, Samsung's and Hyundai's subsidiary losses through political manipulation, and general economic and sociopolitical instability betrayed to the general public and major business leaders deeply corrupt ties between the new regime and the emerging private sector.

The Automobile Industry: The 1980s and After

In the 1980s, Hyundai, Kia, and Saehan (of Daewoo) thrived as Korea's Big Three and even started to globalize. This, despite the toll of the oil shock and financial scandals on the broad Korean economy and consumer psychology.

Discussion of the development of Korea's 1980s automobile industry must refer to the February 1981 Chun administration proclamation of the Automobile Industry Rationalization Measure (*Chadongch'a kong'óp hamnihwa choch'i*), which regulated production until 1986. For the three chaebol subsidiaries in the automobile industry, it specified what size of car each firm should produce: Hyundai and Saehan passenger cars and pick-ups, and Kia small and mid-sized trucks. The official rationale was to end inefficient competition among automakers and duplicate investment (*chungbok t'uja*) of national resources so that the economy could rebuild after the oil shock and downturn. However, the state may in fact have used the policy to divide-and-rule in pursuit of greater control of the automobile industry as obtained by restructuring broadcasting.

Three points are pivotal as I consider the measure's impact on the1980s automobile industry.

First, most strange is the government's favorable attitude towards Saehan. Since the early 1970s, Hyundai, Kia, and Saehan each had produced both passenger cars and pick ups. Of the three, Saehan had the most unstable corporate history, especially in financial ownership and technological autonomy. Yet, Kia was forced out of the most profitable passenger car and pick up category. Further, in 1983, a year after the law took effect, Daewoo assumed the other half of GM Korea to fully integrate it into the business group as Daewoo Motor. In sum, among the major automakers, Daewoo benefited most from early 1980s political measures, just as its ancestor, Shinjin, had enjoyed government favoritism a decade before.

Second, in 1987 the Fifth Republic lifted some product restrictions, two years after announcing the plan. The automakers responded in important and interesting ways. Kia immediately returned to passenger car production with plans to export, previously prohibited. Soon after the 1985 announcement, it had forged ties with Mazda and Ford to produce the Pride (known as Festiva in Japan and the US), the smallest passenger car ever in the Korean market. This innovative decision naturally intensified competition within Korea's automobile industry, as is discussed below. Moreover, as the Pride hit the Japanese market in 1986 and the Korean market in March 1987 (just two months after restrictions were partially lifted), it soared to one of the most popular compact models for several years in both countries. In 1992, for instance, the Pride boasted almost 40% of Korea's small car sales. When production ended in 1998, Kia had produced almost 1.5 million Prides, more than half of which sold outside Korea.

Finally, in 1986 Hyundai and Daewoo first mass-exported passenger cars (the Excel/Presto and LeMan respectively) to the US. The Hyundai Motor Company established its first subsidiaries[7] in Canada in 1982 and in the US in 1985. Also in the mid-1980s, Daewoo Motor strengthened ties with GM and its German subsidiary, Opel, to work on the LeMan. Kia, as stated above, was cooperating with Mazda and Ford for the Pride. Thus, all three groups responded to the Automobile Industry Rationalization Measure with very similar product orientations—small passenger cars

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[7] To be distinguished from subsidiaries of the Hyundai *business group*.

for mass-export—although the political decision meant to force product diversification and reduce competition.

This phenomenon is partly and indirectly explicated as coercive isomorphism that occurs when organizations incur pressure from other organizations (DiMaggio and Powell 1983a)—in this case, from state mandates of business structure. Political action to restructure (diversify) the automobile industry unwittingly pushed the major automakers towards uniform plans to export domestically produced small passenger cars to North America—an epoch-making development in Korea's automobile history, especially in terms of corporate globalization.

Following the pivotal policy shift in 1986, the three isomorphically accelerated their corporate presence abroad and intensified mutual competition, domestically and internationally. They competed with various sizes and models of passenger cars and sports utility vehicles (SUVs), most of which they export.

Their post-1986 globalization strategies varied though in regional focus. Hyundai Motor Company in 1989 established a Canadian production subsidiary and a US financing company. By 1990, it sold more than a million cars in the US. In 1991, it expanded to the German market. Production began in Indonesia and Turkey in 1995 and in China in 2000.

Although Daewoo ended relations with GM in 1992, it expanded internationally afterwards, with a relatively strong focus on Europe. It alone among the Big Three expanded aggressively into formerly socialist Eastern Europe. In 1994, it established UK and Romanian subsidiaries, and in 1995, it assumed local auto firms

in Czechoslovakia and Poland and began local production in India. Daewoo completed factories in Uzbekistan and Vietnam in 1996 and in Egypt in 1998. In 2000, it expanded production and sales to Taiwan.

Kia Motors founded local corporations in Japan and the US in 1992. It launched an R&D center in Tokyo and a financial service firm with Ford in 1995; participated in Indonesia's public car project in 1996; and opened a joint-investment factory in China in 1997.

The Semiconductor Industry: The 1980s and After

In 1982, the Korean government issued the Semiconductor Industry Promotion Detailed Plan (*Pandoché kong'óp yuksóng sebu kyehoek*). It suggested that the semiconductor industry eventually develop and produce diverse items, from transistors, to ICs for home electronic goods and industrial use, to high-tech ICs (Ryu 1994: 39). Unlike the US's and Japan's funded projects for semiconductor industries after World War II, Korea's general policy offered no concrete action; and notwithstanding the plan's product development suggestions, Korea's semiconductor business in the 1980s aggressively focused on memory chips, especially DRAM products, as discussed below. More importantly, the plan imposed unprecedented eligibility requirements on firms interested in wafer fabrication, to in advance avoid over-competition. As a result, Hyundai was the only large business group that newly joined and stayed in semiconductors after 1983.

Regarding corporate initiatives in the industry, the initial state response to Samsung's plans to increase semiconductor investment was noteworthy. In the late 1970s, Lee Byung-Chull, Samsung's founder, vaguely expressed interest in the semiconductor industry as preparation for entry into aircraft production (Cho 1995: 219). When he directly avowed concrete intentions for a new semiconductor project in mid-1982 that soon produced Korea's first domestic memory chips, the government professed astonishment and cited financial difficulties and risk; the Blue House (presidential office) requested that Samsung postpone its project given possible harm to the national economy; and other chaebol expressed skepticism (Han 1995: 19). The government response was ironic, given its Detailed Plan, yet Lee officially announced his decision to enter into memory chips in February 1983, and Hyundai's Chung similarly confronted sardonic responses from international economic magazines and intellectuals when he entered into semiconductors (Chung 1991: Preface).

The Early 1980s: 64K DRAM and 256K DRAM

Korea's semiconductor industry leader was Samsung. It developed 64K DRAM (dynamic random access memory) in December 1983 and mass-produced it in 1984 using the licensed VLSI (very large-scale integration) technology of Micron Technology. In 1984, it successfully engineered 256K DRAM, mass-produced in 1986. Around 1984, Hyundai was working on 16K SRAM (static random access memory) and 64K DRAM, and LG on the 8-bit microprocessor and 64K DRAM. The former used Texas Instruments and Vitelic technologies, the latter those of Advanced Micron Devices and Zilog. Despite being the industry latecomer, Hyundai managed

mass-producing both 64K DRAM and 256K DRAM by 1985 and exporting the latter in 1987.

Though Daewoo acquired Zymos and transferred production to Korea to experiment on VLSI based memory chip production in 1985, it soon turned to non-memory telecommunication products (see Kim 1997b: 156-157). It no longer is deemed a semiconductor player due to poor performance, unlike Samsung, Hyundai, and LG, considered semiconductor/memory world leaders by the early 1990s. After the three-player competition structure gelled among semiconductor firms through technology transfer relationships, each launched foreign R&D subsidiaries for crucial work on product development. Samsung founded an R&D center in Silicon Valley in 1983; Hyundai and LG followed in 1984. Thus, by 1984—just a year after Hyundai joined the industry despite heightened government requirements—the three Korean semiconductor companies had secured local corporations in Silicon Valley (Cho 1995: 105). Samsung's and Hyundai's Silicon Valley based R&D figured centrally in developing new memory products in 1983 and 1984 (Kim 1997b: 155-156). Unlike most chaebol (E. Kim 2000: 124), the three semiconductor firms invested overseas directly for access to advanced technology, even before initial domestic production.

Two points about Korea's semiconductor industry until the mid-1980s are notable. First, each of the three leaders worked on 64K DRAM or other memory products, following Samsung's lead. They chose to compete in the same field rather than specialize in diverse products. As discussed below, they competed in DRAM

products until the end of the 1990s, led by Samsung in new product development and mass-production. This is an instance of mimetic isomorphism.

Second, changes in both inter-corporate and intra-corporate relationships suggest that the three firms followed similar structural transformation. In the early 1980s, although the US semiconductor industry mostly targeted development of non-memory products such as CPUs, the three developed ties with and purchased licenses from US firms rather than Japanese leaders in memory. Some business groups had forged technology transfer relationships with Japanese firms before the memory production phase, as discussed above. However, in memory production no such ties began. Internally, all three founded R&D posts in Silicon Valley, none in Japan.

Mimetic isomorphism aptly explicates both points above. J. Kim (1996) concludes that Korean semiconductor firms' corporate strategies showed isomorphism in product orientation in the early 1990s. My analysis shows that mimetic isomorphism applied to both product orientation and structural transformation and that it explains Korea's semiconductor development since the early 1980s.

The Mid-1980s: 1M DRAM

In 1986, Samsung developed 1M DRAM independently. Unlike 256K DRAM or previous projects, it chose in this instance not to license production technology from other (foreign) firms but to develop the product alone (Cho 1995: 106; Kim 1997b: 160) for unprecedented technological independence. Mass production followed in 1987. Unlike Samsung, Hyundai and LG continued to rely on foreign firms, Vitelic and Hitachi respectively, for 1M DRAM technology. Hyundai

developed 1M DRAM in 1988 for January 1990 production. Thus, after the mid-1980s, all three firms concentrated on 1M DRAM, showing still greater isomorphism in product development than the early 1980s when orientations were somewhat diverse—SRAM, microprocessing, and so forth.

Soon after Samsung showed some technological autonomy in new product development with 1M DRAM, some US and Japanese semiconductor firms sued it and Hyundai for patent infringement, among other charges, which obliged them to pay royalties. Such lawsuits indicate that leaders such as Texas Instruments and Intel were wary of Korean producers' technological advancement and no longer dismissed them as occasional customers of old technology.

The Late 1980s Through the Mid-1990s: 4M DRAM to 256M DRAM

In 1986, as Korean semiconductor firms started to face tough legal challenges by foreign industry leaders, their government proposed to intervene. The VLSI Joint Development Plan (VLSI *Kongdong kaebal kyehoek*) aimed to establish a research consortium comprising the three firms and universities—the Electronics and Telecommunications Research Institute (or ETRI)—to lead Korean the three in co-developing 4M DRAM by 1989 to avoid duplicate investment.

However, ETRI could not induce the firms' researchers to collaborate, and each chaebol organized its own 4M DRAM research team (Kim 1997b: 162). Samsung's breakthrough came in 1988, about a year ahead of the government schedule, and mass-production began in November 1989 (Han 1995: 201). LG soon followed. Both operated without benefit of others' licensed technology, unlike

Hyundai, which collaborated with foreign firms—Mosaid and Bright Microelectronics—while working on 4M DRAM and flash memory products (Kim 1997b: 163). Hyundai developed 4M DRAM in 1989 and mass-produced it in April 1991. In August 1990, Samsung achieved 16M DRAM before its Korean competitors and ahead of the government-suggested schedule by six months (Han 1995: 206), to be mass-produced in the latter half of 1993 (Han 1995: 209). Hyundai broke through in March 1991, and produced 16M DRAM in July 1993.

A few points regarding Korea's semiconductor advance in the late 1980s warrant mention. First, Korea's semiconductor industry was more technologically independent than the automobile. Mimicking Samsung's 1M DRAM strategy, LG used its own R&D for 4M DRAM. Thus, two of the three semiconductor firms abjured foreign technology by that time. Samsung even managed 4M and 16M DRAM development ahead of the government-suggested schedule.

Second, the state's effort to entice the three semiconductor competitors to collaborate on R&D in the face of foreign challenges failed. Samsung and LG refused and worked independently, though Hyundai continued to license foreign technology for 4M memory products instead of attempt independent chip design. That is, contrary to the government's intention to eliminate duplicate investment, each firm increased R&D competitive spending. The government response was ill-timed as well. Samsung had already developed 1M DRAM independently, and lawsuits by foreign concerns already threatened the firms.

With the 1990s, the government continued to attempt intervention, now for 64M DRAM R&D. Through ETRI it urged the three firms to co-develop new products using the consortium. They firms continued to refuse, rendering ETRI a merely nominal liaison between the semiconductor industry and government (see Kim 1997b: 163) and even a source of inter-firm conflict. When Samsung announced 64M DRAM development in September 1992, Hyundai accused it of violating an inter-firm commitment to peer review and ETRI approval for new product development announcements (Han 1995: 226-227). Hyundai's 64M DRAM development was currently under ETRI review by the other two consortium companies—dramatic evidence that the firms were in intense competition rather than interested in potentially cost-effective collaboration. Again state intervention failed to eliminate duplicate investment and competition among the firms.

After Samsung generated 64M DRAM in 1992, it exported its commercial samples in 1994, almost coincident with development of 256M DRAM ahead of government schedule and Japan (Kim 1997b: 163). It began to mass-produce 256M DRAM in January 1996. Hyundai developed 64M DRAM in September 1992 and mass-produced up to five million chips monthly by December 1997. In November 1996, Samsung engineered 1G DRAM to produce in May 1998. Its 4G DRAM development followed in February 2000. Though focus remained on standard DRAM, the Korean firms began to develop and produce other semiconductor products with the 1990s. Samsung moved into Alpha Chip CPU, Flash Memory, RAMBUS DRAM, MDRAM, SDRAM, SGRAM, DDR Synchronous DRAM, and other products; and

Hyundai into 1M Slow SRAM, 8M MASK ROM, 256M SRAM, FeRAM, Direct RAMBUS DRAM, and 64M DDR Synchronous and Fourth Generation DRAMs, and others.

Competition in new product development and production continued apace in the 1990s. Samsung opened foreign production facilities at a site in Suzhou, China, in 1991; in Portugal as a joint-venture with Texas Instruments; and in Austin, Texas, in 1996. In 1994 Hyundai founded a production site in China, and in 1996 in Oregon and Scotland. LG also structurally globalized by building a production site in Wales in 1996.

Summary

The Korean state sought in vain to intervene in its automobile and semiconductor industries with an aim to avert inter-corporate competition that might breed inefficiencies through duplicate product investment. Some efforts were clearly untimely. My historical review suggests that isomorphic inter-corporate competition in product development and structural globalization better explain the industries' growth than state intervention.

In the automobile industry, small workshops began primitive small-scale domestic production in the 1940s. In the early 1960s, Kukje's Shibal models were ubiquitous in the taxicab business and drew the general Korean public's attention to the industry for the first time. Yet when the Park administration, contrary to its 1962 Automobile Industry Protection and Promotion Law, allowed Saenara to import and

sell relatively inexpensive Japanese cars and to convert them to cabs, Kukje—at the time the only profitable domestic automobile production concern—collapsed, followed by Saenara soon after. Late in the decade, larger companies emerged—some with chaebol ties—mainly through technology transfers with foreign firms. At the time, the state discriminated among automakers. For instance, it pressured Hyundai, eventually the industry leader, to stay out of the automobile business, which ironically motivated it to pursue globalization and technological independence.

In the semiconductor industry, companies with large business group ties acquired wafer fabrication technology—key to production of advanced semiconductor goods—in the late 1970s. Korea's production previously served only simple electronics. The government dubbed it a strategic industry in 1976, but offered no financial support or invention, unlike such industry leaders as the US and Japan.

In the early 1980s Korea reeled from the 1970s oil shock. A series of financial scandals involving government corruption, and political instability following Park's 1979 assassination only worsened economic woes. To restore political stability, the government forced some industries to restructure, which easily secured Daewoo an automobile presence in the early 1980s. Despite a precarious business environment and government favoritism, Korea's business groups continued to competitively invest in the two industries for new product development and international expansion.

In the early 1980s, the government promulgated the Automobile Industry Rationalization Measure to impose size-specific product specialization on automakers. Kia was barred from passenger cars while Daewoo was granted entry into the

profitable business despite its unstable ownership. When measure enforcement receded in the mid- to late-1980s, Kia promptly returned to passenger cars and almost immediately mass-exported small-sized passenger cars to the world market. This marked the first instance of mass automobile export in Korea's history. Continuous international expansion followed until the 1990s.

Regarding semiconductors, the state announced the Semiconductor Industry Promotion Detailed Plan in 1982 to promote IC product concentration within the industry. In the early 1980s most companies instead heavily invested in memory chip development and became the world semiconductor industry titans. The state strongly objected to Samsung's plan to venture into memory chips (just as with Hyundai's bid when it attempted entry into automobiles and later became the industry leader). Samsung remained the world's top memory chip producer after the early 1990s, about a decade following its initial success with DRAM. By 1986, the advancing technological autonomy of Korean semiconductor firms prompted lawsuits by foreign industry leaders. In response, the government created ETRI, an R&D consortium to build collaboration among the three companies. Co-development of new products was favored to achieve cost-efficiencies and avoid inter-firm competition. ETRI rather became a source of inter-firm conflict and the three firms chose to work on new products independently as they expanded internationally until the late 1990s.

This chapter demonstrates the need for an alternative to statism to explain the two industries' growth and stresses the importance of corporate globalization. The two industries each exhibited some intra-industry isomorphism in being managed by

large business groups, and responded similarly to government intervention. Yet in product development and international expansion, the semiconductor industry showed greater intra-industry isomorphism that supports the mutual influence hypothesis Chapter One outlines than the automobile. Unlike most Korean multinationals, semiconductor firms established R&D subsidiaries abroad even before domestic production. In the early 1980s they also shared a memory chip concentration, contrary to state preferences. As for global expansion, both industries used similar international network strategies, which Chapters Four and Five further analyze through network approaches. The concluding chapter comprehensively discusses all of these processes.

Chapter Three

Theories and Methods of Social Network Analysis

This chapter details the concepts and methods used for network analysis of the MNCs in Korea's automobile and semiconductor industries. As previous chapters indicated, focus on industries' internal situation to explain industrial growth advances an alternative explanation of Korea's industrial growth, since most studies use units of analysis other than industry. Social network theory and methods that structurally analyze MNC growth in the industries show great advantage.

I first review basic network concepts and methods most relevant to economic sociology and the empirical research in this dissertation. This indicates the theoretical and methodological promise of network analysis in studying mutual influence in economic action.

Embeddedness, Social Capital, Network, and Economic Organization

A critical point in social network concept and theory is emphasis on persons' interdependence through exchange. This clearly corresponds to the economic sociology worldview that mutual influence among actors is fundamental to explicate economic action (Smelser and Swedberg 1994). Review of the concepts of embeddedness and social capital suggests the advantage of social network concepts in studying economic organizations.

To trace the tradition of economic sociology most pertinent to this dissertation, I start with selected arguments by Polanyi that most fundamentally emphasize the interdependent nature of human association. They belie the individualist philosophical orientation of mainstream economics and rational choice theory (for general review of the economist fallacy based on Polanyi's explanations see Olofsson 1995). Polanyi suggests that 'economic' refers to the logical character of means-ends relationship such words as 'economical' and 'economizing' imply (Polanyi 1957a). Building on this, he points out that realistic understanding of human action must consider persons' ineluctable interdependence (Polanyi 1957a). All economic actions and transactions are *embedded* in social relations (Polanyi 1957b). This makes social relationship fundamental in understanding the structural foundation of economic activity and leads to the most basic propositions that embed economic organizations in networks, as Granovetter (see 1985) explores. Interestingly, in contrast to most individualist economist perspectives, Arrow, a prominent economist, acknowledges the importance of social structure in economic action—"each [economic] transaction is a social event" (Arrow 1998: 98)—as he evaluates the sociological achievements of network approaches.

Social scientists have adopted Polanyi's embeddedness concept to explain various economic phenomena, although with inconsistency in usage. Evans (1995; 1996a) and Woo-Cumings (1996) use it to describe the relationship between political and other sectors in historically explaining national economic development from statist perspectives. DiMaggio and Louch (1998)—whose theoretical orientation is

somewhat economic sociology—in studying economic behavior at the level of individuals speak of embeddedness to explain how noncommercial relationships affect consumer transactions and satisfaction. At the level of organizations, Uzzi repeatedly invokes embeddedness and its network implications to empirically discuss their diverse impacts on economic behavior and performance (see 1996; 1997), and more specifically resource sharing in seeking financial assistance (see 1999).

While embeddedness highlights the importance of social structure and specific relationships in economic activity, "social capital" refers to the centrality of structured social relationships to the financial outcomes of economic action. Coleman publicized the concept based on Loury's prior proposals (1977; 1987). For Coleman, Loury's usage of social capital denotes "the set of resources that inhere in family relations and in community social organizations that are useful for the cognitive or social development of a child or young person" (1990: 300). Elaborated, it implies "the relations of authority and of trust and the norms" (1990: 300).

Coleman also elucidates social capital impacts. Stressing mutual influence and cooperation in collective action, he further states that "individuals do not act independently, goals are not independently arrived at, and interests are not wholly selfish" (Coleman 1990: 301). For him, social capital is defined by function, which varies according to two characteristics— "some aspect of a social structure" and facilitating "certain actions of individuals who are within the structure" (Coleman 1990: 302). Thus, social structure, which social relations reflect, specifically conditions how social capital facilitates interpersonal and collective action. With this

understanding of social capital, Coleman recognizes the significance of relations among economic actors that the embeddedness concept stresses.

Accordingly, whereas capital generally means a variety of productivity-affecting resources that economic actors use to generate profit—for instance, financial capital—social capital describes interpersonal or inter-organizational relationships, which may entail financial profit (see Coleman 1988; Coleman 1990). Acquaintances may economically benefit persons, for example, by introducing a job or exchanging privately circulated job information (see Granovetter's 1995 detailed study). Drawing on both embeddedness and social capital, Portes and Sensenbrenner (1993) discuss immigrants' economic life by asking how social structures impact economic action.

In line with Polanyi and Coleman's emphasis on the interdependent and collective nature of human economic activity, Granovetter elaborates on the notion of embeddedness to study economic organizations with an emphasis on network properties. He stresses the significance of concrete ties and networks in the embeddedness of economic transactions in social relations (see Granovetter 1985), and thence the importance of the network perspective in studying economic organizations (see Granovetter 1992). As to why firms exist (see Coase 1937), Granovetter contends that "MNC is to firm as firm is to individual economic agent" (Granovetter 1994: 453). Thus the embeddedness of economic transactions explains MNC internal structure as the following chapter understands it. His MNC definition—"a collection of firms bound together in some formal and/or informal ways" (Granovetter 1994: 454)—also shows that the inherent network property of MNCs agrees with another definition that

stresses "personal and operational ties among all the firms" (Strachan 1976: 20). Thus, using economic sociology tradition, MNCs are networks.

In sum, for Polanyi and Coleman embeddedness describes the inherently interdependent nature of human economic action that in social capital theory can lead to economic profit. These two concepts prove pivotal for using Granovetter's concept of network to describe economic organizations.

"Social" Network and Transaction

Networks have been increasingly used to plumb a variety of interpersonal and inter-organizational situations and dynamics in many disciplines. The network concepts used to discuss various economic activities (for the term economic network, see Mann 1986; Mann 1993; and Powell and Smith-Doerr's 1994 comprehensive review) and inter-firm relations among companies and their suppliers and customers (for the term network enterprise, see Castells 1996: 168) directly and indirectly apply to economic organizations in general. The term network has, however, has grown de rigueur in describing contemporary organizations (Nohria 1992: 1). Only select network concepts are relevant to the network analysis this dissertation presents.

The network concept proves most powerful in empirical analysis of network actions when it meets the criterion that defines social network: a set of nodes linked by a set of social relationships of a specified type (Laumann, Galaskiewicz and Marsden 1978). A social network thus is conceptually more than a group in that specific relationships or transactions—not just a shared, often nominal, boundary—connect

members, in keeping with Granovetter's (1985) stress on transactions and their embeddedness. Thus, a specific relationship or transaction is essential for a group of actors to conceptually qualify as a social network. In discussing general economic activities and organizations, transaction means transfer of a good or service across a technologically separable interface (see Williamson 1994).

Expressing Networks in the Sociomatrix Format

For network analysis of MNCs in Korea's automobile and semiconductor industries, particularly to examine mutual influence in their competition and growth, I use the sociomatrix (or the adjacency matrix) (see Scott's 1991 adjacency matrix: 42-50; Wasserman and Faust 1994: 77-84, 150-152). It allows probe of the basic structure of intra-corporate relationships in each MNC's international network and the inter-subsidiary transactions linked to it. In a social network sociomatrix, the number of rows and of columns are the same and each row and column *n* signifies the same network actor or point. Each cell reveals what kind of transaction occurs between the corresponding network actors. In this dissertation, the cells will display numbers that quantify the ties between the actors (for sociomatrix construction for social network analysis see Wasserman and Faust 1994: 77-79). Such information allows discussion of various relationship characteristics at the entire network and actor levels.

Almost three decades ago, Granovetter (1973) charged that sociologists lacked both theory and measurement to "move sociometry from the usual small-group level to that of larger structures," a necessity for network-based organizational research.

Afterwards, concepts and approaches to study corporations emerged to discuss interlocking directorates and their centralized structure (e. g., Roy and Bonacich 1988), inter-firm strategic alliance (e. g., Ghoshal and Bartlett 1990), inter-employee relationships (e. g., Ibarra and Andrews 1993), and so forth. A standardized model is yet to be constructed that approaches an MNC or an MNC as a network of intra-corporate, inter-subsidiary relationships in a sociomatrix form. In the sociomatrix I use to examine MNCs' activities in Korea's automobile and semiconductor industries, rows and columns represent countries that host their subsidiaries, and each cell the number of transaction routes between subsidiaries in the concerned country or countries.

Efficiency of Network Views in Studying Korean MNCs

Why is the intra-corporate network critical, and why particularly so for MNCs in Korea's automobile and semiconductor industries? Most Korean MNCs, particularly large ones in the semiconductor and automobile industries with their own respective international business networks, share characteristics in terms of internal transaction structure. As Williamson discusses from an institutional perspective following the question Coase (1937) initially posed, large firms develop their own hierarchies—internal structures—to execute important actions rather than rely on markets (see Williamson's 1975 discussion of hierarchies), thus to minimize transaction costs (see Williamson's 1981 review of transaction cost economics; Williamson 1994: 86-90). His explanations of hierarchies and transaction cost help

illuminate the basic structure of Korean MNCs and the reason for their structural growth. Historically, Korean MNCs have much preferred establishing subsidiaries for repetitive economic actions rather than outsourcing; their subsidiaries similarly prefer to transact with other subsidiaries in the same MNC rather than forge relationships with companies tied to other MNCs.

Korean MNCs subsidiaries have two functions. Each MNC's subsidiaries coordinate among themselves shifts of human and material resources as necessary (Steers, Shin and Ungson 1989). Subsidiaries each also "keep some separate identity" (Granovetter 1994: 454) to carry out their own missions. Thus, together subsidiaries of one MNC are a unit in terms of financial ownership, mutual investment, human resource sharing, technology exchange relationship, etc. However, each operates independently in that each specializes in and has official responsibility for a unique process that is part of MNC's larger mission. That is, Korean MNC subsidiaries are both independent and interdependent.

Subsidiaries each have a mandate that diverges from that of others (Ghoshal and Bartlett 1988: 365). MNCs in this dissertation generally use different subsidiaries for each of three operations: trading (marketing), production, and R&D. Within one MNC's intra-corporate network, an R&D firm supplies technologies to a production firm that in turn ships its finished product to a trading firm for sales. Conversely, the trading firm purchases and supplies goods the R&D and production firms require. Though an MNC's subsidiaries are supposed to coordinate to maximize their parent conglomerate's profit, each may occasionally deviate from the supposed ideal of

harmonious cooperation and operate as though unrelated to the other subsidiaries for the sake of its unique business function. This realistic cognizance of the fluidity of Korean MNCs' typical intra-corporate inter-subsidiary network structure particularly renders the concept a valuable and appropriate analytical approach.

Each MNC this dissertation studies is an international network of its subsidiaries that interact with each other to execute production, R&D, sales, marketing research, and so forth that serve headquarter's strategic vision. My network analysis focuses on MNC production and sales subsidiaries, which execute the most obvious transactions, and the intra-network flow of products. When a producing or selling subsidiary transacts with a peer subsidiary or client in a different country, lack of buyer and seller physical co-presence is no obstacle thanks to telecommunication. Thus, when an MNC bothers to establish physical subsidiary presence in a foreign country, the country is somehow uniquely strategically important for its business. Therefore, knowing which countries host its subsidiaries is key to understanding an MNC's intra-corporate network structure and growth.

Network Hypotheses and Variables

Building on

1) the suggestion that research needs to focus on internal industry factors;

2) the advantage of network analysis in explaining MNC structural growth and competition; and

3) the hypothesis based on mimetic isomorphism or mutual influence,

I hypothesize that to minimize risks in a venture previously not attempted, an MNC constructing a multinational intra-corporate network mimics or is influenced by MNCs who have attempted the venture.

In discussing organizational change, isomorphism theory reflects an institutionalist analysis of why organizational homogenization does or does not occur. Mimetic isomorphism claims that organizations imitate others that appear more efficient, especially in uncertain situations (DiMaggio and Powell 1983a: 151-2). This implies that an organization will tend to model internal structure in keeping with others effective in their field. More generally, this theory recognizes the importance of mutual influence in corporate and organizational activities, which economic sociology traditionally emphasizes. Originally discussion of isomorphism concerned general organizational change. I use it to study network changes—network meaning an organization of transactions among multiple economic actors.

For actual network analyses, I more specifically hypothesize that, within the respective industries, intra-corporate network characteristics of an MNC mimic or are influenced by those of other MNCs of an earlier or the same time[8], given that MNC network characteristics are functions of positional characteristics of member subsidiaries (country) within each MNC's international network.

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[8] The lag is set to vary from 0 to 2 on the assumption that it takes 0 to 2 years for an MNC to imitate or to be influenced by another MNC's network/organizational change. For this and the following network hypothesis, the analysis will be about the period 1980-1999.

To test my main hypothesis with manifest variables, network characteristic measures used for network analysis in the following chapter are pivotal.

First, a relatively simple variable to test the sub-hypothesis that, within the respective industries, expansion of one MNC's network to other countries in the same industry is influenced by other MNCs' having done so at an earlier or the same time is critical.

This variable is particularly useful to detect and measure mimetically isomorphic or mutually influential patterns in MNCs' expansion to countries considered key in terms of technological progress (e. g. advanced countries such as the US, the UK, and Japan), marketing (e. g. China), and so forth. Examining which countries are expanded to most and least through mimickry or influence indicates each country's importance along with whether MNCs' networks change in the direction of intensifying or avoiding competition among themselves. Which countries or world regions MNCs more or less concentrate in also becomes clear.

To discuss the hypotheses about inter-corporate influence I examine growth of Korea's automobile industry global network using three network variables—sparseness, hierarchy, and reachability—theoretically and mathematically based on graph theory that deals with various internal dynamics of social networks (see Harary 1969; Scott 1991: 12-13).

Sparseness (or graph efficiency) shows a curvilinear relationship to organizational effectiveness (Krackhardt 1994: 102 and 109-110) as it signifies the extent to which each weak network component has the least number of links necessary to

remain connected (Krackhardt, Blythe and McGrath 1999). Mathematically, it calculates the extent to which, in an underlying graph (e.g., G_1, G_2, etc.) of each component (e. g., D_1, D_2, etc.) of directed[9] graph D (for detailed definitions of graph and directed graph, see Krackhardt 1994: 91; Scott 1991: 68), there are exactly N_n - 1 links, where N_n is the number of nodes in the corresponding component D_n (Krackhardt 1994: 98). If network sparseness equals 1, the network has the minimum number of lines to remain connected to actors. If it equals or is close to 0, actors are connected by more than the minimum—for instance some pairs of network nodes are linked directly and indirectly.

In the ideal-typical network, the fewer the redundant connections, the more effective the network. Redundant transaction paths may slow transactions among network actors by presenting more options for executing any transaction. Yet, excess connections among network actors do not necessarily indicate network organizational inefficiency, perhaps simply less than optimal performance. For instance, less sparse and thus more graph-inefficient structures may enhance quick diffusion of innovative ideas within high-tech or organic organizations (Shrader, Lincoln and Hoffman 1989). Therefore, the relationship between network sparseness and network effectiveness or other network characteristics needs further study. In the following chapter's discussion of MNC growth and competition, network sparseness measures the extent to which transaction routes between indirectly connected subsidiaries are minimal.

[9] In the context of discussing connections among network actors, "directed" means that the relationship or transaction has a direction, e. g., from one actor to the other.

Using this variable, I suggest the following sub-hypothesis based on the proposition of mimetic isomorphism: within the respective industries, network sparseness of one MNC at a time is influenced by that of other MNCs at an earlier time, or, at the same time.

Second, hierarchy (or graph hierarchy) is associated with the degree to which the network is dominated by status (Krackhardt 1994: 102) as it measures the extent to which the transitive closure of the digraph lacks symmetric ties (Krackhardt, Blythe and McGrath 1999). The hierarchy variable mathematically calculates the extent to which, in a directed graph, for each pair of points where one (P_i) can reach another (P_j), the latter (P_j) cannot reach the former (P_i) (Krackhardt 1994: 97). Thus, network hierarchy measures how unidirectional transactions are in general.

In terms of internal network structure, if hierarchy of a network is close to 1, the network has a relatively vertically integrated structure. If it equals 1, it means that no network actors are at the same hierarchical level showing a clear authority structure as all transactions within such a network are unidirectional. If a network's hierarchy is close to 0, it means the structure of the network is relatively horizontal than vertical. If it is 0, every network actor is at the same transaction level as the exchange structure of the network looks democratic with all transactions being bi-directional between the connected actors. Thus, theoretically, network hierarchy is positively associated with the strength of networks' vertical integration relative to horizontal equality. In the context of analyzing the structure of MNCs in the following chapter, network hierarchy will show the extent to which exporting countries only export and not import from other countries.

Using this variable, I suggest the following sub-hypothesis based on the proposition of mimetic isomorphism: within the respective industries, network hierarchy of one MNC at a time is influenced by that of other MNCs at an earlier time, or, at the same time.

Third, reachability (or connectedness) is associated with the ease with which the organization can deal with and implement change (Krackhardt 1994: 102) as it measures the degree to which each point in a network can reach every other point therein directly or through other points (Krackhardt 1994: 95; Krackhardt, Blythe and McGrath 1999). Mathematically, given that a violation in a network is defined as a point being unable to reach another point therein, for a network or a group of points, when the number of existing violations is divided by the maximum number of violations, the result represents the degree to which the graph is disconnected. 1 minus this ratio equals the degree of reachability in the structure.

The closer network reachability is to 1, the more points connect one another through transactions. If every point in a network is directly or indirectly connected the other points in the network, reachability equals 1. The closer reachability is to 0, the more points remain unconnected for transaction. If no point is connected to the other points, it equals 0, then the group of the points conceptually fails to construct a transaction-based social network.

In the network analyses to be presented in the following chapter, reachability basically represents the strength of each MNC's presence in each industry's global network. The higher reachability is for an MNC, the more countries are reached. For

instance, in the country-based network annual data, if an MNC's reachability equals 1, it means that all countries show that MNC's presence. If an MNC's reachability equals 0, it means that the MNC has established local presence in no countries other than Korea. Thus, in the context of discussing the MNC network data in the following chapter, network reachability is positively correlated with the degree of internationalization per MNC.

Using this variable, I suggest the following sub-hypothesis based on mimetic isomorphism: within the respective industries, an MNC's network accessibility is conditioned by that of other MNCs at an earlier or the same time.

Data and Method

For network analysis to test the above hypotheses, I use 1) corporate histories by MNCs in Korea's automobile and semiconductor industries, namely, Samsung, LG, Hyundai, Kia, and Daewoo; 2) the *Directory of Korean Corporations Overseas* (*Haewoe chinch'ul Han'guk ki'óp direkt'ori*) by the Korea Trade Promotion Association (KOTRA); 3) the *Status of Overseas Investment to Local Subsidiaries* (*Haewoe t'uja hyónji pób'in hyónhwang*) by the Ministry of Finance and Economy (MOFE) of the Republic of Korea; and, 4) the *Overseas Direct Investment Statistics Yearbook* 2000 (*Haewoe chikchóp t'uja t'ong'gye yónbo* 2000) by the Export-Import Bank of Korea to construct a master spreadsheet that depicts MNC name, location (country), year of establishment, type of business (production, sales, or R&D), etc. for each year from 1980 to 1999 for Korea's automobile and semiconductor industries.

The analyses will transform or export the master spreadsheet to KrackPlot (Krackhardt, Blythe and McGrath 1994), UCINet (Borgatti, Everette and Freeman 1999), etc. as appropriate.

Using UCINet, I construct a blank matrix that comprises all member countries in Korea's worldwide automobile and semiconductor business networks for each year from 1980 to 1999. According to Gereffi's distinction (1994a: 219-222; 1994b), global commodity chains show two basic patterns—one producer-driven, the other buyer-driven—depending on which end of the chain is more influential in developing and shaping the whole. The networks of Korean MNCs Chapters Four and Five analyze fit the former pattern. As Guillén (2001b: 17) reconfirmed recently, actor location is critical in understanding network activity (see also Campa and Guillén 1999). Thus, for each MNC, the countries that host subsidiaries are network points, and the flow of products—for instance, finished goods ready for sale, parts for assembly—from a production subsidiary to a sales subsidiary is the line that holds them in one corporate network. For each network of the six MNCs in the two industries, structural information appears in the form of sociomatrix to generate analytical diagrams and data for further analysis to be Chapters Four and Five present.

To show product flow between subsidiaries/countries by MNC, in each sociomatrix cell I put the number of transaction routes, as the exemplary matrix below shows (Table 3.1). Rows represent production countries, and columns sales operation countries.

Table 3.1. Exemplary Sociomatrix

MNC X: year 19yy

	Country A	Country B	Country C
Country A	2	0	4
Country B	0	0	0
Country C	1	0	2

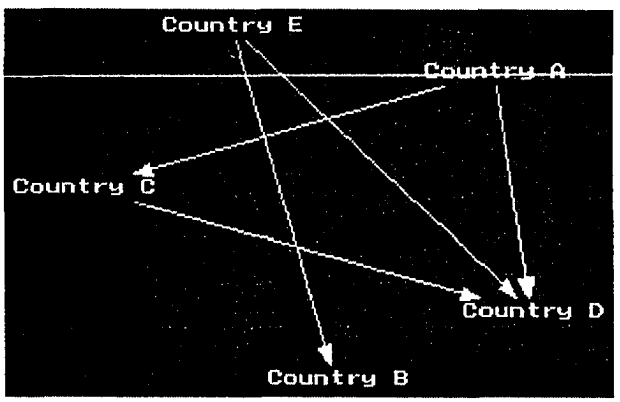
In this exemplary sociomatrix, the first line shows two producer-seller connections within country A, four from A to C, one from C to A, and two within C. The second line for country B only has 0s because B was not a member of MNC X in the year 19yy.

After data entry for every MNC for years 1980 to 1999 was complete, UCINet network data files were exported to KrackPlot to generate network diagrams and calculate the three network measures.

For visual network analysis, which allows discussion of general structural characteristics (e. g. the expansion variable) of MNC networks, I show network diagrams of the flow of goods within them using KrackPlot. This clearly depicts the structure of the flow of goods within the given MNC's network. In KrackPlot-generated network diagrams, directed arrows indicate between which countries products move. For instance, Figure 3.1 shows that, in the exemplary MNC network, country D products are imported from countries A, E, and C, and so forth. To

calculate the values of the suggested network variables, I use the menu of KrackPlot and record them for presentation and further analysis.

Figure 3.1. Exemplary Network Diagram



To test the three mutual influence network hypotheses, I regress one MNC on the other two (multiple regression) or on one of the two (simple regression) in several different models with varying lags, and so forth. In the regression results, I examine which regression coefficients are statistically significant to determine whether the hypotheses prove true in any MNCs' relationships.

Summary

Social network theory as a perspective to study economic activity starts from the importance of persons' interdependence in economic action. Polanyi asserts that economic actions are embedded in social relationships, providing a sociological

foundation for research on economic activities that diverges from individualism-based mainstream economics. Coleman's discussion of social capital indicates that such sociologically conceptualized social relationships can also explain outcomes of economic action. Continuing in this tradition, Granovetter provides ways to understand economic organizations and their structures by connecting network properties to embeddedness—particularly useful in clarifying the internal structure of large firms. Williamson's discussion of hierarchies and transaction cost helps explicate Korean MNCs' structural growth and preferred transaction partners.

Among the various meanings attached to network, I use the concept of social network—which requires reference to actors and ties—to trace the internal structure of MNCs. I find the sociomatrix form based on graph theory an effective way to construct network data for the MNCs in my analyses. In the data, I use countries in which subsidiaries locate as actors, and intra-MNC, inter-subsidiary transaction routes as ties. This network perspective and method is appropriate to capture the network characteristics of the MNCs: Their subsidiaries are both independent and interdependent as they each carry out different subsidiary-specific tasks, yet together serve parent MNC goals.

Returning to the main analytical purpose of the dissertation, to explain MNC and industry growth, I see whether MNCs mutually influence expansion to certain locations and whether their network variables such as sparseness, hierarchy, and reachability influence each others' network growth. Regression analysis is used to

detect inter-corporate influence including mimetic isomorphism using the data of network measures.

Chapter Four

A Network Analysis of the Structural Growth and Mutual Influence of Multinational Corporations in Korea's Automobile Industry, 1980-1999

Utilizing the concepts and methods introduced in the previous chapters, this chapter begins to analyze the growth of the networks of the MNCs in Korea's automobile industry, followed by some preliminary comparisons to the semiconductor industry in the period 1980-1999, to discuss the mutual influence hypotheses empirically. As explained in the previous chapters, although subsidiaries of an MNC are supposed to serve the financial interest and strategic goals of their respective parent MNCs, each subsidiary is a legally independent corporation with its own missions and operational autonomy. Thus, while the concept of social group that requires sharing of a common identity and objectives for the members is incomplete in capturing internal organizational characteristics of MNCs, network perspectives provide a more effective way to analytically understand the MNCs' internal structure and inter-subsidiary dynamics.

Through network approaches, this and the following chapters examine how similar, different, and influential to one another the MNCs in Korea's automobile and semiconductor industries were as they structurally expanded, based on which similarities and differences between the two industries will be further discussed.

Analytical Visualization of Networks Using the Multidimensional Scaling Method

For analytical and visual purposes, I used KrackPlot 3.2 (Krackhardt, Blythe and McGrath 1994) generate network diagrams, in which the connecting arrows represent from and to which country products move, within each MNC's international network. Due to the way KrackPlot handles the network data, in some MNCs' diagrams, some countries remain isolated outside the flow of products, which means they are part of the other MNCs' networks.

The layout used for the network diagrams in this chapter is based on the two-dimensional multidimensional scaling (or MDS) method, in which distance between the connected nodes represents the geodesic path distance, i. e., the length of the shortest path between two connected nodes in the network given that the length of any one line is standardized to 1 (see Krackhardt, Blythe and McGrath 1999; Scott 1991: 151-156; Wasserman and Faust 1994: 110). Additionally, in the MDS diagrams, two countries are structurally equivalent if they have identical ties to and from all other countries in the network (see definition of structural equivalence Wasserman and Faust 1994: 356). Thus, each MNC's MDS diagram shows connected countries' relative distance from one another, and, the closer any two connected countries are, the more structurally equivalent they are. Also, the thickness of connecting lines is commensurate with the number of transaction routes between the connected countries. In the MDS diagrams, the loops starting from one point and returning thereto indicate the transaction of products consumed in the same country.

The MDS-based network visualization will provide a summary of the MNCs' structural expansion, demonstrating what to further examine using statistical tests using the network measure data. (When KrackPlot superimposed one country on another, or beneath the lines between countries to the extent of hiding the label, I relocated them slightly to recover legibility.)

MDS Analysis of Corporate Networks in Korea's Automobile Industry

Figures 4.1 to 4.20 are the MDS visualizations of the corporate networks of Korea's automobile industry, in the years 1980, 1985, 1990, and 1999. Figures 4.1 to 4.5 represent the combined network of all three companies in Korea's automobile industry. Figure 4.1 shows that, in 1980, Korea was right at the center of the network of transaction routes as the only production base, shipping to subsidiaries in Korea and also exporting to the other countries. By 1985 as shown in Figure 4.2, some production is done in subsidiaries in the US. By 1990 (Figure 4.3), the US strengthens as a producing and exporting center but Korea continuously shows more transaction routes to more export destinations. By 1995 (Figure 4.4), China participates in export-oriented production, and, several other countries start to serve as production bases but mainly for local consumption, e. g., the Philippines, India, Poland, etc. By 1999 as shown in Figure 4.5, the pattern shown by 1995 does not change much: Korea, the US, and China are production points, yet Korea's automobile industry develops connections to more countries. Figures 4.4 and 4.5 show that the US and China are

positioned mutually close in terms of MDS, indicating that production sites outside Korea shared similar transaction routes to the other countries.

For MNC-specific diagrams, I will explain in the sequence of Hyundai, Daewoo, and Kia to reflect each MNC's reputation and general performance in the industry.

In the case of Hyundai alone, in 1980 (Figure 4.6), the data show that official inter-subsidiary exporting routes were established to only two countries. By 1985 as shown in Figure 4.7, Hyundai establishes a production subsidiary in the US from which exporting and local consumption is done. By 1990 (Figure 4.8), Hyundai exports to more countries from its production bases in Korea and the US. By 1995 (Figure 4.9), China becomes an additional production site for exporting and also for local consumption too. By 1999, as Figure 4.10 shows, Hyundai's automobile business establishes presence in more countries including a production subsidiary in India which was for local consumption as indicated by the loop. Unlike all automobile MNC-combined network (Figures 4.4. and 4.5) in which production subsidiaries outside Korea were mutually close but a bit distant from the Korean one, all of Hyundai's production subsidiaries are relatively more structurally equivalent by the MDS except for the one in India that does not export.

In Daewoo's case, even in 1980 as shown in Figure 4.11, its inter-subsidiary network covered quite many countries relative to the other automobile MNCs. Yet, the pattern of the flow of products was about the same in the sense that Korea was the only production base just as in the case of Hyundai of 1980 (Figure 4.6). By 1985

(Figure 4.12), Daewoo's network reaches more countries. However, Korea still is the only production center unlike Hyundai of 1985 (Figure 4.7). By 1990 (Figure 4.13), Daewoo's production base in Korea reaches many more countries. Yet, unlike in the case of Hyundai's inter-subsidiary transaction pattern in which most non-Korean production sites develop transaction routes to other multiple countries in addition to the Korean ones (Figures 4.7 through 4.10), Korea is the only country that exports to other countries in its network. Until 1999 as shown in Figures 4.14 and 4.15, the same pattern continues: Daewoo's subsidiary network continues to cover more countries, but Korea is the only exporting points while production subsidiaries outside Korea serve for local consumption just as in the case of Hyundai's production subsidiary in India.

Kia shows quite a different expansion pattern compared with the other two leaders in the automobile industry, clearly remaining the least globalized of the three MNCs throughout the period. Until 1990 (Figures 4.16, 4.17, and 4.18), Kia's inter-subsidiary network reaches Japan only while the other MNCs have each established a much more global network as represented by the increasing number of unconnected countries. Even by 1999 as shown in Figures 4.19 and 4.20, Kia shows a far lower degree of corporate globalization compared with the other two MNCs examined above. For Kia, it is only after 1995 when it establishes a production subsidiary outside Korea. Thus, Kia did not only remain as the smallest of the three automakers, but also lagged most behind in terms of corporate internationalization.

Comparison of the Two Leaders: Hyundai and Daewoo

Hyundai and Daewoo's automobile MNC networks clearly show the following similarities and differences in terms of structural expansion. In the respect that the automobile businesses of the two MNCs continue to grow structurally, they are very similar. Yet, Daewoo's network constantly contains more member countries than Hyundai's, particularly more so in the 1990s. Most countries reached by Daewoo only are relatively underdeveloped and located outside Western Europe and North America. Also, unlike those of Hyundai, Daewoo's non-Korean subsidiaries are engaged in production for local consumption only, as opposed to actively exporting products to other countries as shown in Hyundai's case. Thus, although the two leaders in the automobile industry seem similar in that they continuously expand their respective corporate networks since 1980, they show different patterns in terms of expanding transaction destinations and subsidiaries' roles.

Network Sparseness of MNCs in Korea's Automobile Industry

Figure 4.21 shows the historical trends of network sparseness of MNCs in Korea's automobile industry. Throughout the period, Daewoo's sparseness stays at 1 unchanging. This empirically reflects that Daewoo's network lacked redundant paths between any two linked countries with its corporate presence, which is considered an efficient network from the theoretical perspective of graph theory (see Chapter Three). In the case of Hyundai and Kia, sparseness fluctuates since 1985 and 1996 respectively unlike in the case of Daewoo. Considering that 1986 was the year when

Korean automobile companies genuinely started to mass-export the domestically produced small passenger cars such as the Pony, the LeMan, and the Pride (see Chapter Two), it is noteworthy that Hyundai's network sparseness drops about .3 just one year before then. This indicates that Hyundai, in the mid-1980s, established more transaction routes with car-trading subsidiaries to prepare for sales to soon follow, resulting in more redundant and indirect paths between linked countries right before its mass-export era began.

In the late 1990s, mean sparseness of the three MNCs decreases even further down reflecting development of more redundant links. Since 1985, Hyundai's sparseness constantly stays below the mean sparseness of the three groups and that of the other two groups until the end although the MNC has always been the industry leader of the three MNCs throughout the period. Considering this, the network sparseness of multinational MNCs in Korea's automobile industry seems generally uncorrelated to corporate performance although sparseness is discussed to show a relationship to organizational effectiveness (Krackhardt 1994: 98, 99, and 102).

Network Hierarchy of MNCs in Korea's Automobile Industry

When it comes to the network hierarchy of the automobile industry as shown in Figure 4.22, isomorphic influence is somewhat present between Daewoo and Kia. Their hierarchy measures stay at 1 until 1996 since the early 1980s. This means that, in the networks of the two MNCs, the flow of products from producing countries and selling countries was all unidirectional in the period.

In the case of Daewoo (as in network diagrams shown in Figures 4.11 through 4.15), production outside Korea begins by 1995. However, as Daewoo's subsidiaries outside Korea produce for local sales, not exporting products to other countries, network hierarchy stays at 1. Kia's hierarchy falls below 1 only in the late 1990s as China, in addition to Korea, becomes its additional production center that exports as well, as was shown in Figure 4.20.

In the case of the industry leader, Hyundai's hierarchy stays below the mean in 1985-1988 and again beginning 1992 until 1999. Such fluctuation of Hyundai's network hierarchy seems quite independent of the other two MNCs. Thus, based on the figure, the network hierarchy of the automobile industry shows some isomorphism between Daewoo and Kia, apart from the industry leader, Hyundai.

As pointed out in Chapter One, most previous studies of Korean business organizations had been done from cross-national comparative perspectives to consequently support the already classic institutionalist conclusion that they are patrimonial generally and, in terms of intragroup network structure, hierarchical from top (see Orrù, Biggart and Hamilton 1991). Unlike the Korean vertical type, for instance, most Taiwanese family-based firms show a horizontal structure, thus, with greater elective affinity to the buyer-driven commodity chain (Biggart and Guillén 1999; Orrù, Biggart and Hamilton 1997) according to the institutionalist conclusion. Guillén (2001b: 17) argues that Korean chaebols' vertical structure stems from patrimonial social organizations and considered a good example for the producer-driven linkage. My hierarchy measure-based analysis confirms that these previous

descriptions are generally applicable in understanding the network structure of Korea's automobile MNCs too. However, they seem to fall short of explaining the difference between the leader Hyundai and the other two MNCs as found in the analysis. (This point will be re-discussed in comparison to the semiconductor industry later.)

Network Reachability of MNCs in Korea's Automobile Industry

The network reachability trend of Korea's automobile industry (Figure 4.23) shows a unique pattern of mutual influence that is unfound in the above analyses based on the other two network measures. In the context of discussing the corporate network data used in this dissertation, each MNC's network reachability represents its proportion of the countries covered out of the entire industry's network, which serves as a measure for the degree of corporate globalization of each MNC relative to the others.

In the case of Kia, it stays near 0 with a very small amount of fluctuation meaning its corporate network connects a very small proportion of the countries reached by Korea's entire automobile industry.

From the early 1980s, Daewoo's reachability goes down from 1 to near .5 until the early 1990s while Hyundai's goes up from near 0 to approximately .3. Afterwards, roughly, Daewoo's reachability goes up to almost .8 as Hyundai's goes down to stabilize around .15 in the late 1990s. Based on the substantive meaning of network reachability, this means that Daewoo's corporate presence was much more globalized,

reaching far more countries than Hyundai, from the beginning of the two-decade period. As shown in the above-discussed network diagrams for the two MNCs respectively (Figures 4.6-4.10 and 4.11-4.15), both continued to structurally expand throughout the period. Then, the negative correlation from the early 1980s until the early 1990s, especially the reason why Daewoo's reachability declines, indicates that the rate of Hyundai's expansion was higher than that of Daewoo's while the number of countries reached by Daewoo started off and remained greater until 1999.

Hyundai has never caught up with Daewoo in terms of reachability measures although the gap closes down to about .2 in the early 1990s. The gap between the two MNCs resumes widening afterwards, which means the rate of Daewoo's network expansion is higher than that of Hyundai during that period as both MNCs continue to establish more international inter-subsidiary transaction routes. In sum, comparison of network reachability shows that there is some mutual influence between Hyundai and Daewoo in the automobile industry.

Vector Autoregression (VAR) Analysis for Preliminary Comparison of the Automobile and Semiconductor Industries

To examine which of the automobile and semiconductor industries shows more mutual influence in terms of network change, using each of the three network variables, I ran saturated vector autoregression (VAR) models in which an MNC's network situation is regressed on its past (t-1 and t-2), and the other two MNCs' multiple time points (t, t-1, and t-2) for the two industries separately. In the result of

this VAR and other regression models, statistically significant regression coefficients indicate presence of influence from the independent variable to the dependent variable. (Chapter Five will present the network analysis of the semiconductor industry in detail. Yet, for comparisons with the automobile industry, this chapter briefly reports the VAR results of the semiconductor industry.)

In the case of the automobile industry, the result turns out that it is only some of the autoregressive terms that are statistically significant in some models. This means that, as the statistically significant autoregressive terms function to hide intercorporate influence among the MNCs is uncaptured in the saturated VAR models suggesting that, to further examine mutual influence, additional analysis is required after dropping the autoregressive property from the regression model, which will be presented in the following sections.

In contrast, in the case of the semiconductor industry, the same saturated VAR analysis results in the form of path diagrams (Figures 4.24-4.26) show presence of mutual influence among the MNCs. In the result of network sparseness (Figure 4.24), the autoregressive terms of both Samsung and LG, the leaders in the industry compared to Hyundai, are statistically significant. This means that when the autoregressive terms are dropped in further analysis, intercorporate influence may turn out stronger. Yet, when statistical significance is examined using a more generous criterion ($P < .1$), intercorporate influence between the two industry leaders is clearly captured. Samsung's network sparseness explains LG's when the lags are 0 to 2. In return, LG's explains Samsung's when the lags are 0 or 1.

In Figure 4.25 that shows the result of the same VAR model using network hierarchy measures, Samsung and LG again show mutual influence when the lag is 0 by the generous criterion for statistical significance ($P < .08$).

As in Figure 4.26, when network reachability is used in the same VAR model, Samsung's autoregressive term is statistically significant when the lag is 1, which suggests further analysis dropping it to examine intercorporate influence. Additionally, Hyundai's reachability explains Samsung's when the lag is 1. Between LG and Hyundai, mutual influence is seen when the generous criterion ($P < .09$) is used.

These radically different VAR results between the automobile and semiconductor industries mean that, in terms of changes in corporate networks, the semiconductor industry, which has grown more rapidly than the automobile industry despite its shorter history, shows more mutual influence among the three member MNCs. This basically supports my hypothesis that corporate actors' mutual influence would explain industrial growth and suggests that further regression analysis without autoregressive terms may show more intercorporate influences among the MNCs in both industries. Thus, I will move on to further statistical examination using regression analysis to specifically capture mutual influence among MNCs' network change by industry.

Regression Analysis of Network Variables of the Automobile Industry

To discuss mutual influence in network growth more rigorously, the following analyses regress one MNC on the other two using the data of the three network variables with the lag varying from 0 to 2. In addition to this multiple regression model, to specifically discuss all possible pairs of two MNCs' mutual influence, the simple regression model regressing one MNC on each of the other two will be run as well.

The upper portion of Table 4.1 presents the multiple regression models of network reachability that examine mutual influence among the MNCs in Korea's automobile industry. (As Daewoo's sparseness and hierarchy values stay at 1 with no variance throughout the period as shown in Figures 4.21 and 4.22, the corresponding portion of the regression result table is left blank.)

The three columns for models t, t-1, and t-2 mean that the lag between the dependent and independent variables is 0, 1, and 2 respectively. The three lag values represent the assumption that, for MNCs to influence or mimic one another to change structurally by establishing new subsidiaries or new transaction routes, it would take 0 to 2 years. For instance, MNCs sometimes publicly announce their international expansion plans a few years prior to actual execution, in which case, the other MNCs may follow to establish new subsidiaries in the same country at the same time. Or, if an MNC influences imitates other MNCs' already executed structural change, having done so within a one and two year's lag will be considered in the regression model where t equals 1 and 2 respectively.

The multiple regression results show that 1) based on network sparseness and hierarchy, no intercorporate influence is statistically significant, but 2) that in terms of network reachability, Hyundai and Daewoo, the largest two MNCs in the automobile industry, explain each other's network growth in some models while Kia's case remains relatively weakly related.

When the multiple regression coefficients of network reachability are reviewed in terms of statistical significance, Daewoo explains Hyundai when the lag is 0 or 1, and Hyundai explains Daewoo in all three models as it varies from 0 to 2. Thus, the two leader MNCs' mutual influence is very clear.

Also, Kia explains Daewoo when the lag is 1 or 2 in the corresponding regression models. Although I intend to refrain from overemphasizing this particular result as Daewoo's international network has always had more transaction routes thus has been reaching much more countries than the other MNCs' throughout the period, these statistical test results indicate that the expansion strategy of Daewoo may have been influenced by Kia as well. Also, in the multiple regression result, Hyundai explains Kia when the lag is 2 but the amount of the impact seems minimal compared with the other regression coefficients as it is -.072, very close to 0. In line with what I observed in and discussed based on Figure 4. 23 that presented the three MNCs' measures of network reachability, the negative signs of the statistically significant multiple regression coefficients between Hyundai and Daewoo in Table 1 reflect the negative correlations between the two. Yet, when the absolute values of the regression coefficients are compared, in all three models respectively, Hyundai's influence on

Daewoo is greater than vice versa, meaning the industry leader's effect impacted more strongly although it constantly had a smaller number of transaction routes and also a smaller number of countries reached in its corporate network.

Thus, I tentatively conclude from the multiple regression results based on the reachability data, Hyundai and Daewoo's mutual influence is clearly shown as was in part noticed from the above-presented analysis based on the MDS diagrams and the network variable graphs.

The simple regression results at the bottom of Table 4.1 are about influence between all possible pairs of two MNCs in terms of the three network characteristics. In the table, cells concerning Daewoo's sparseness and hierarchy are again left blank as the values are constant (1), to which regression analysis is inapplicable. In the simple regression models, the entire network is additionally used as an independent variable to examine if it explains each MNC, on the assumption that it is possible for individual MNCs to be influenced by or imitate the structural change of the entire industry network.

In terms of network sparseness, the entire network explains Hyundai in all models statistically significantly. Also, in terms of network hierarchy, the entire network explains Hyundai, in models 1 and 2, statistically significantly. This suggests that the internal network structures of Hyundai, the industry leader, have been internally changing in the direction of mimicking those of Korea's entire automobile industry's transaction network unlike in the case of the other two MNCs.

In terms of network reachability, in addition to the above discussed multiple regression models, the simple regression results also show that Hyundai and Daewoo explain each other statistically significantly. In models 1 and 2, the two MNCs do so mutually. In model 3, Hyundai explains Daewoo statistically significantly. This means that, the above observed relationships between the two MNCs based on the multiple regression models of network reachability, which showed clear intercorporate influence or their competition in structural expansion is reconfirmed in the simple regression models.

In models 2 and 3, Kia is shown to explain Hyundai and Daewoo statistically significantly. As shown at the bottom of the simple regression results, the other two MNCs do not statistically significantly explain the growth of Kia's corporate network. Again, considering that the other two MNCs' international presence has been far larger than Kia's, I intend not to emphasize these results. This may, however, imply that the MNCs with greater international presence were conscious not only of each other's network growth, but also of the small competitor's individually while the network of the smallest MNC in the industry remained uninfluenced by those of the other two leaders.

Figure 4.1. The Corporate Network of Hyundai, Daewoo, and Kia's Automobile Businesses Combined in 1980 (MDS Analysis)

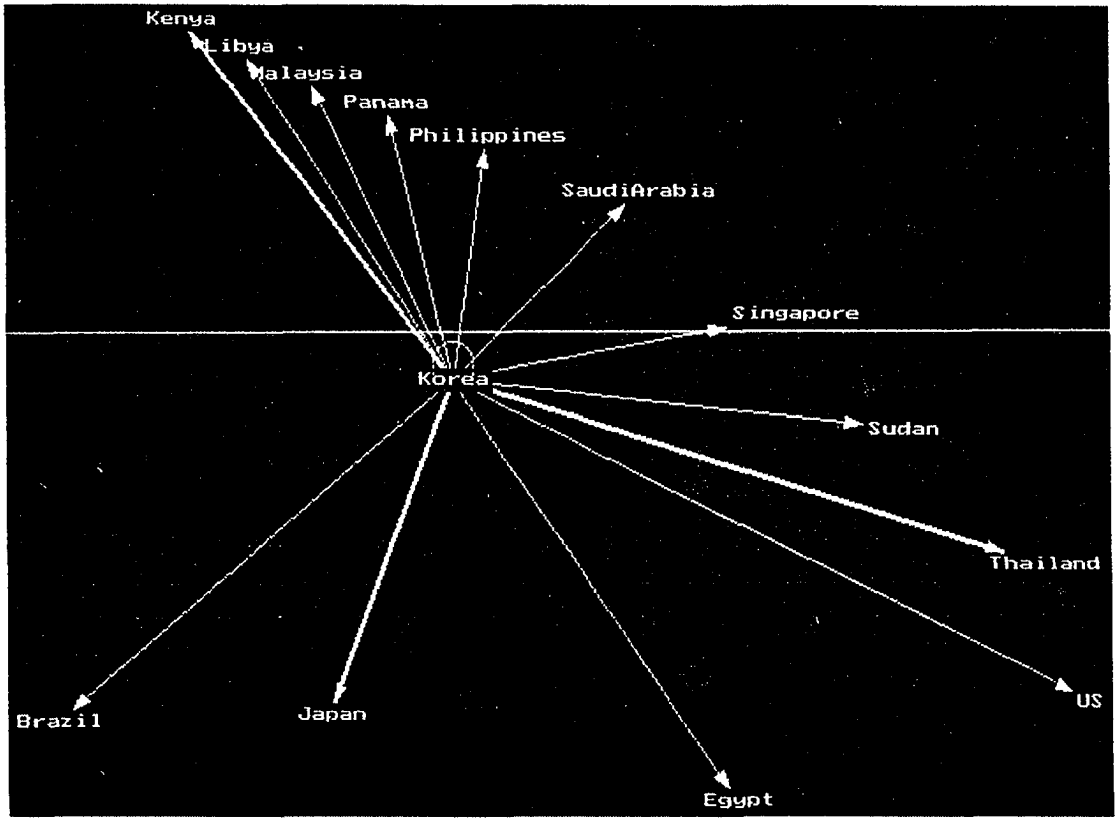


Figure 4.2. The Corporate Network of Hyundai, Daewoo, and Kia's Automobile Businesses Combined in 1985 (MDS Analysis)

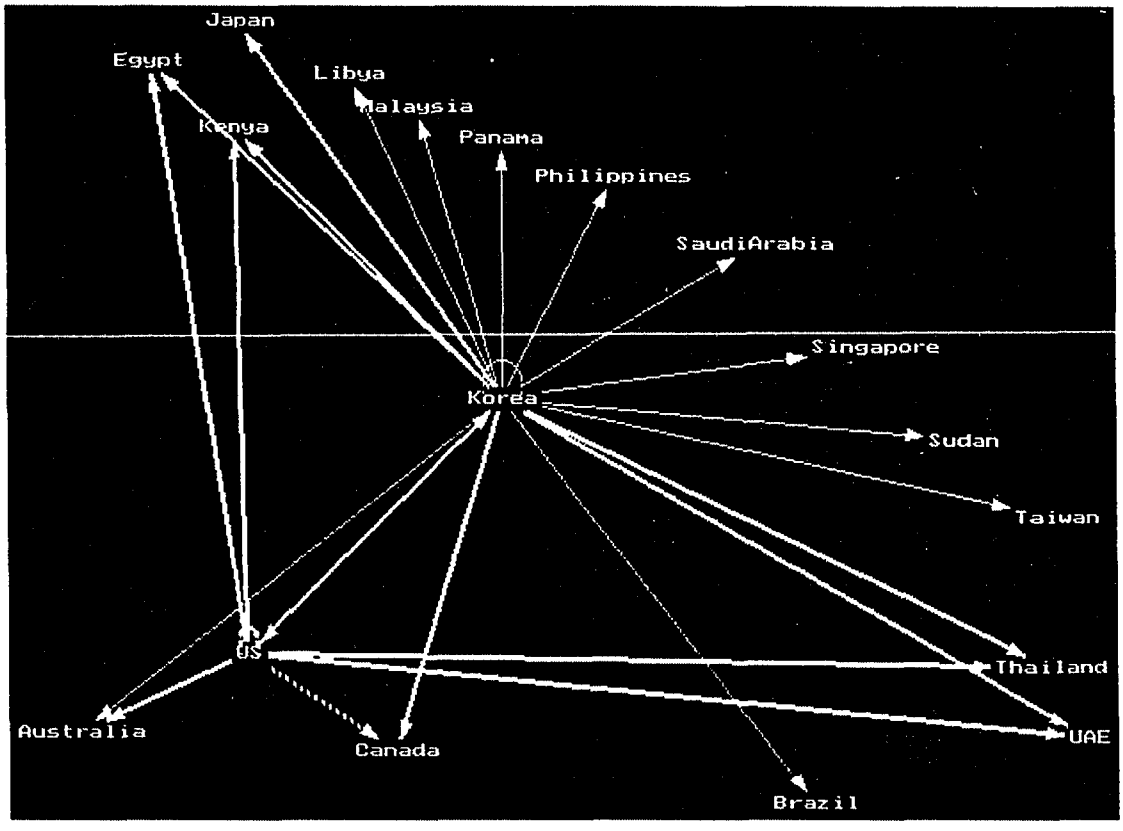


Figure 4.3. The Corporate Network of Hyundai, Daewoo, and Kia's Automobile Businesses Combined in 1990 (MDS Analysis)

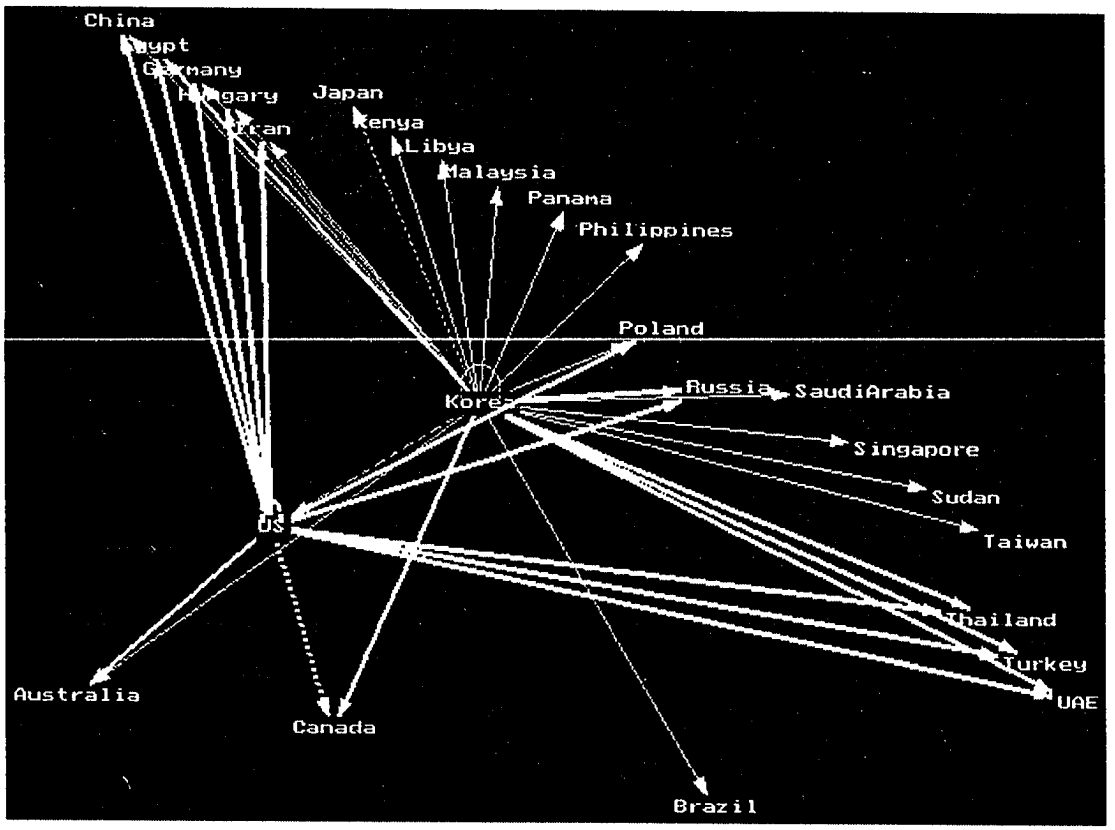


Figure 4.4. The Corporate Network of Hyundai, Daewoo, and Kia's Automobile Businesses Combined in 1995 (MDS Analysis)

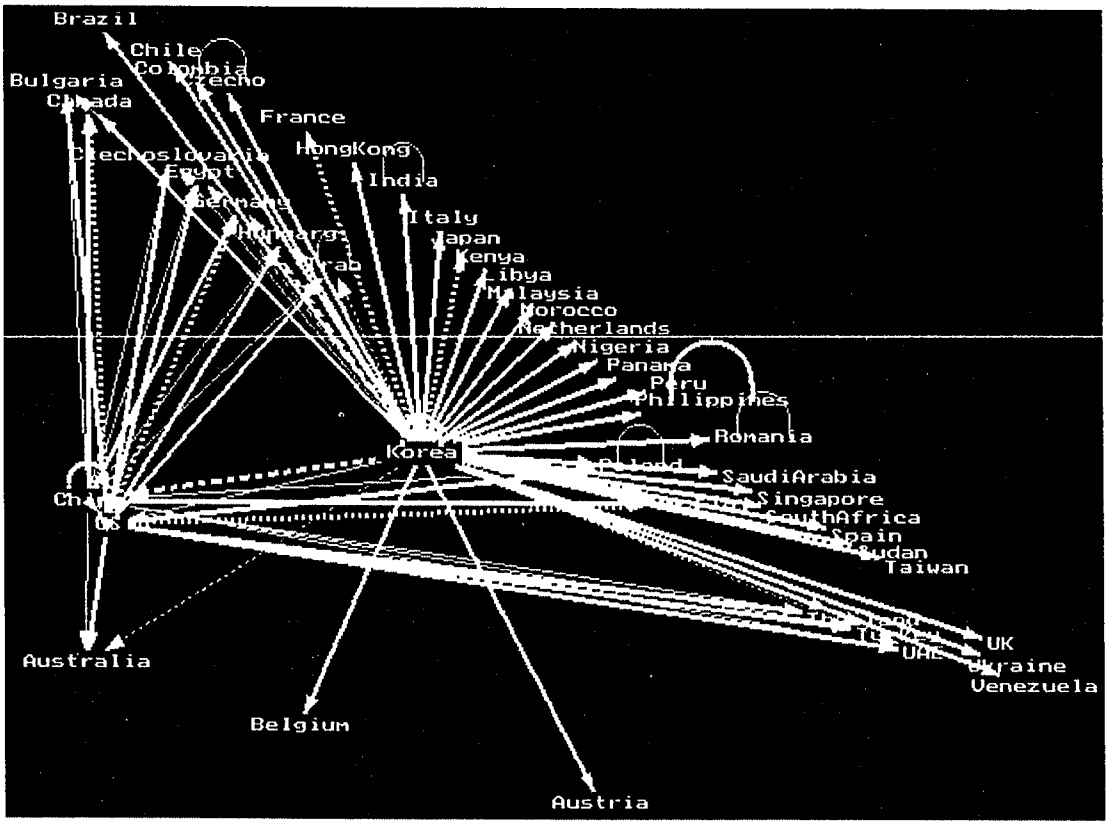


Figure 4.5. The Corporate Network of Hyundai, Daewoo, and Kia's Automobile Businesses Combined in 1999 (MDS Analysis)

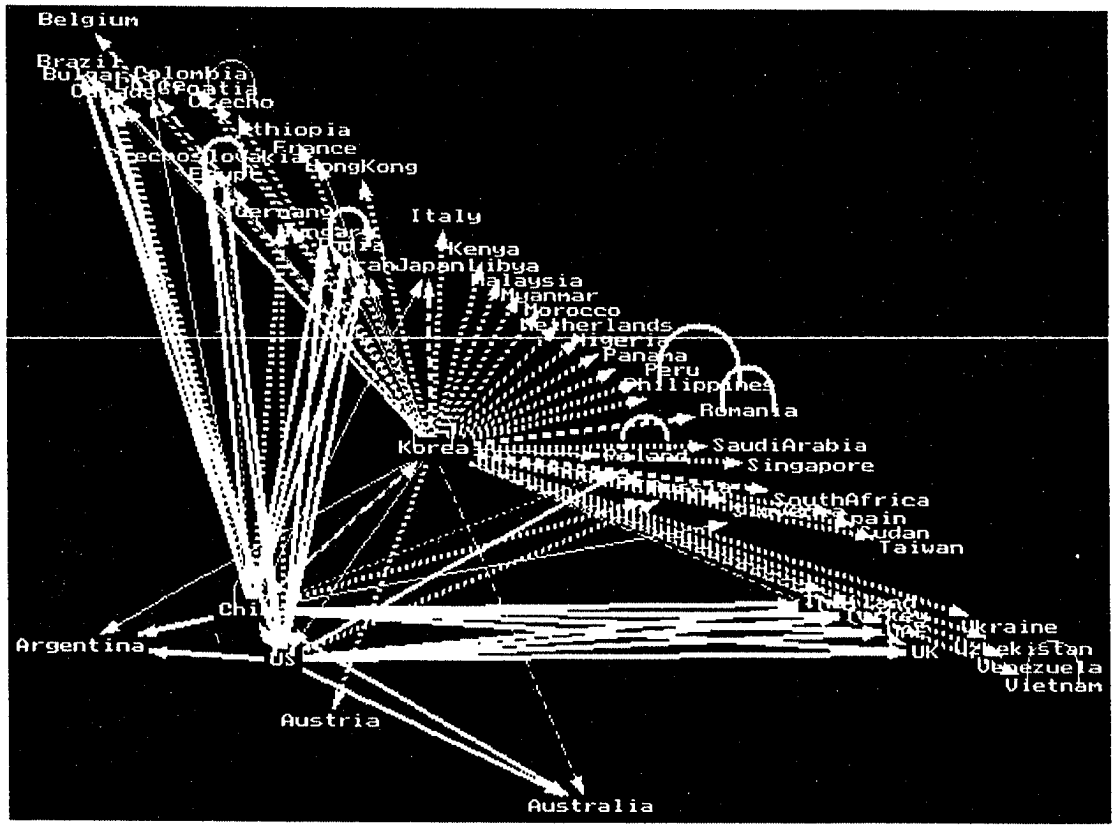


Figure 4.6. The Corporate Network of Hyundai's Automobile Business in 1980 (MDS Analysis)

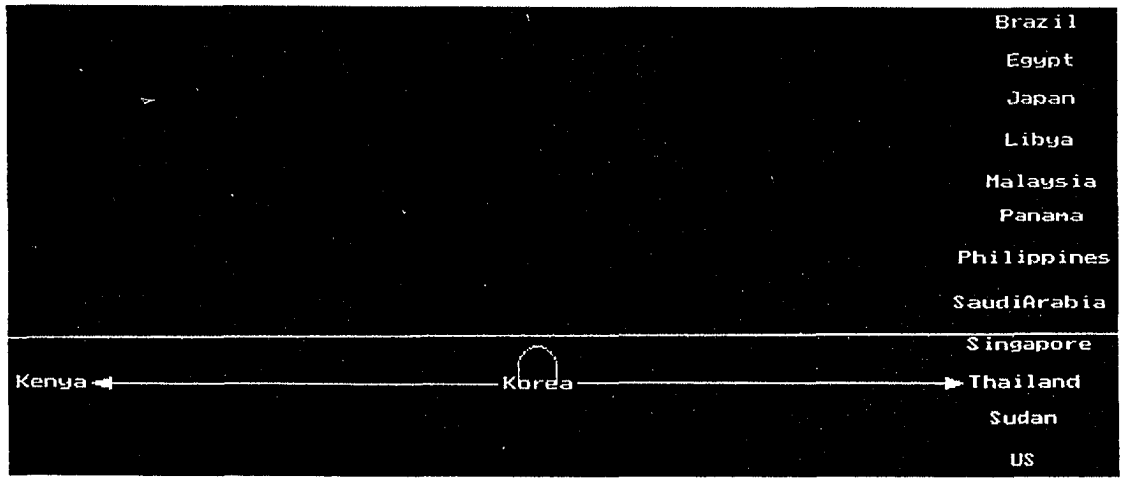


Figure 4.7. The Corporate Network of Hyundai's Automobile Business in 1985 (MDS Analysis)

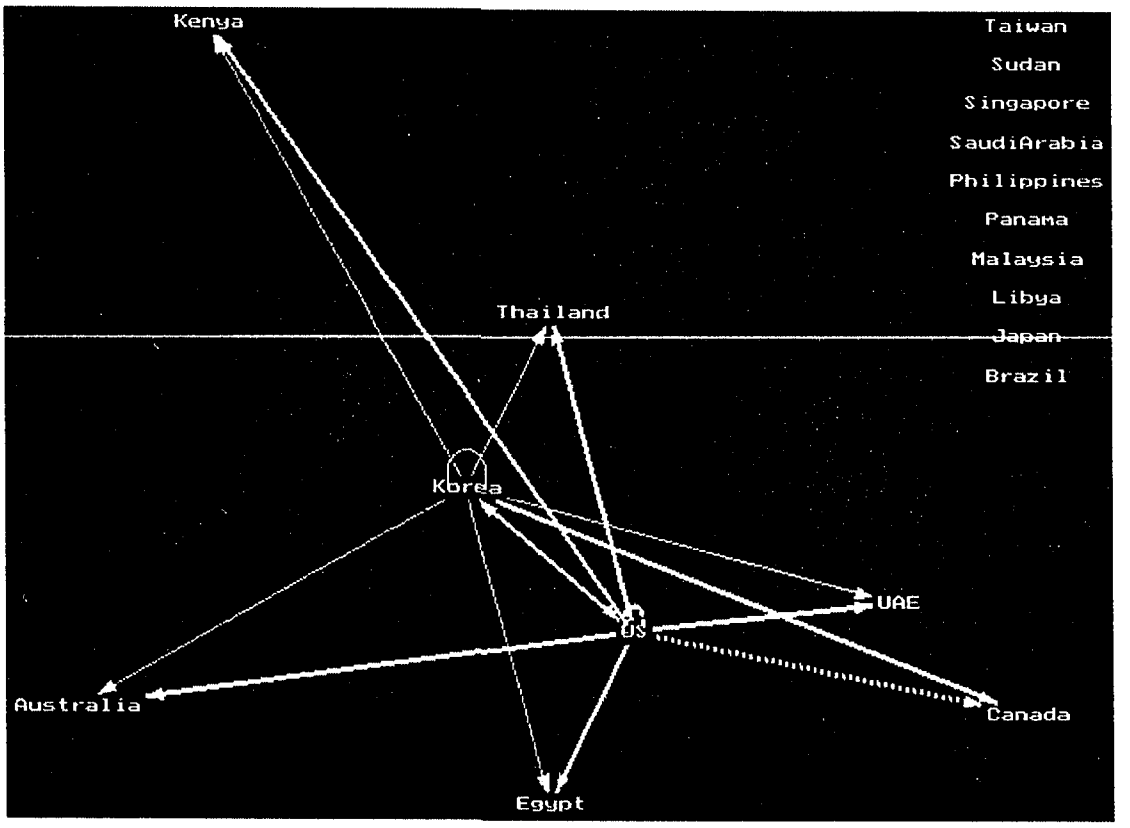


Figure 4.8. The Corporate Network of Hyundai's Automobile Business in 1990 (MDS Analysis)

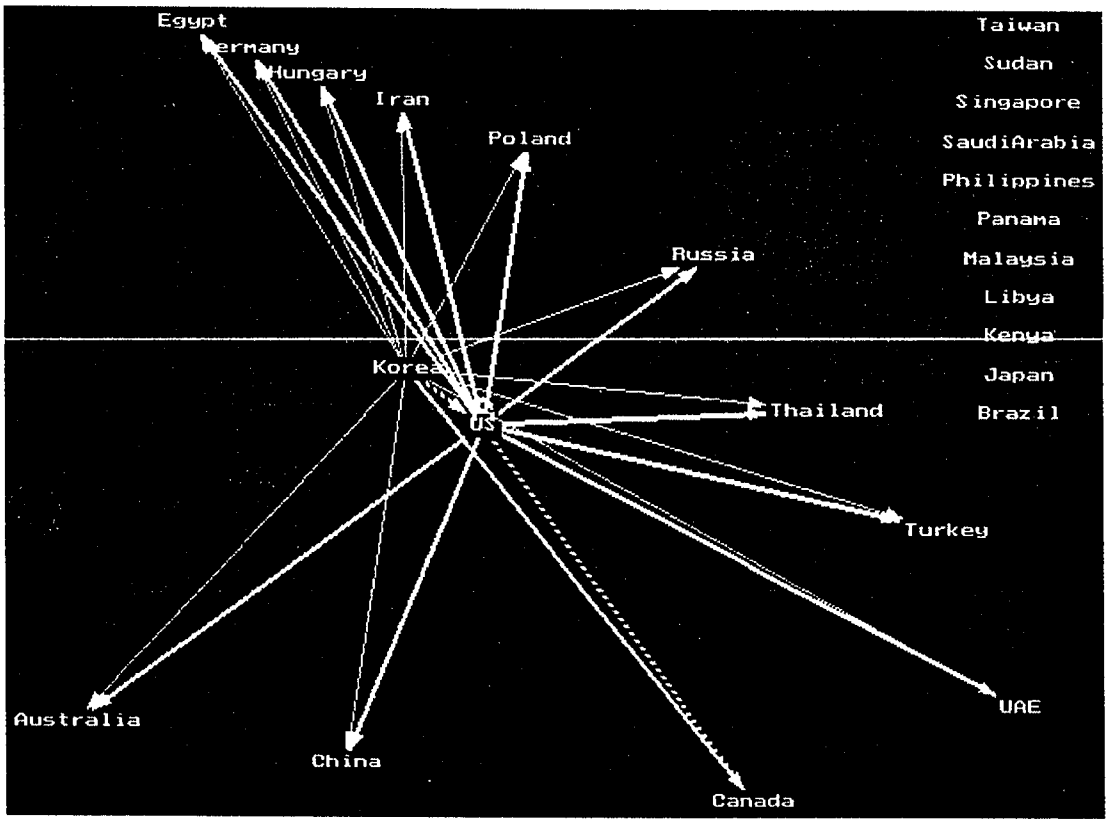


Figure 4.9. The Corporate Network of Hyundai's Automobile Business in 1995 (MDS Analysis)

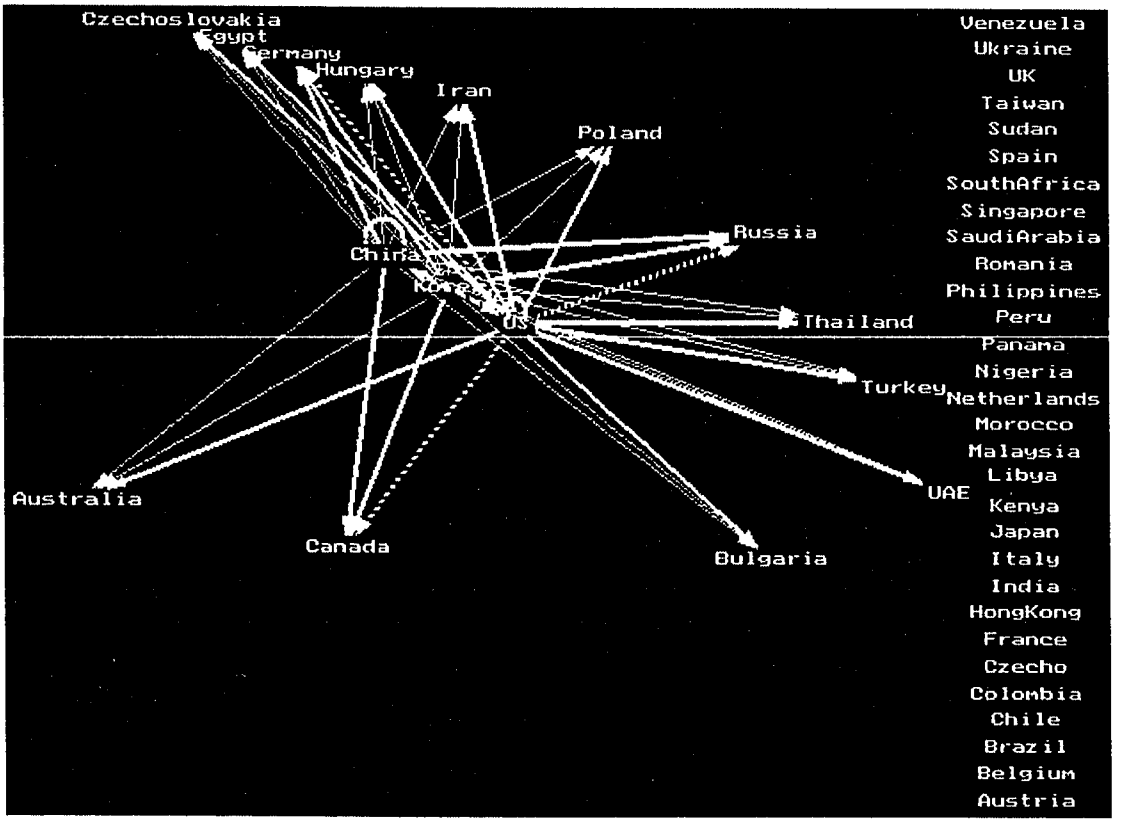


Figure 4.10. The Corporate Network of Hyundai's Automobile Business in 1999 (MDS Analysis)

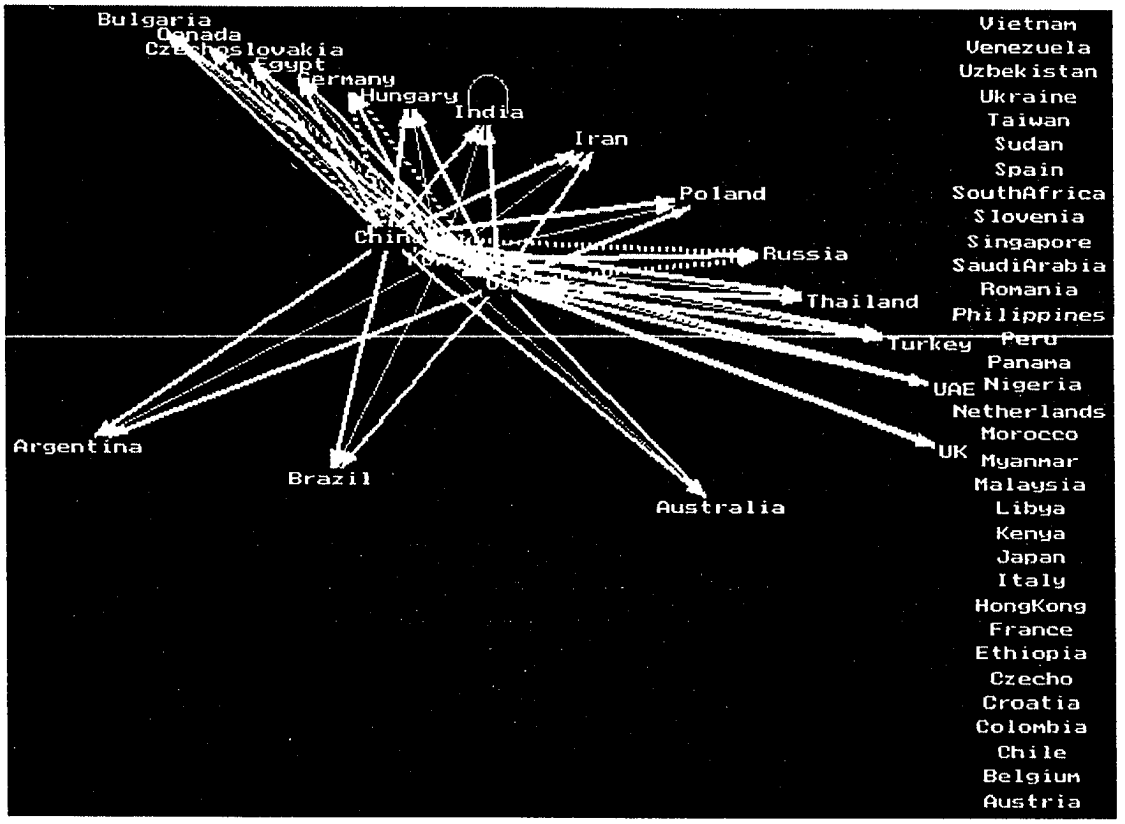


Figure 4.11. The Corporate Network of Daewoo's Automobile Business in 1980 (MDS Analysis)

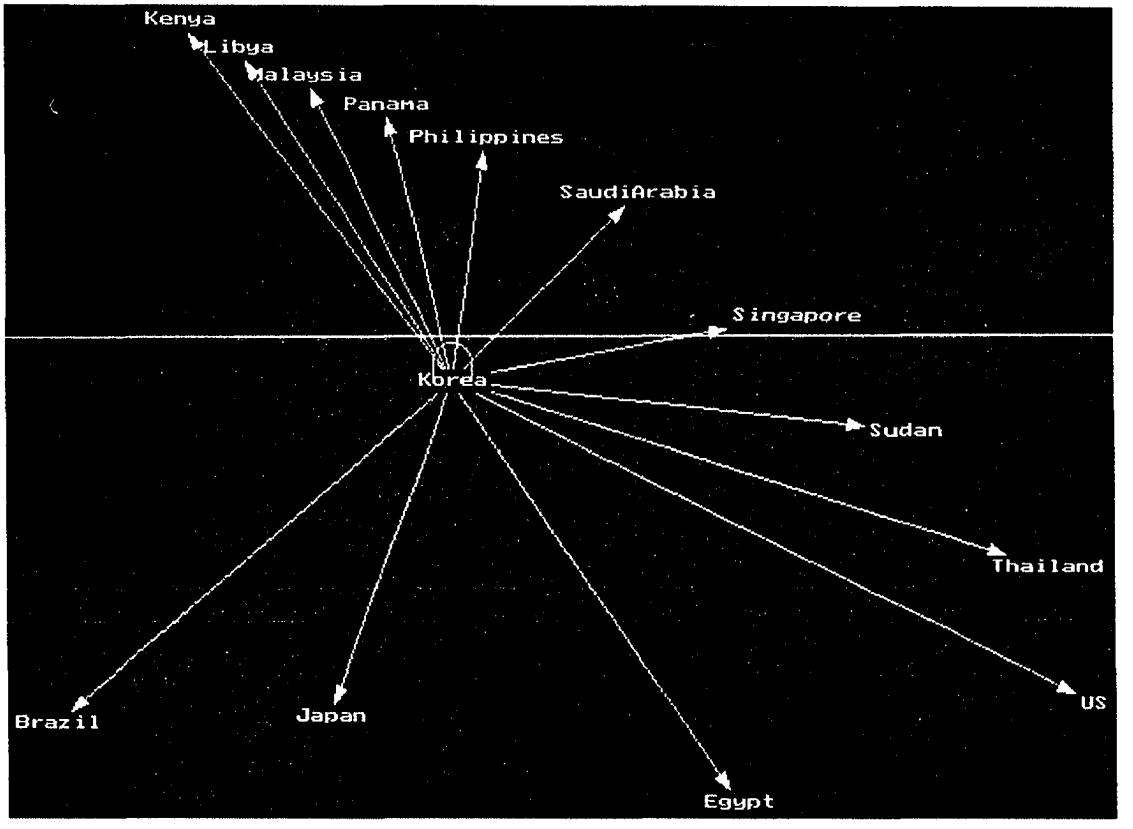


Figure 4.12. The Corporate Network of Daewoo's Automobile Business in 1985 (MDS Analysis)

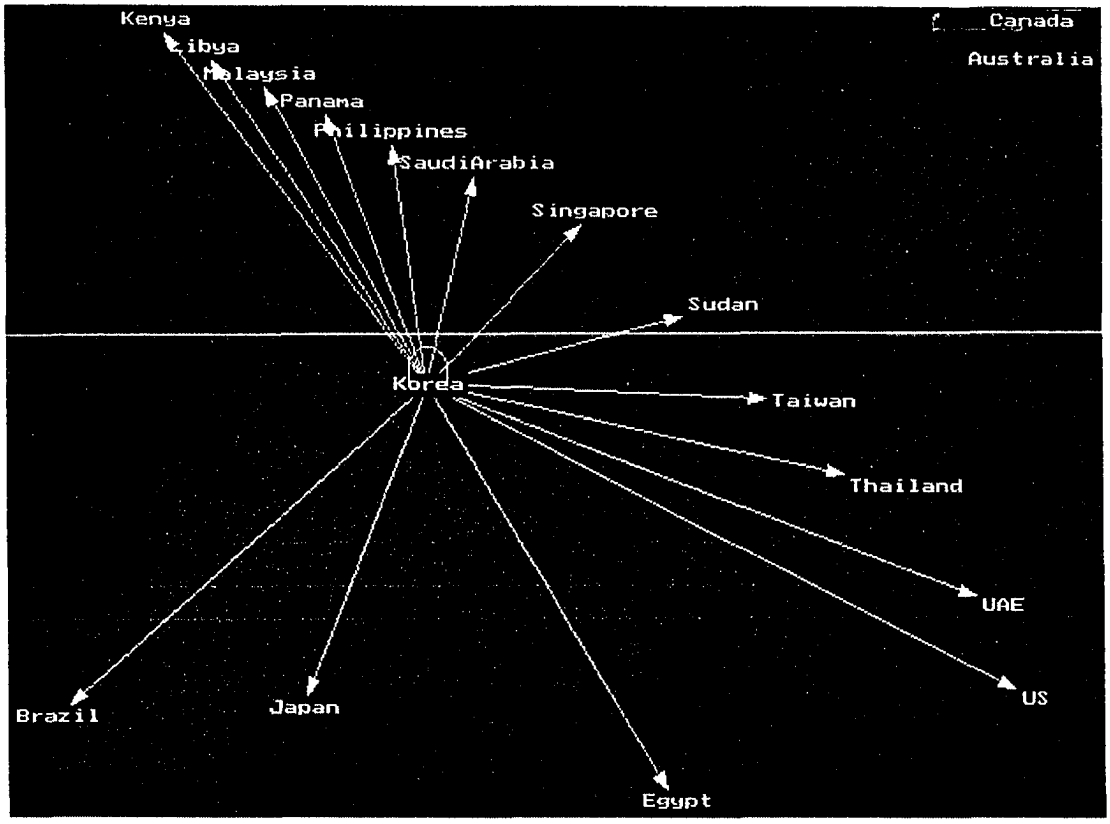


Figure 4.13. The Corporate Network of Daewoo's Automobile Business in 1990 (MDS Analysis)

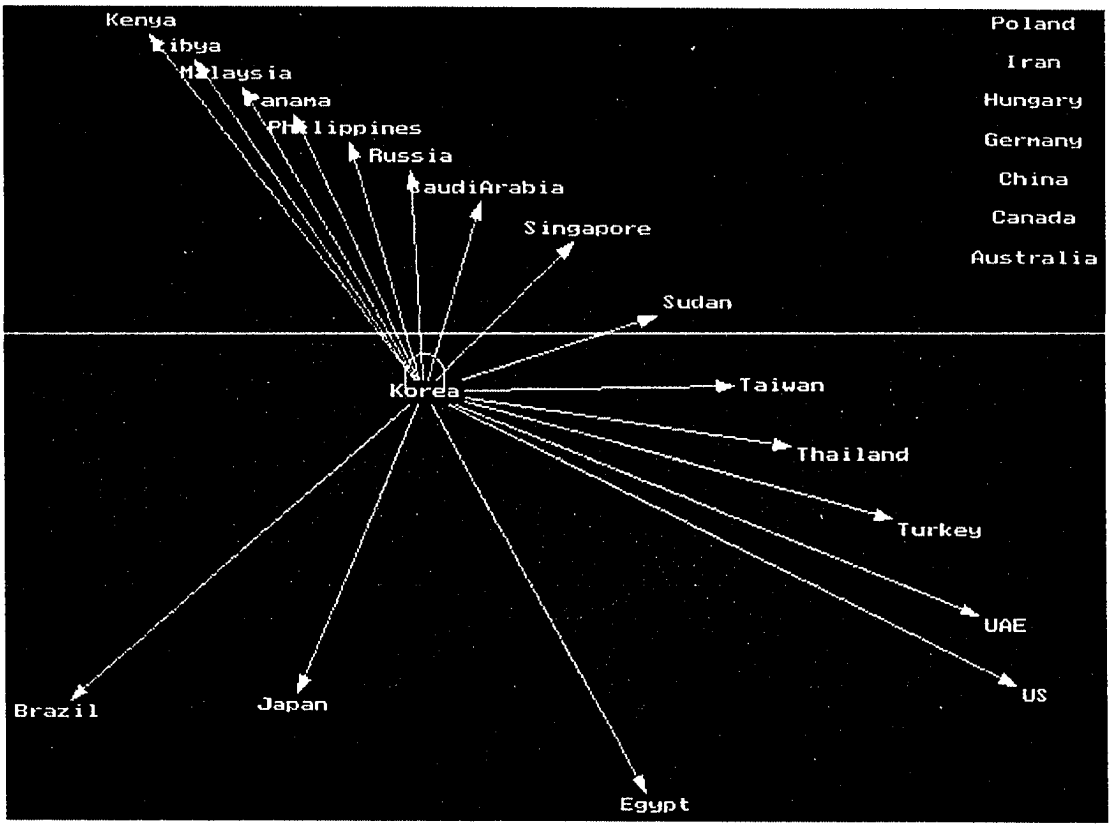


Figure 4.14. The Corporate Network of Daewoo's Automobile Business in 1995 (MDS Analysis)

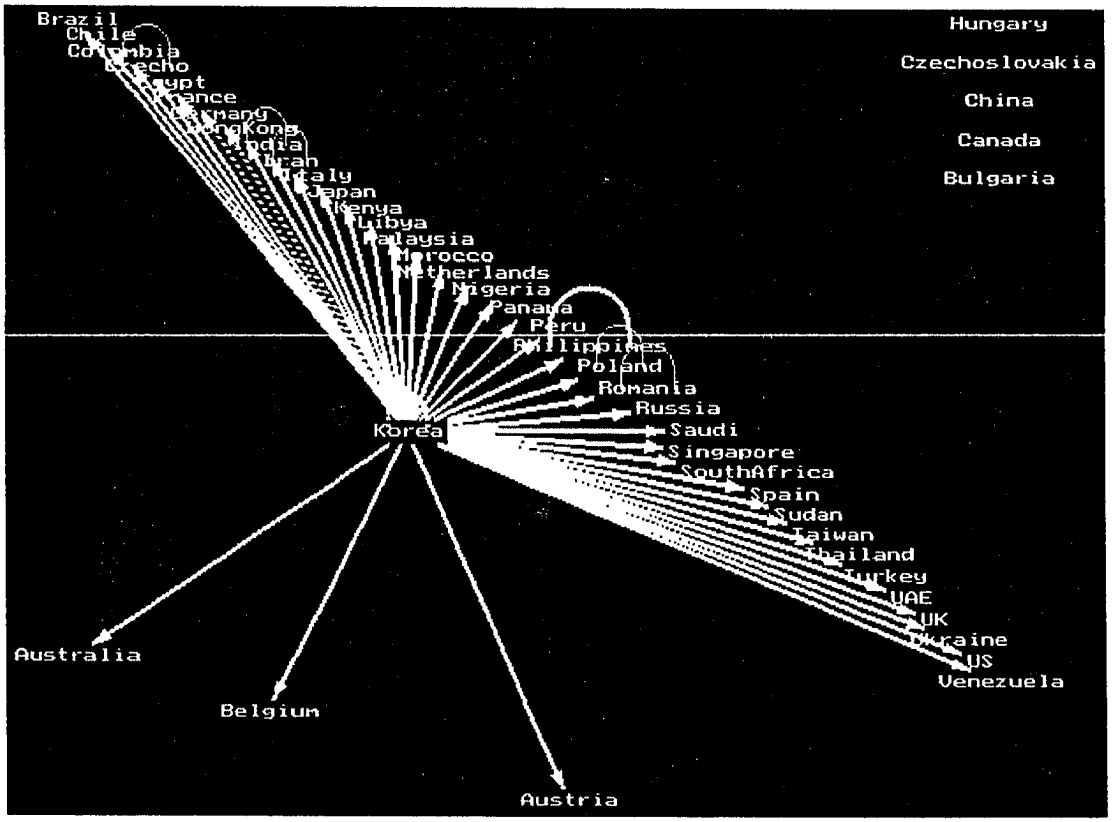


Figure 4.15. The Corporate Network of Daewoo's Automobile Business in 1999 (MDS Analysis)

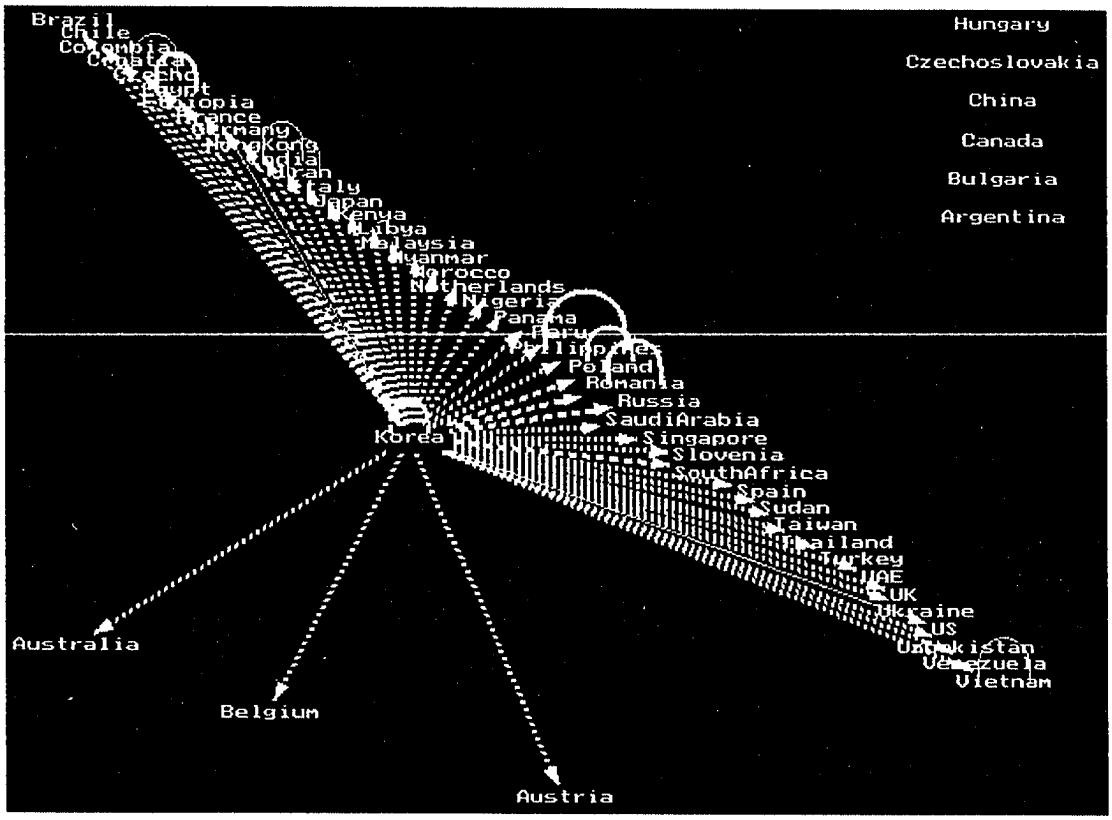


Figure 4.16. The Corporate Network of Kia's Automobile Business in 1980 (MDS Analysis)

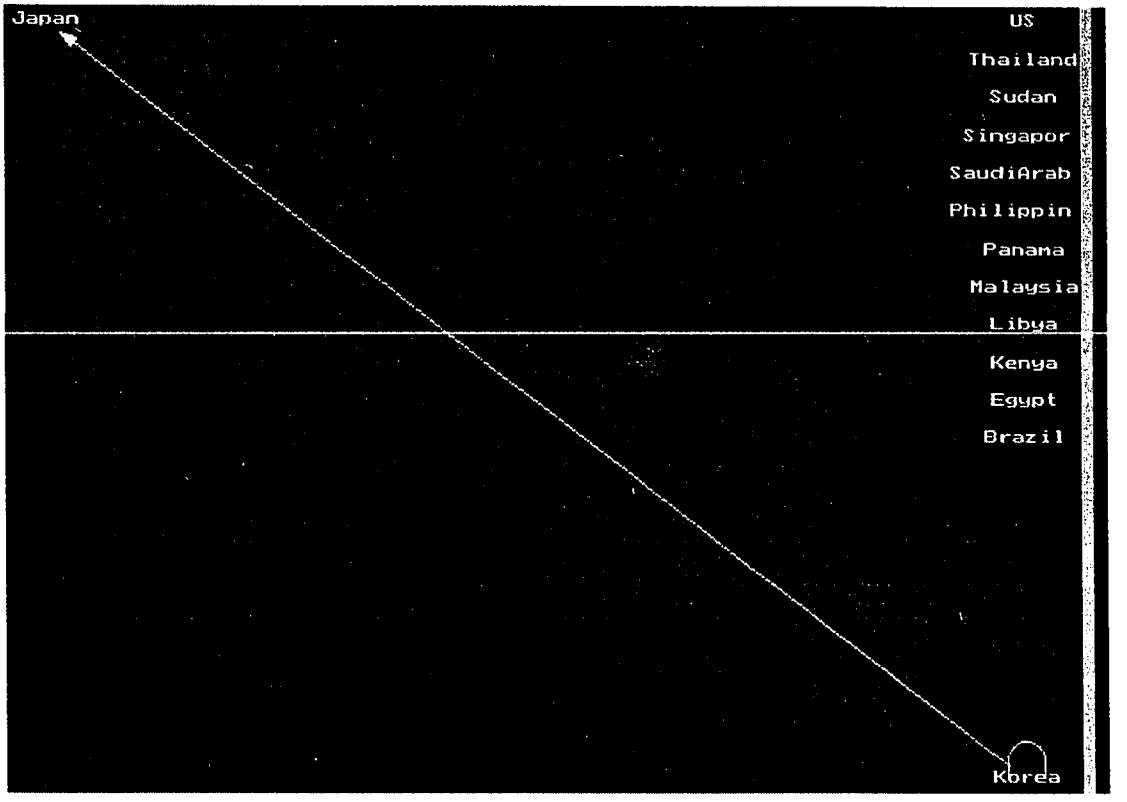


Figure 4.17. The Corporate Network of Kia's Automobile Business in 1985 (MDS Analysis)

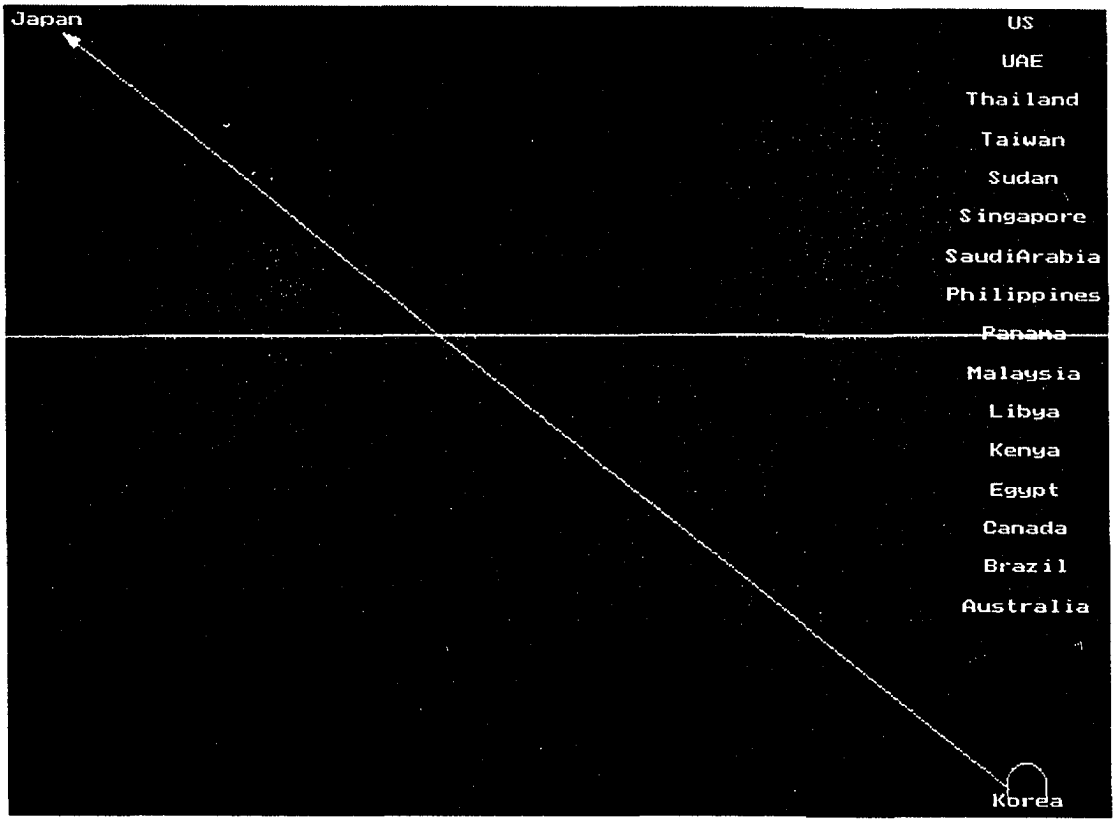


Figure 4.18. The Corporate Network of Kia's Automobile Business in 1990 (MDS Analysis)

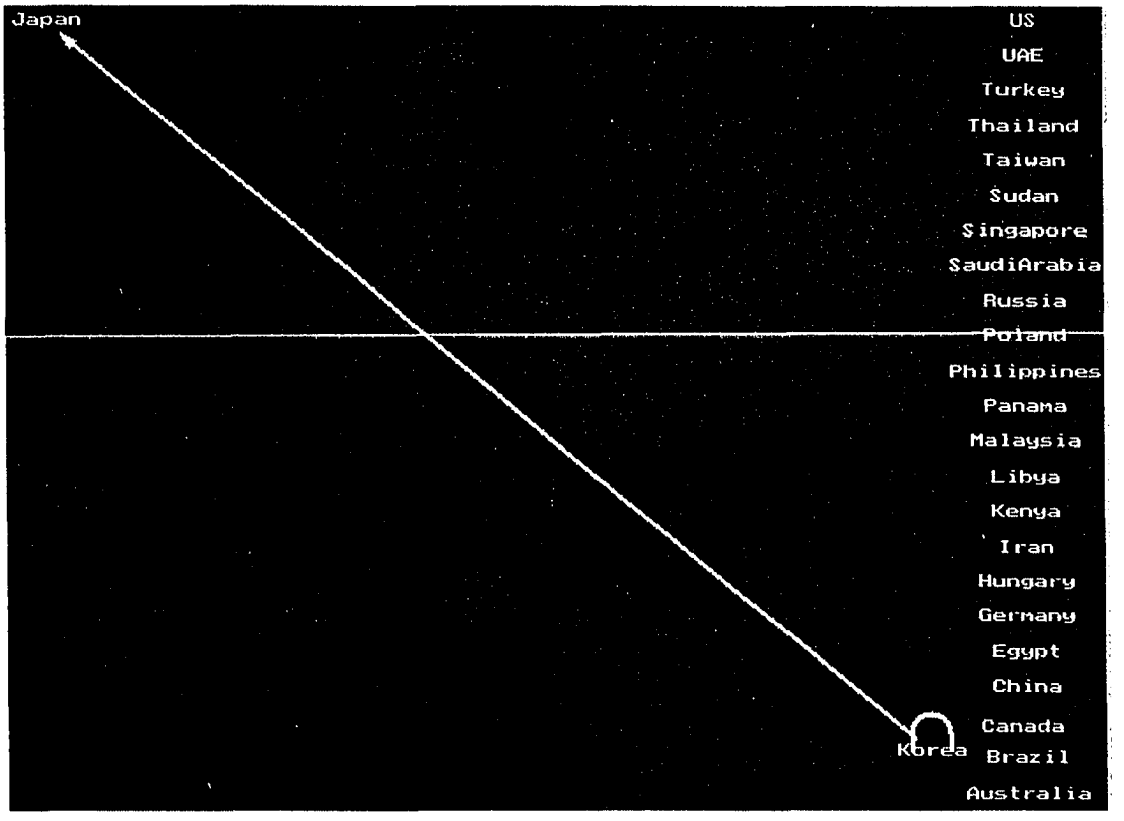


Figure 4.19. The Corporate Network of Kia's Automobile Business in 1995 (MDS Analysis)

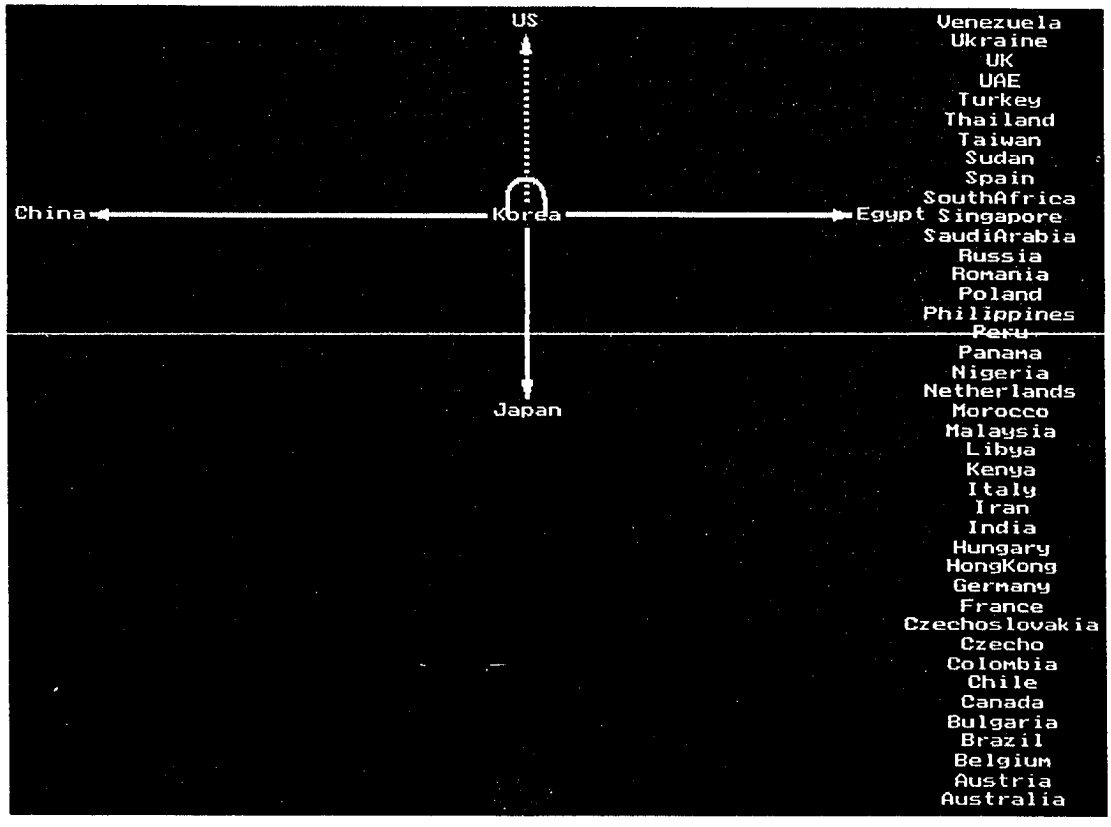


Figure 4.20. The Corporate Network of Kia's Automobile Business in 1999 (MDS Analysis)

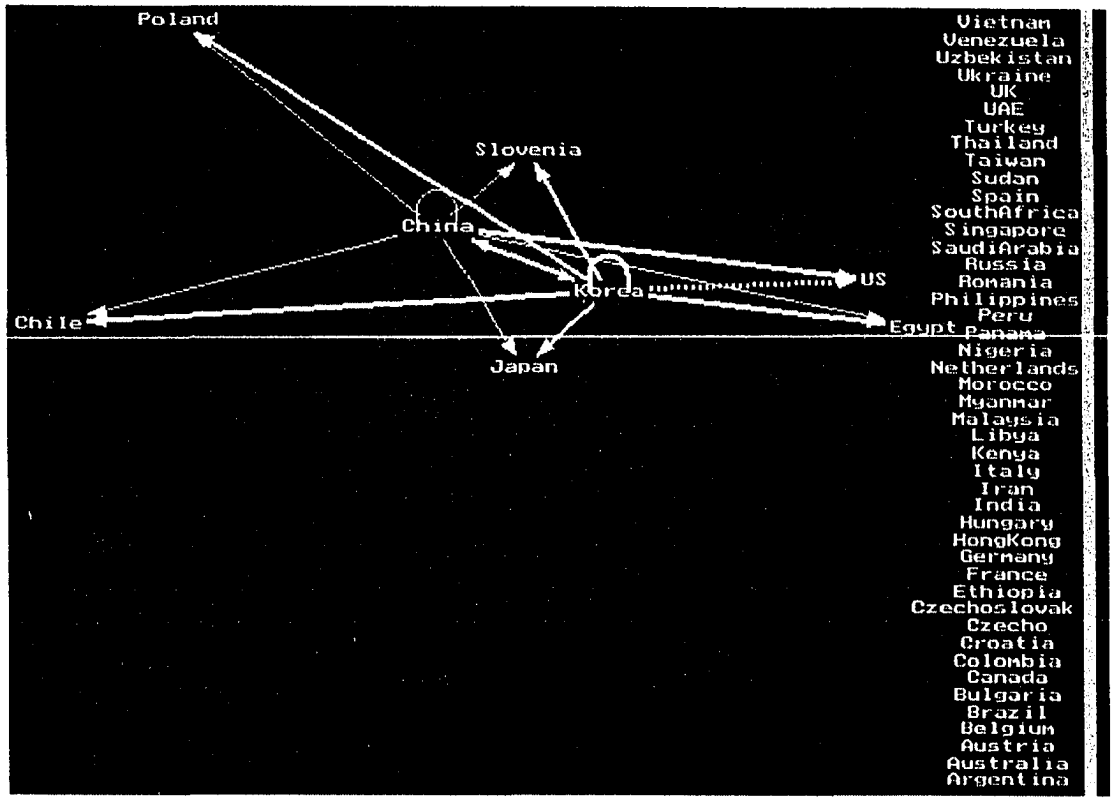


Figure 4.21. Network Sparseness of Korea's Automobile Industry, 1980-1999

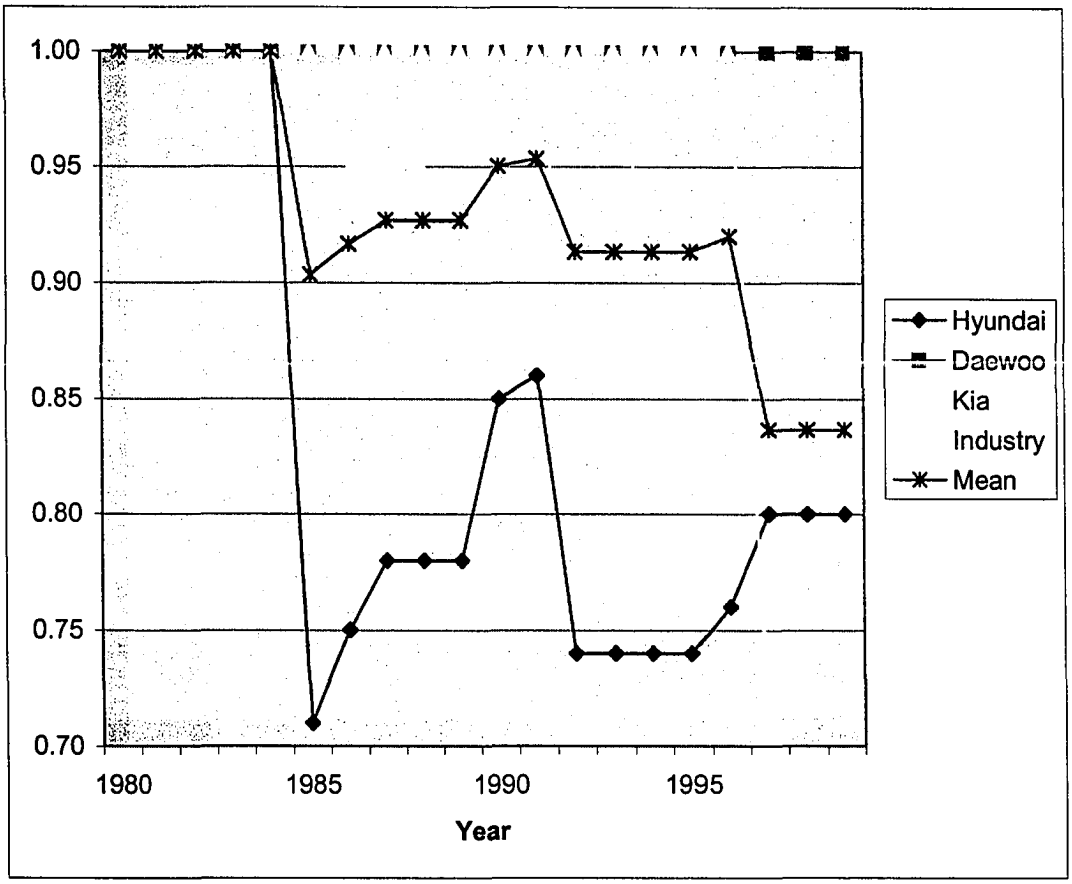


Figure 4.22. Network Hierarchy of Korea's Automobile Industry, 1980-1999

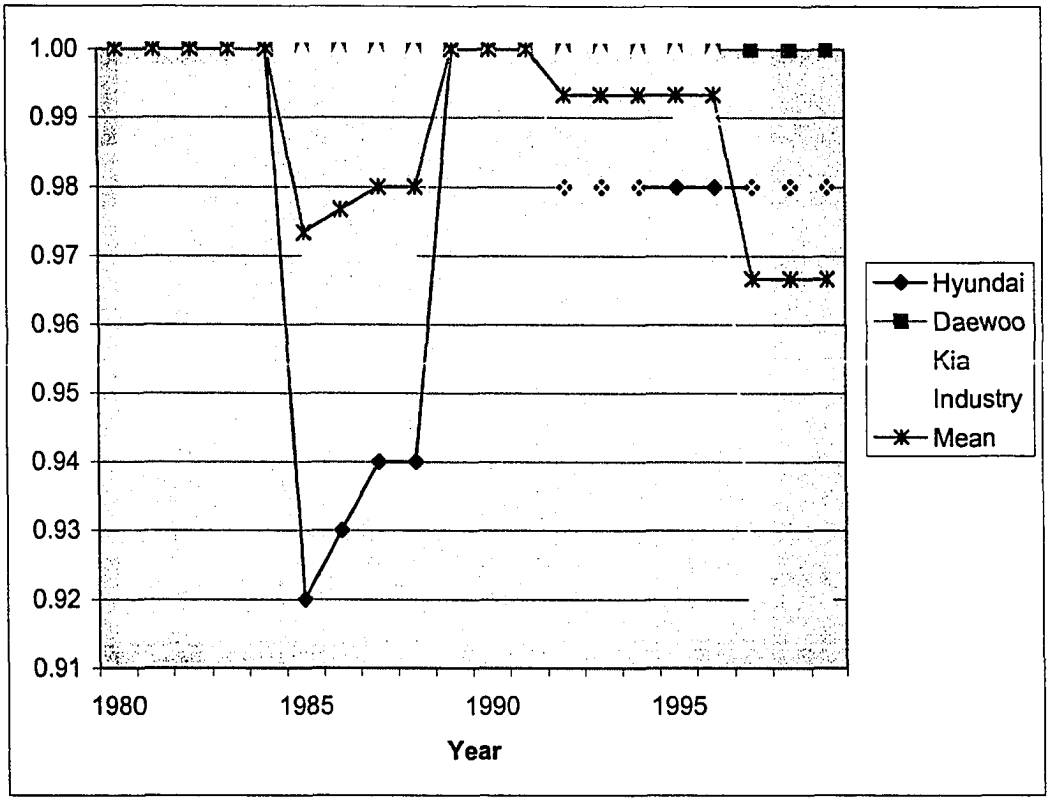


Figure 4.23. Network Reachability of Korea's Automobile Industry, 1980-1999

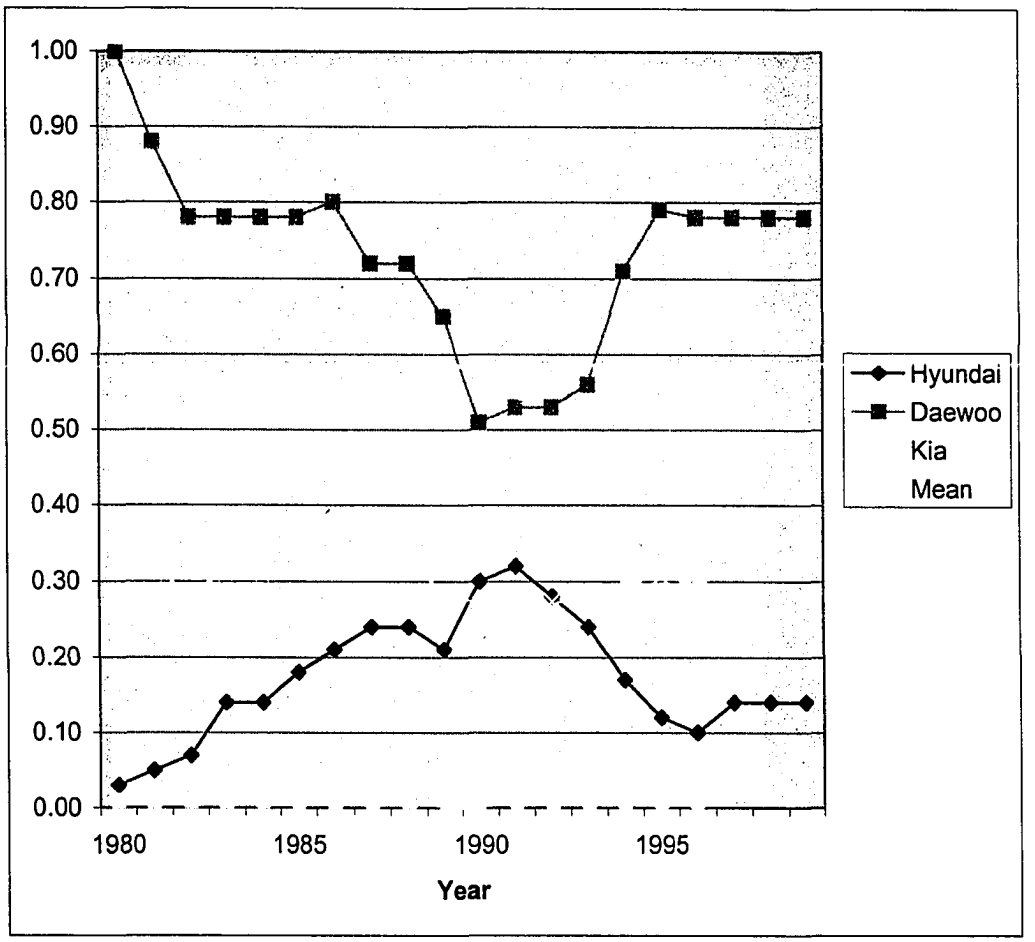
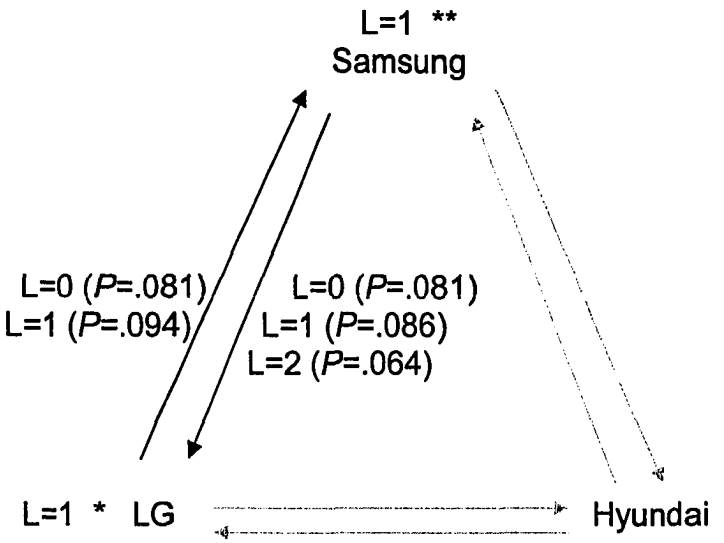
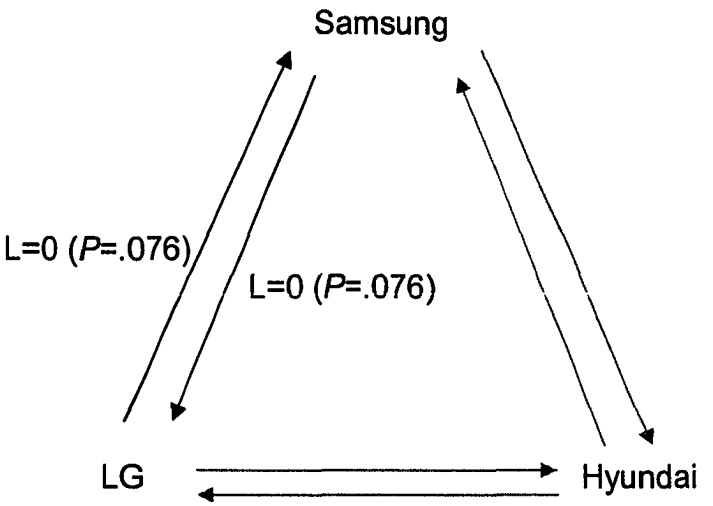


Figure 4.24. Vector Autoregression of Network Sparseness: MNCs in Korea's Semiconductor Industry, 1980-1999



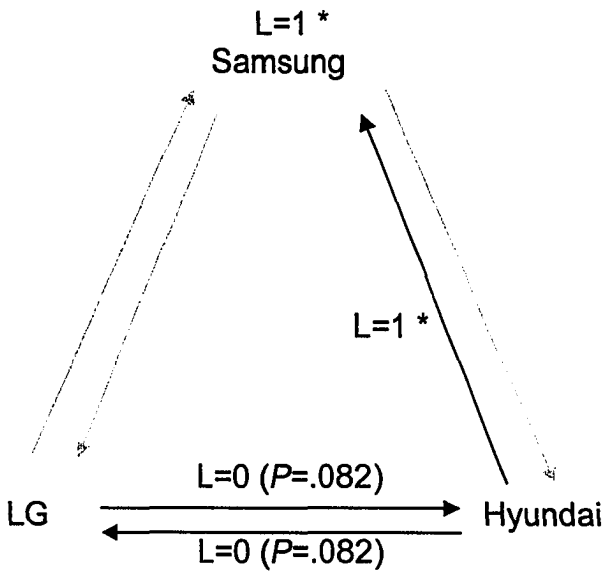
* $P < .05$; ** $P < .01$; L: lag.

Figure 4.25. Vector Autoregression of Network Hierarchy: MNCs in Korea's Semiconductor Industry, 1980-1999



L: lag.

Figure 4.26. Vector Autoregression of Network Reachability: MNCs in Korea's Semiconductor Industry, 1980-1999



* $P < .05$; L: lag.

Table 4.1. Regression Analysis of Network Variables: Korea's Automobile Industry

Multiple Regression Model: Regression Coefficients and Standard Errors

Network Measure	Dependent Variable	Independent Variables	Model 1: *t*		Model 2: *t-1*		Model 3: *t-2*	
Sparseness $_t$								
	Hyundai	Daewoo	-		-		-	
		Kia	0.128	(.234)	0.087	(.267)	0.047	(.344)
	Daewoo	Hyundai	-		-		-	
		Kia	-		-		-	
	Kia	Hyundai	0.128	(.234)	0.190	(.238)	0.281	(.239)
		Daewoo	-		-		-	
Hierarchy $_t$								
	Hyundai	Daewoo	-		-		-	
		Kia	-0.022	(.206)	-0.037	(.248)	-0.051	(.344)
	Daewoo	Hyundai	-		-		-	
		Kia	-		-		-	
	Kia	Hyundai	-0.029	(.27)	-0.030	(.276)	-0.032	(.283)
		Daewoo	-		-		-	
Reachability $_t$								
	Hyundai	Daewoo	-0.585	(.079) ***	-0.395	(.096) **	-0.148	(.123)
		Kia	-0.015	(1.911)	-4.548	(2.573)	-7.506	(3.824)
	Daewoo	Hyundai	-1.303	(.176) ***	-0.937	(.164) ***	-0.703	(.203) **
		Kia	2.129	(2.804)	7.610	(2.883) *	9.950	(4.14) *
	Kia	Hyundai	0.000	(.031)	-0.039	(.032)	-0.072	(.03) *
		Daewoo	0.015	(.02)	-0.015	(.021)	-0.036	(.019)

Simple Regression Model: Regression Coefficients and Standard Errors

Network Measure	Dependent Variable	Independent Variable	Model 1: *t*		Model 2: *t-1*		Model 3: *t-2*	
Sparseness $_t$								
	Hyundai	Daewoo	-		-		-	
		Kia	0.128	(.234)	0.087	(.267)	0.047	(.344)
		Entire Network	4.195	(.614) ***	3.161	(.804) **	2.194	(.88) *
	Daewoo	Hyundai	-		-		-	
		Kia	-		-		-	
		Entire Network	-		-		-	
	Kia	Hyundai	0.128	(.234)	0.190	(.238)	0.281	(.239)
		Daewoo	-		-		-	
		Entire Network	-0.099	(1.165)	-0.435	(1.188)	-0.441	(1.219)
Hierarchy $_t$								
	Hyundai	Daewoo	-		-		-	
		Kia	-0.022	(.206)	-0.037	(.248)	-0.051	(.344)
		Entire Network	1.883	(.22) ***	0.964	(.447) *	0.127	(.512)
	Daewoo	Hyundai	-		-		-	
		Kia	-		-		-	
		Entire Network	-		-		-	
	Kia	Hyundai	-0.029	(.27)	-0.030	(.276)	-0.032	(.283)
		Daewoo	-		-		-	
		Entire Network	0.596	(.549)	0.350	(.58)	0.098	(.607)
Reachability $_t$								
	Hyundai	Daewoo	-0.586	(.071) ***	-0.459	(.095) ***	-0.240	(.124)
		Kia	-5.313	(3.533)	-8.500	(3.317) *	-9.245	(3.585) *
	Daewoo	Hyundai	-1.347	(.164) ***	-1.078	(.18) ***	-0.860	(.219) **
		Kia	9.051	(5.271)	13.000	(4.616) *	14.566	(5.095) *
	Kia	Hyundai	-0.021	(.014)	-0.020	(.015)	-0.024	(.015)
		Daewoo	0.016	(.009)	0.008	(.01)	0.006	(.01)

* $P < .05$; ** $P < .01$; *** $P < .001$.

Chapter Five

A Network Analysis of the Structural Growth and Mutual Influence of Multinational Corporations in Korea's Semiconductor Industry, 1980-1999

Following the analytical framework shown in Chapter Four, this chapter presents network analyses of Korea's semiconductor industry with some additional comparisons with the automobile industry.

MDS Analysis of Corporate Networks in Korea's Semiconductor Industry

Figures 5.1 to 5.5 show the historical growth of Korea's semiconductor industry's multinational network. Figure 5.1, which is for the year 1980, shows the situation before Korea's semiconductor industry genuinely started to engage in the production of memory chips. (As was explained in Chapter Two, the Korean companies started developing memory chips in 1983 and afterwards.) At that time, factories in Korea produced relatively primitive semiconductor goods and trading subsidiaries in Japan and the United Kingdom sold them. By 1985 (as shown in Figure 5.2), after a few years of the initial domestic production of memory chips, some production was done in the United States in addition to Korea. Unlike in the history of the automobile industry, it is noteworthy that Korea's semiconductor production was in part done in the United States relatively early in its industrial history. As was discussed in Chapter Two, the three MNCs in the semiconductor industry established subsidiaries in the United States since the early 1980s as they began to work on

DRAM products domestically. In 1990 (Figure 5.3), the location of the production centers remains the same, yet more subsidiaries engage in marketing their MNCs' semiconductor products. By 1995 (Figure 5.4), the MNCs establish more production facilities in China and Portugal. By 1999 (Figure 5.5), the United Kingdom becomes one of the production centers as well. In terms of MDS, the situations of 1995 and 1999 suggest that among production subsidiaries outside Korea, the ones in the United States and China are more structurally equivalent to the ones in Korea in general.

In the case of Samsung separately, until 1990 (Figures 5.6 through 5.10), Korea was the only country with its production facilities. By 1995 as shown in Figure 5.9, China and Portugal become its production centers. By 1999 (Figure 5.10), the United States becomes one of the producing/exporting countries in the corporate network. Throughout the period, in the case of Samsung, all production subsidiaries export to other countries. Figures 5.9 and 5.10 show that all Samsung's production subsidiaries are structurally equivalent to one another regardless of location, exporting to subsidiaries in the other countries.

In the case of LG alone, until 1995 (Figures 5.11 through 5.14), Korea is the only country with its production facilities. Only in the late 1990s, as shown in Figure 5.15, LG establishes a production subsidiary outside Korea, in the United Kingdom. Just as in the case of Samsung, all production facilities of LG export.

In the case of Hyundai, soon after it entered the semiconductor production business in the early 1980s as a latecomer, it establishes a production subsidiary in the United States (Figures 5.16 and 5.17). By 1995 (Figure 5.18), China becomes one of

the production centers. By 1999 (Figure 5.19), the United Kingdom becomes another production center in the corporate network. In the case of Hyundai too, all production subsidiaries export through its corporate network.

In sum, the three MNCs in the semiconductor industry show the following similarities in expanding their respective corporate networks.

1. Compared with the corporate networks in Korea's automobile industry, the three MNCs in the semiconductor industry generally show greater similarities in their structural growth in terms of the number of countries covered by their respective networks. In the case of the automobile industry network, Daewoo always reached much more countries Hyundai and Kia did. This point will be further discussed below with the network reachability data of the semiconductor industry in comparison to those of the automobile industry.

2. The three MNCs in common establish the first outside-Korea production facilities in advanced countries in the West. Afterwards, around the mid-1990s, Samsung and Hyundai start to produce in China to utilize relatively inexpensive labor and to maintain presence in a potentially large market.

3. Unlike the network of Korea's automobile industry in which many production centers produced only for local consumption (e. g., the ones established by Daewoo in Eastern Europe), in the semiconductor industry, most production centers outside Korea export to trading subsidiaries located in other countries. This point will be reexamined below based on network variables.

Network Sparseness of MNCs in Korea's Semiconductor Industry

In terms of network sparseness as shown in Figure 5.20, the three MNCs show similarities, especially the larger two. Samsung and LG's sparseness measures stay at 1 until the early 1990s. Afterwards, first, Samsung's sparseness starts decreasing in the early 1990s and stays at .5 in the late 1990s, and LG's sparseness also starts to decrease in the mid-1990s down to below .8 in the late 1990s. Observing these two MNCs', in terms of network sparseness, Samsung seems to lead LG. In the case of Hyundai, after the fluctuation until the late 1980s that seem unrelated to the fluctuation of the other two MNCs, its sparseness increases to above .6 in the early 1990s, but it decreases to about .3 in the late 1990s. In the latter half of the two-decade period, it is noteworthy that LG and Hyundai's sparseness values follow Samsung's decrease that started in the early 1990s.

With regards to the above presented MDS analyses of the semiconductor MNCs, as they establish outside Korea production subsidiaries and, as they also export internationally, unlike the case of the automobile industry network, the number of redundant paths increased lowering the value of network sparseness of all semiconductor MNCs in the 1990s. Samsung has been the leader in Korea's semiconductor industry throughout the period. Although network sparseness represents network efficiency as explained in Chapter Three, the measure's fluctuation appears to be unrepresentative of Samsung's corporate performance relative to the other two.

Network Hierarchy of MNCs in Korea's Semiconductor Industry

Figure 5.21 shows the historical trends of the network hierarchy values in the semiconductor industry. In general, the internal structure of the three MNCs in terms of transaction direction is quite unidirectional throughout the period as their hierarchy values stay above .8 since the mid-1980s.

Compared with the graph of network hierarchy of the automobile industry (Figure 4.22), network variable appears to show very clear isomorphism or convergence among the three MNCs. Samsung and LG, the industry leaders' network hierarchy measures appear to fluctuate very similarly throughout the period. In the case of Hyundai, its hierarchy obviously converges with the other MNCs' since the early 1980s.

The network hierarchy of the three MNCs altogether decreases in the late 1990s very visibly, which also seems to indicate isomorphism in the structural change of their networks. The late 1990s is the time when the semiconductor MNCs altogether started to establish production subsidiaries outside Korea, from which transaction routes were established to other trading subsidiaries as well. As a result, transaction routes became less unidirectional lowering network hierarchy values.

Network Reachability of MNCs in Korea's Semiconductor Industry

Figure 5.22 shows the fluctuation of network reachability. In the early 1980s, the difference among the three MNCs seems large. Soon after 1985, Hyundai's hierarchy shows a brief spike. However, as the number of countries in its network was

small around that period, it is of no great significance in my view. Following the mid-1980s, Samsung's reachability stays clearly above the other two MNCs', which signifies that the industry leader reached the greatest portion of countries.

Throughout the period, as shown from the MDS diagrams, the number of countries reached by each MNC's network continuously increases. Yet, around 1990, LG and Hyundai's hierarchy decreases briefly while Samsung's gradually increases. This indicates that the number of countries reached by Samsung's network increased at a higher rate than in the case of the other two. In the late 1990s, reachability seems almost constant except for Hyundai in 1999. Considering all this, Samsung's network reachability that remains the greatest since the late 1980s seems to represent its leadership reflected in the degree of globalization in the industry.

Regression Analysis of Network Variables of the Semiconductor Industry

Table 5.1 shows the result of the multiple and simple regressions based on the data of the network variables. The regression models here are as same as the ones used with the data from the automobile industry.

The upper portion of the table concerns the multiple regression models. First, in terms of network sparseness, Samsung and LG, the industry leaders, clearly influence and mimic each other statistically significantly in models 1, 2, and 3. The influence between Hyundai and the other two MNCs is not statistically significant corresponding to its follower status.

The hierarchy multiple regression models show some statistically significant intercorporate influence, first, between Samsung and LG again in models 1, 2, and 3, and also between Samsung and Hyundai in models 2 and 3. The three statistically significant relationships between Samsung and LG mean that the two MNCs mimicked and influenced each other not only in terms of sparseness, but also in terms of hierarchy, more strongly supporting the mutual influence hypothesis that the analysis of the automobile industry does. Between Samsung and Hyundai, models 2 and 3 show statistical significance. Thus, the tentative conclusion from the hierarchy-based regression models is that the relationship between Samsung and LG clearly shows mutual influence including mimetic isomorphism as was seen in the sparseness-based models.

The reachability regression models show a strong prevalence of mutual influence and mimetic isomorphism. In model 1, all regression coefficients are statistically significant, indicating that the three MNCs' structural expansion progressed influencing one another. In model 2, except for the relationship in which Samsung is the independent variable and Hyundai is the dependent variable, all relationships show statistical significance. In model 3, three regression coefficients turn out statistically significant. The negative signs of the regression coefficients represent that the reachability values of the three MNCs fluctuate in different directions on average.

The bottom half of Table 5.1 shows the results of simple regressions using the three network variables to specifically look at all possible pairs of two MNCs.

In the simple regression models using network sparseness, the statistically significant relationship between Samsung and LG is reconfirmed. In the models 1, 2, and 3 concerning Samsung and LG, the regression results show that the two MNCs' networks grew influencing and mimicking each other. In the regressions in which the entire network is the independent variable, for all three MNCs, models 1 and 2 turn out statistically significant. In the models explaining LG, model 3 additionally does so. This means that, in the case of Korea's semiconductor industry, each MNC's structural growth was influenced by the way the entire network had grown in terms of network sparseness. It is tentatively noteworthy that, in Table 4.1, the simple regression models of the automobile industry did not show this kind of relationship between each MNC and the entire network. Thus, in terms of network sparseness, the MNCs in the semiconductor industry were much more conscious of the structural trends of the whole industry.

In the simple regression models using the hierarchy variable, the statistically significant relationship between Samsung and LG is reconfirmed showing mutual influence and mimetic isomorphism as in the sparseness-based models. Additionally, in the regressions in which Hyundai explains Samsung, and the entire network Hyundai, the coefficients turn out significant in models 3 and 1 respectively, which does not seem as important as the reconfirmed relationship between Samsung and LG.

In the reachability-based simple regression models, mutual influence between Samsung and LG is reconfirmed as models 1, 2, and 3 turn out statistically significant with the signs of the coefficients being negative as were in the multiple regression

results. Comparing the absolute values of the statistically significant regression coefficients, Samsung's influence on LG seems generally greater than vice versa. In the regressions in which Hyundai explains LG, models 1, 2, and 3 again turn out statistically significant, which implies the possibility of LG being conscious of Hyundai's structural expansion. In the regression in which LG explains Hyundai, it is only model 1 that shows statistical significance suggesting possible mutual influence. Yet, the mutually influential relationship between Samsung and LG, the industry leaders, seem much more important than the others.

Further Regression Analysis of Seasonal Difference Terms of Network Variables

The regression analyses presented above looked at mutual influence in the process of MNCs' structural growth based on network measures that signify network states at different times, e, g, how one MNC's state at one time influence others' or another MNC's at the same or a later time. Another way to analyze mutual influence is to use seasonal difference terms that indicate change or difference in network measures between two time points of each MNC, e. g., differences of t and t-1 in an MNC's network measures, and use those values to capture influence among MNCs. For this additional analysis, without autoregressive terms as in the above regression analyses, I used simple regression models to capture mutual influence between all possible pairs of MNCs by industry.

For the automobile industry, only some of the network reachability-based models turned out to contain statistically significant regression coefficients as shown in Figure 5.23.

Between Hyundai and Daewoo, statistically significant are the following directed relationships:

1. Hyundai's influence on Daewoo a) when the seasonal difference is 1 for both; and b) when Hyundai's seasonal difference is 2 and lag is 1 while Daewoo's seasonal difference is 2; and,

2. Daewoo's influence on Hyundai a) when the seasonal difference is 1 for both; b) when the seasonal difference is 1 and the lag is also 1 for both; and c) when the seasonal difference is 2 and the lag is 1 for Daewoo, and the seasonal difference is 2 for Hyundai.

As for Kia's influence on Hyundai, the intercorporate influence is statistically significant by the criterion $P < .06$ a) when the seasonal difference is 1 and the lag is 1 for Kia and the seasonal difference is 1 for Hyundai; and b) when the seasonal difference is 2 and the lag is 2 for Kia, and the seasonal difference is 2 for Hyundai.

In the seasonal difference models, Hyundai and Daewoo explain each other again showing statistically significant intercorporate influence between the industry leaders. Also, Kia too explains Hyundai by the criterion, $P < .06$ indicating that Hyundai might have been conscious of changes Kia's corporate network as was discussed based on the state-term based analyses. This means that, rather than in the aspect of organizational efficiency or internal authority structure, the MNCs in the

automobile industry were mutually influential in terms of structural expansion, most noticeably between the two industry leaders, Hyundai and Daewoo.

In the case of the semiconductor industry, more models show mutual influence. In terms of network sparseness (Figure 5.24), using the criterion, $P < .06$, when the seasonal difference is 1, Samsung and LG explain each other.

In models based on network hierarchy (Figure 5.25), when seasonal difference is 1, mutual influence between Samsung and LG is statistically significant, and so is between LG and Hyundai by the criterion $P < .07$.

Thus, in terms of both network efficiency and internal authority structure, Samsung and LG explain each other. In terms of internal authority structure, LG and Hyundai explain each other by the generous criterion.

In the case of network reachability (Figure 5.26), when seasonal difference is 1, LG and Hyundai explain mutually and Hyundai explains Samsung with statistical significance.

The comparison of the two industries based on the regression analyses of seasonal difference terms again finds that more intercorporate influence was present in the semiconductor industry than in the automobile industry as the MNCs in both industries structurally expanded in the period 1980-1999. Between the two industry leaders, the automobile shows statistically significant mutual influence in terms of network reachability only whereas the semiconductor does not do so but network sparseness and hierarchy models do so therein.

Figure 5.1. The Corporate Network of Samsung, LG, and Hyundai's Semiconductor Businesses Combined in 1980 (MDS Analysis)

Figure 5.2. The Corporate Network of Samsung, LG, and Hyundai's Semiconductor Businesses Combined in 1985 (MDS Analysis)

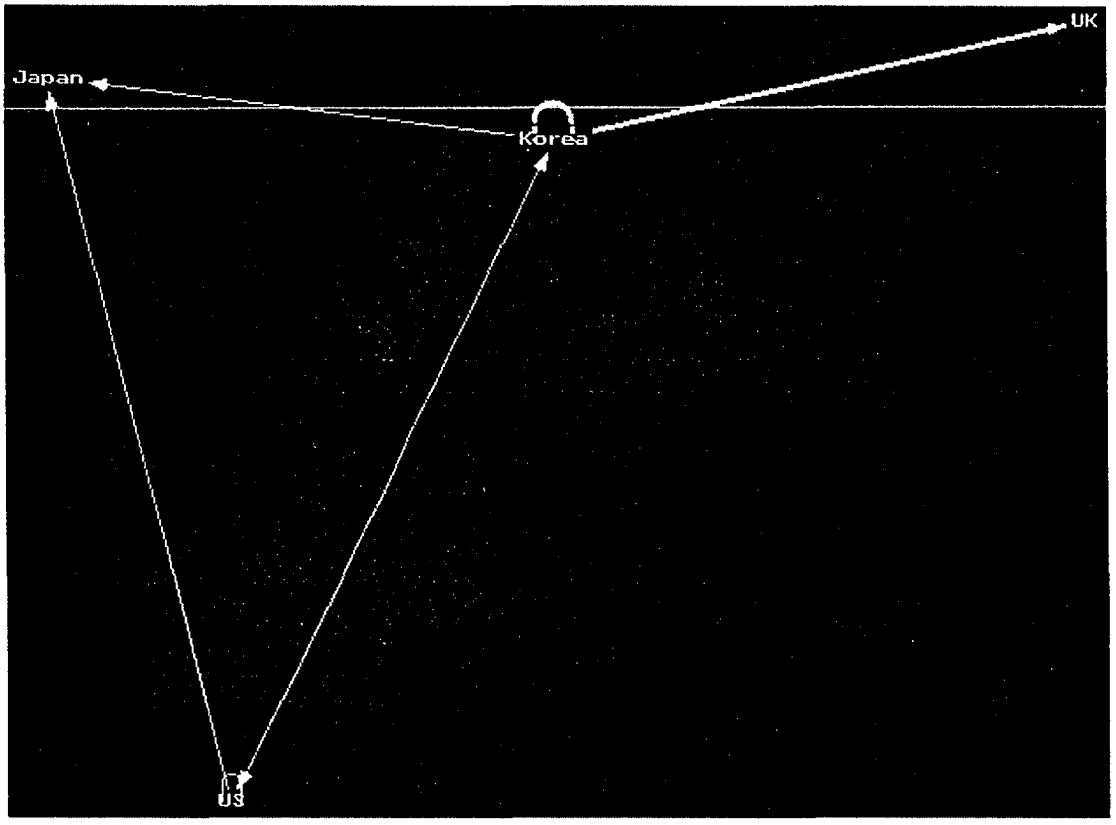


Figure 5.3. The Corporate Network of Samsung, LG, and Hyundai's Semiconductor Businesses Combined in 1990 (MDS Analysis)

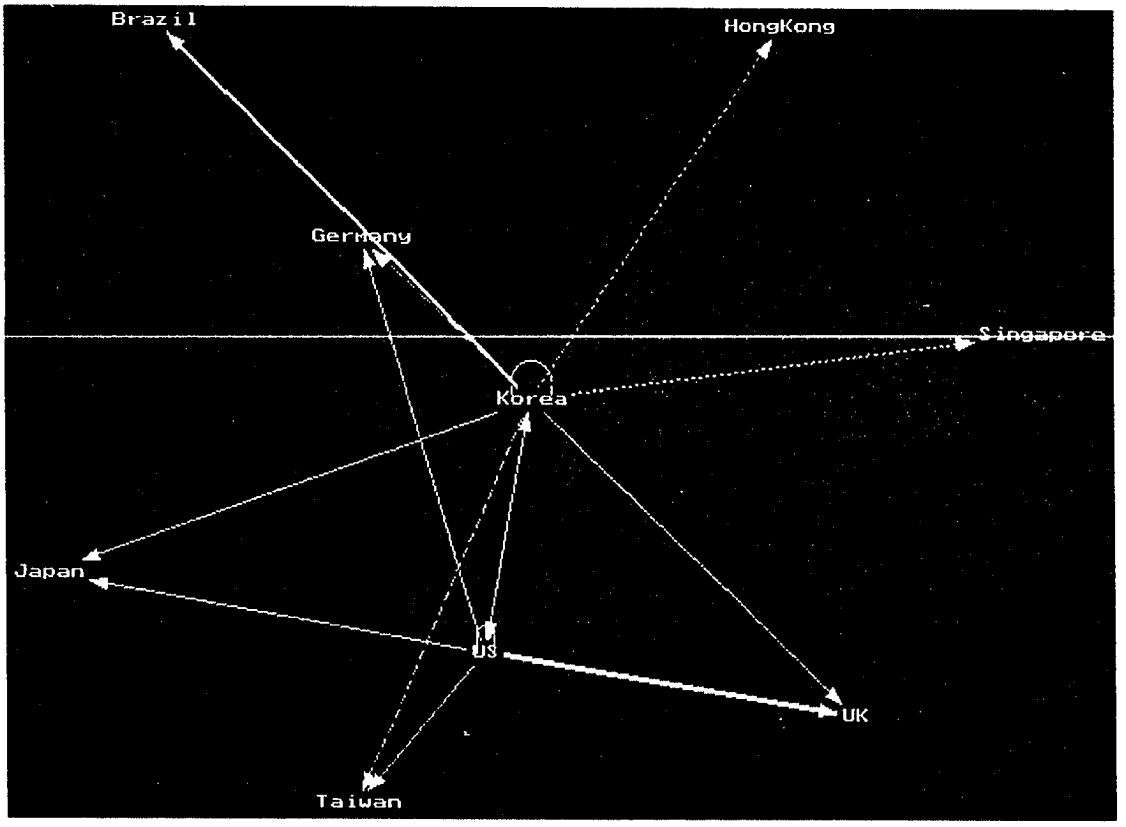


Figure 5.4. The Corporate Network of Samsung, LG, and Hyundai's Semiconductor Businesses Combined in 1995 (MDS Analysis)

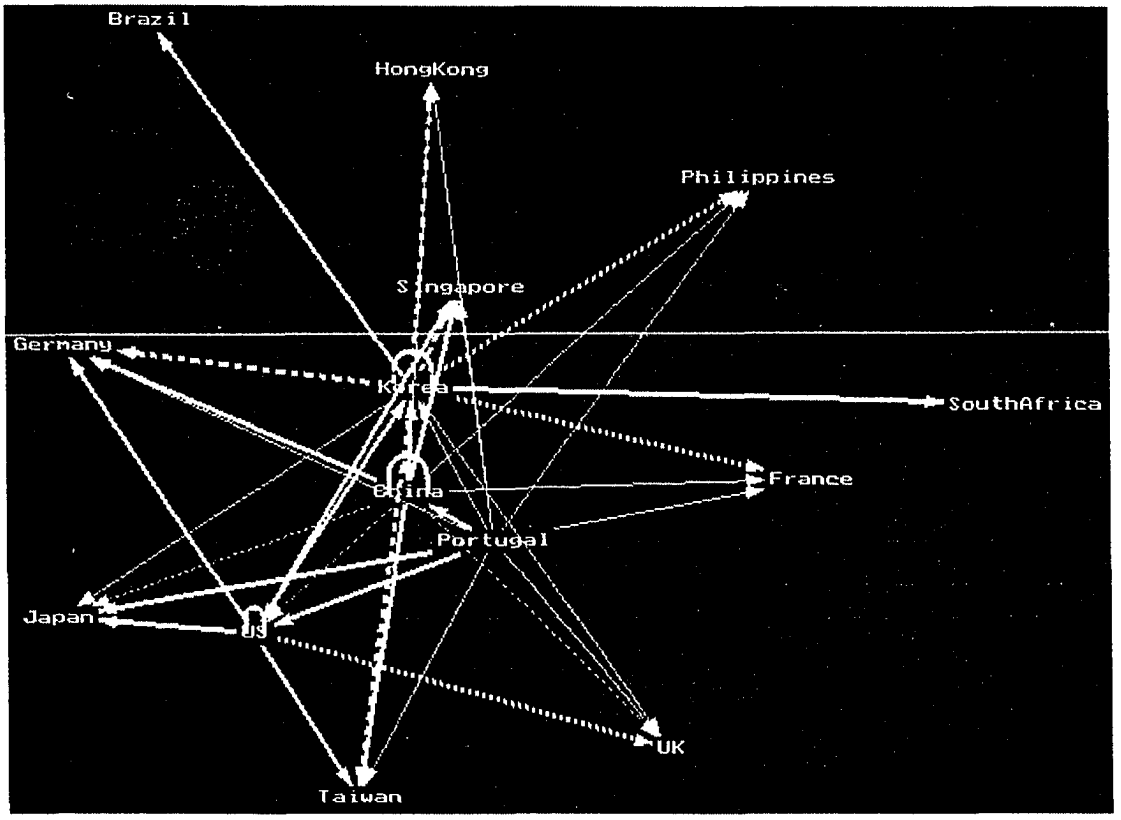


Figure 5.5. The Corporate Network of Samsung, LG, and Hyundai's Semiconductor Businesses Combined in 1999 (MDS Analysis)

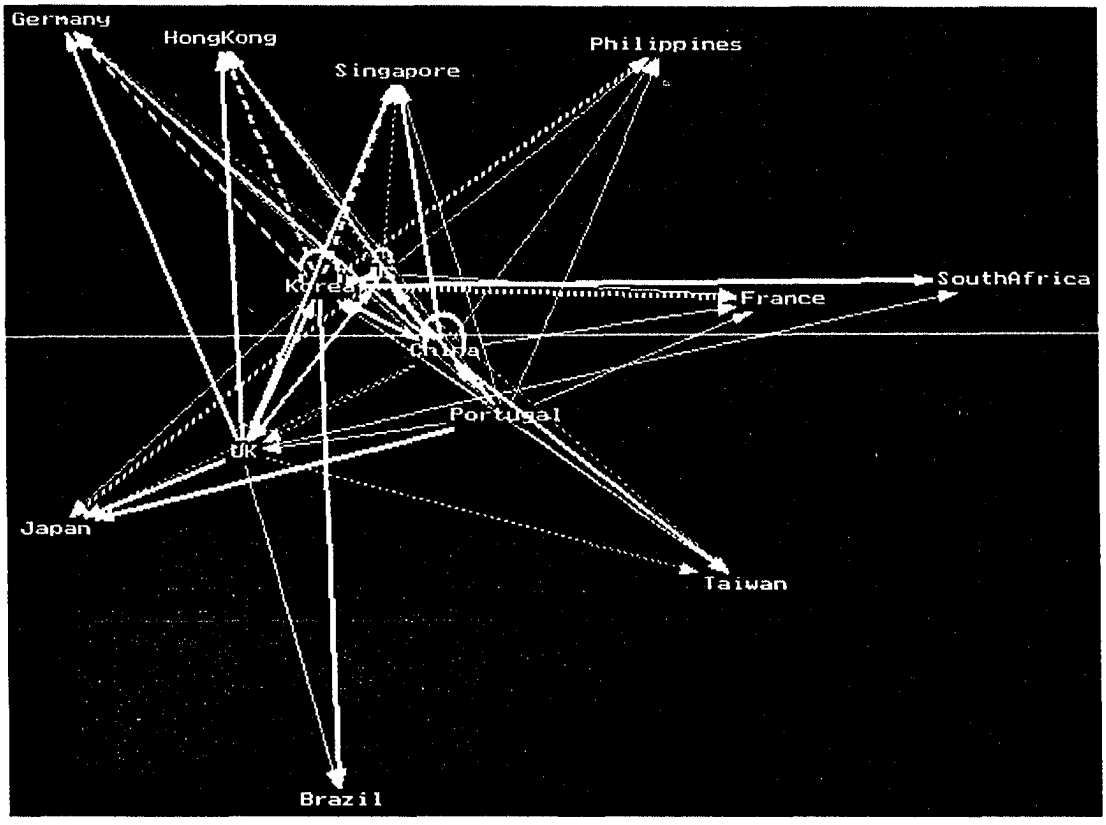


Figure 5.6. The Corporate Network of Samsung's Semiconductor Business in 1980 (MDS Analysis)

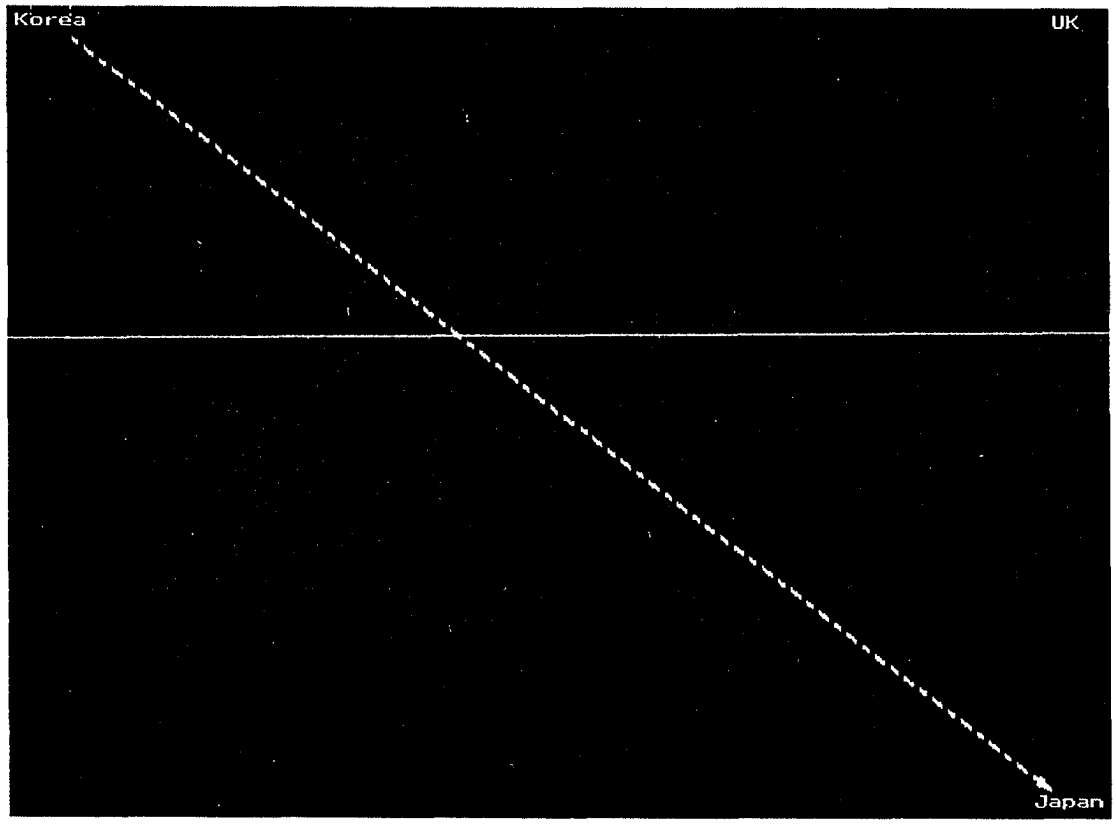


Figure 5.7. The Corporate Network of Samsung's Semiconductor Business in 1985 (MDS Analysis)

Figure 5.8. The Corporate Network of Samsung's Semiconductor Business in 1990 (MDS Analysis)

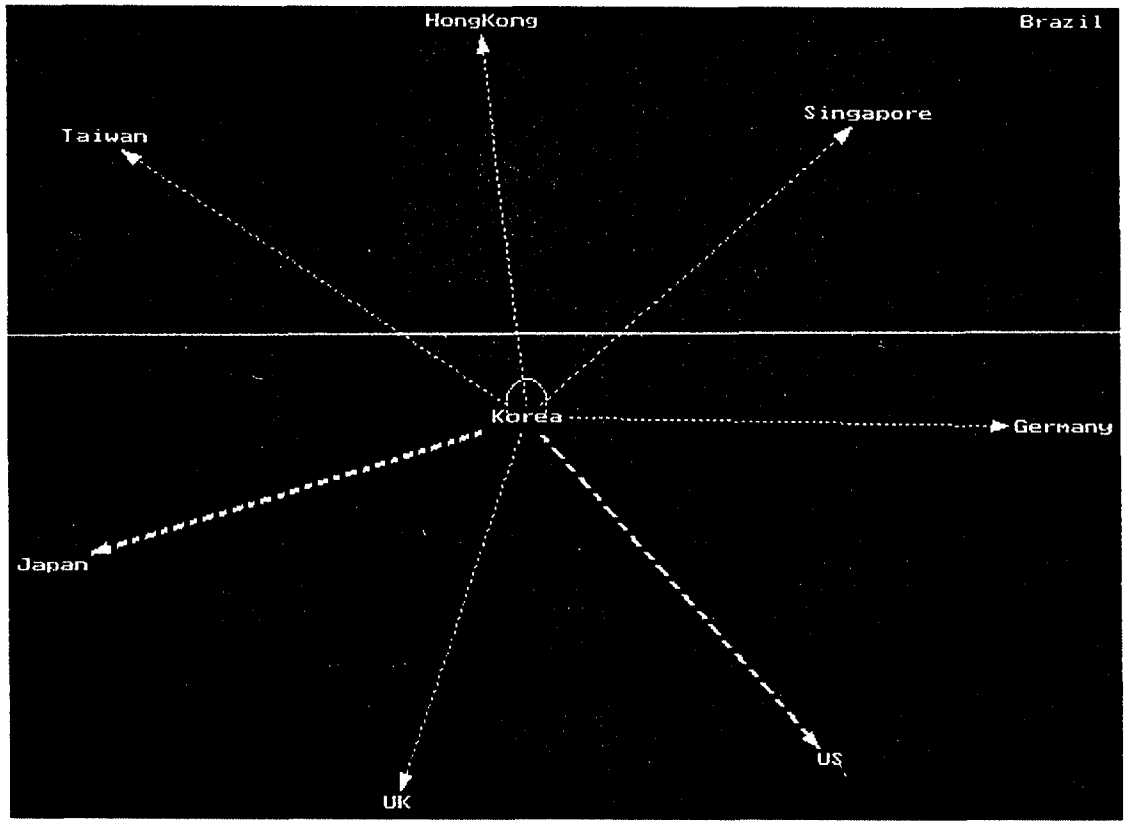


Figure 5.9. The Corporate Network of Samsung's Semiconductor Business in 1995 (MDS Analysis)

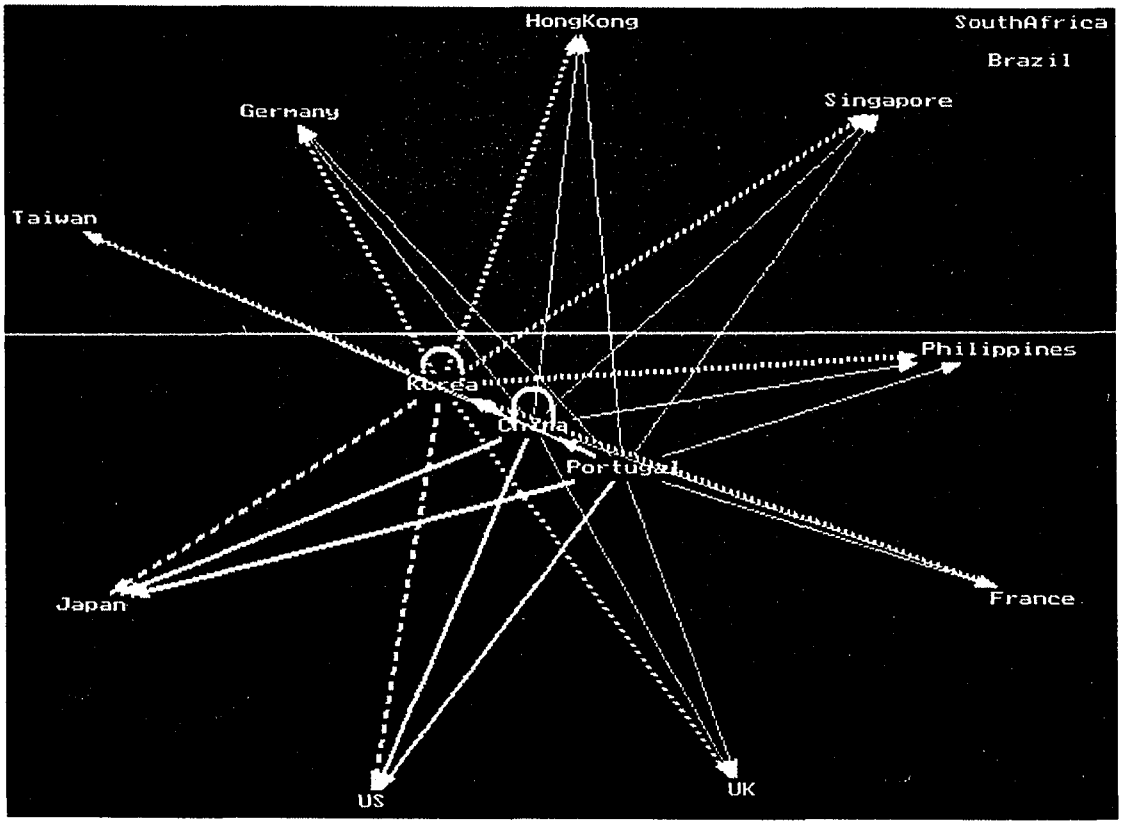


Figure 5.10. The Corporate Network of Samsung's Semiconductor Business in 1999 (MDS Analysis)

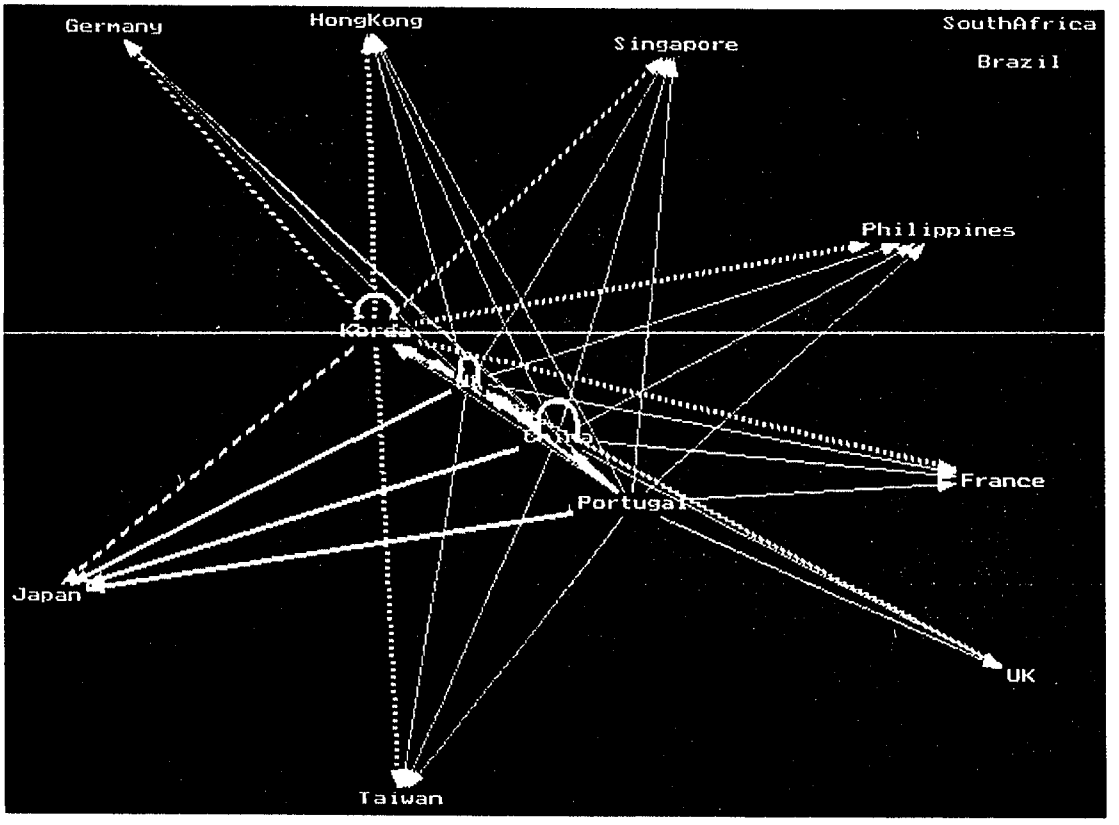


Figure 5.11. The Corporate Network of LG's Semiconductor Business in 1980 (MDS Analysis)

Figure 5.12. The Corporate Network of LG's Semiconductor Business in 1985 (MDS Analysis)

Figure 5.13. The Corporate Network of LG's Semiconductor Business in 1990 (MDS Analysis)

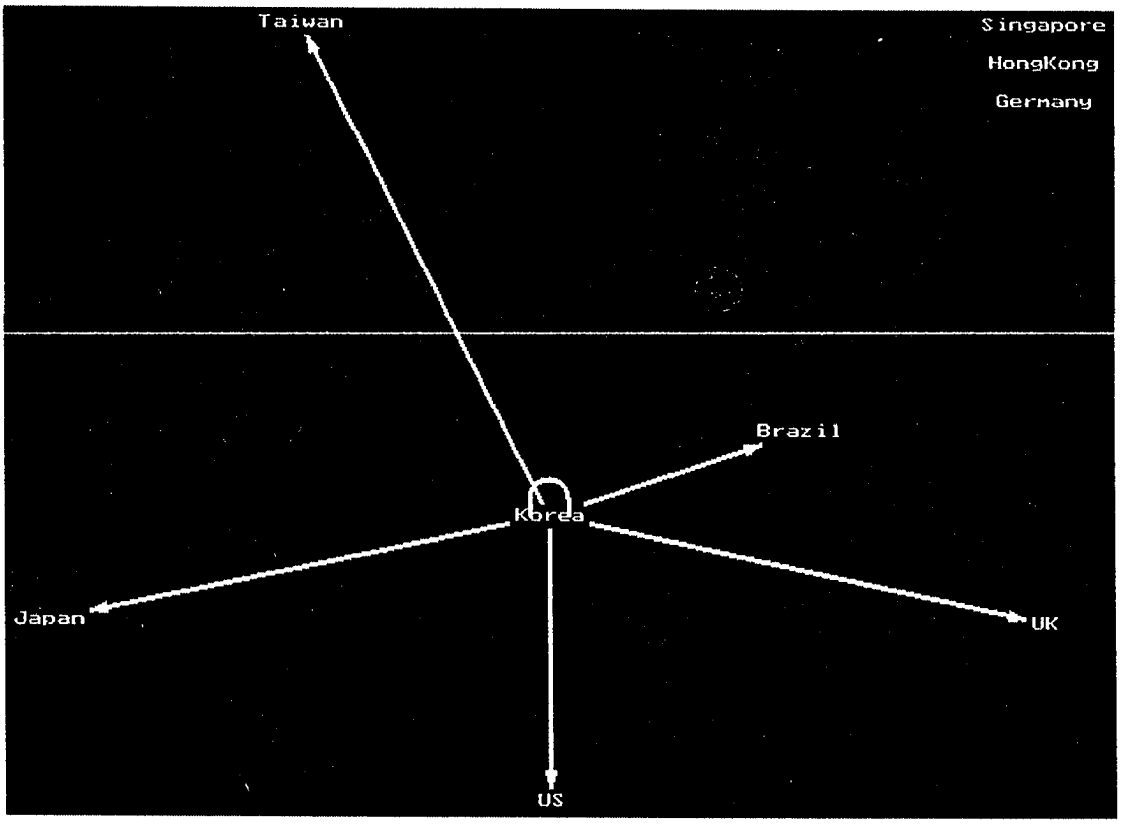


Figure 5.14. The Corporate Network of LG's Semiconductor Business in 1995 (MDS Analysis)

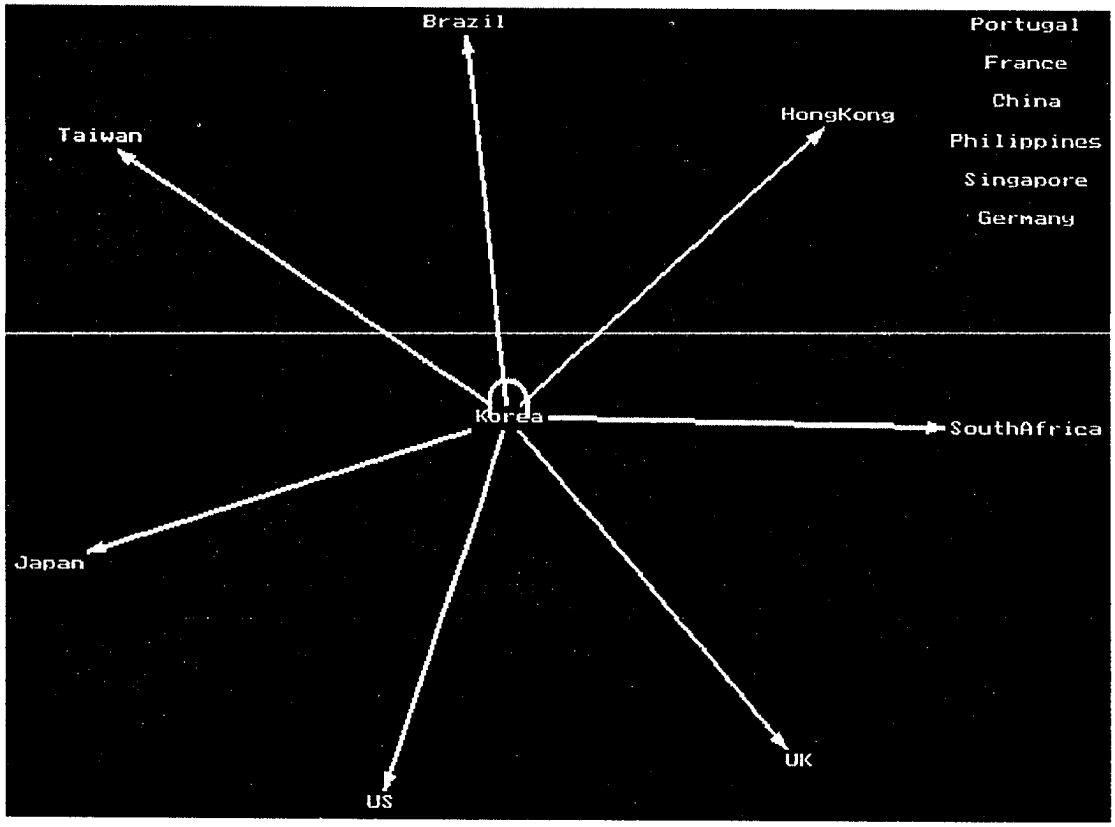


Figure 5.15. The Corporate Network of LG's Semiconductor Business in 1999 (MDS Analysis)

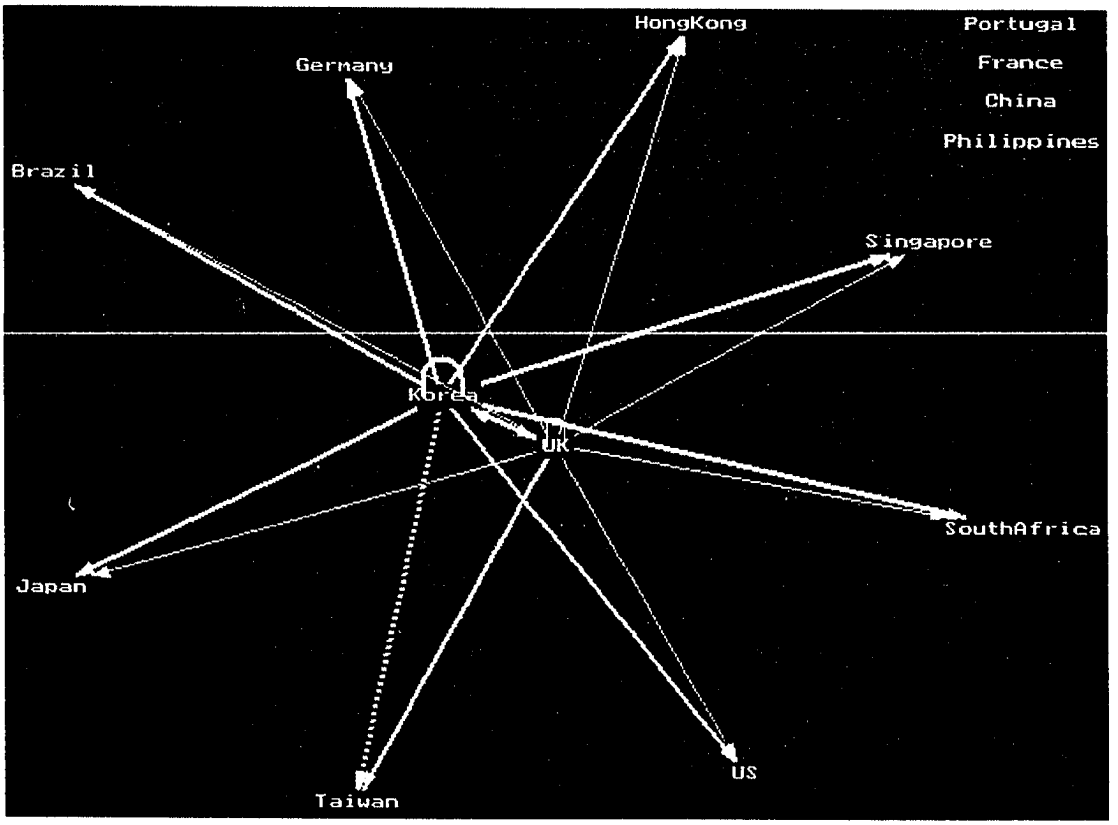


Figure 5.16. The Corporate Network of Hyundai's Semiconductor Business in 1985 (MDS Analysis)

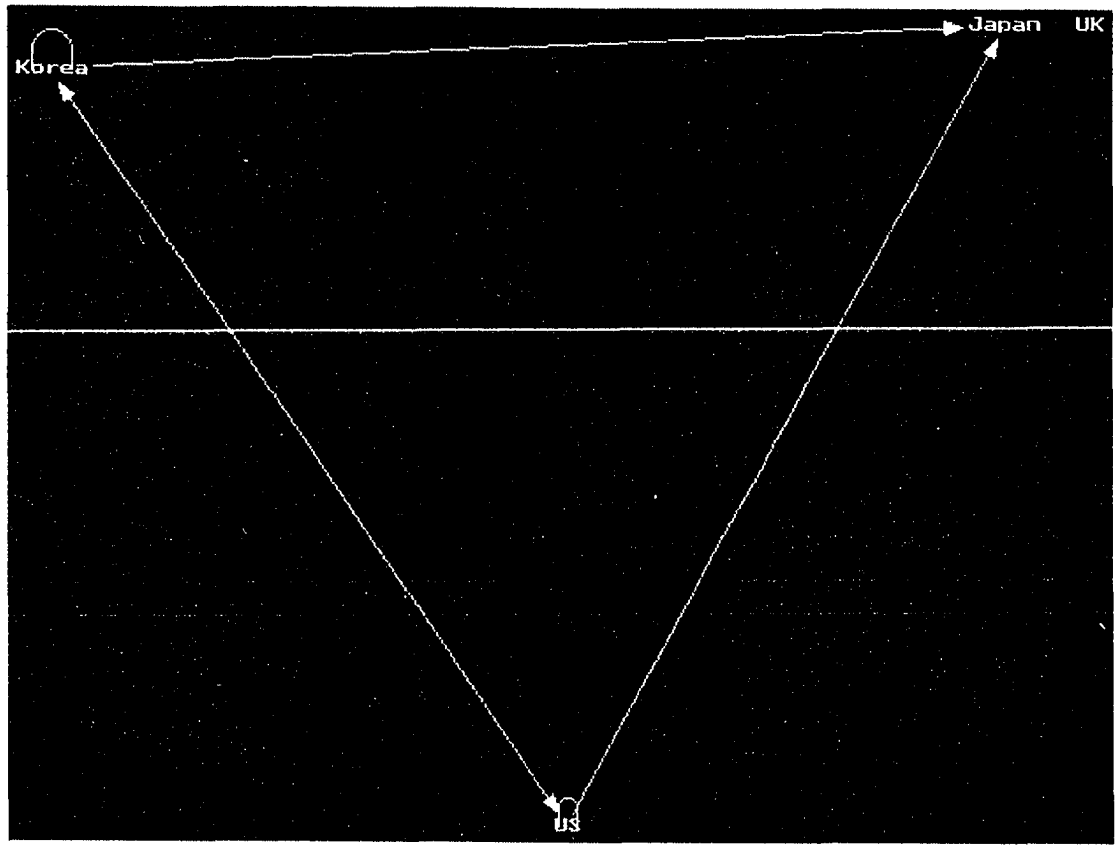


Figure 5.17. The Corporate Network of Hyundai's Semiconductor Business in 1990 (MDS Analysis)

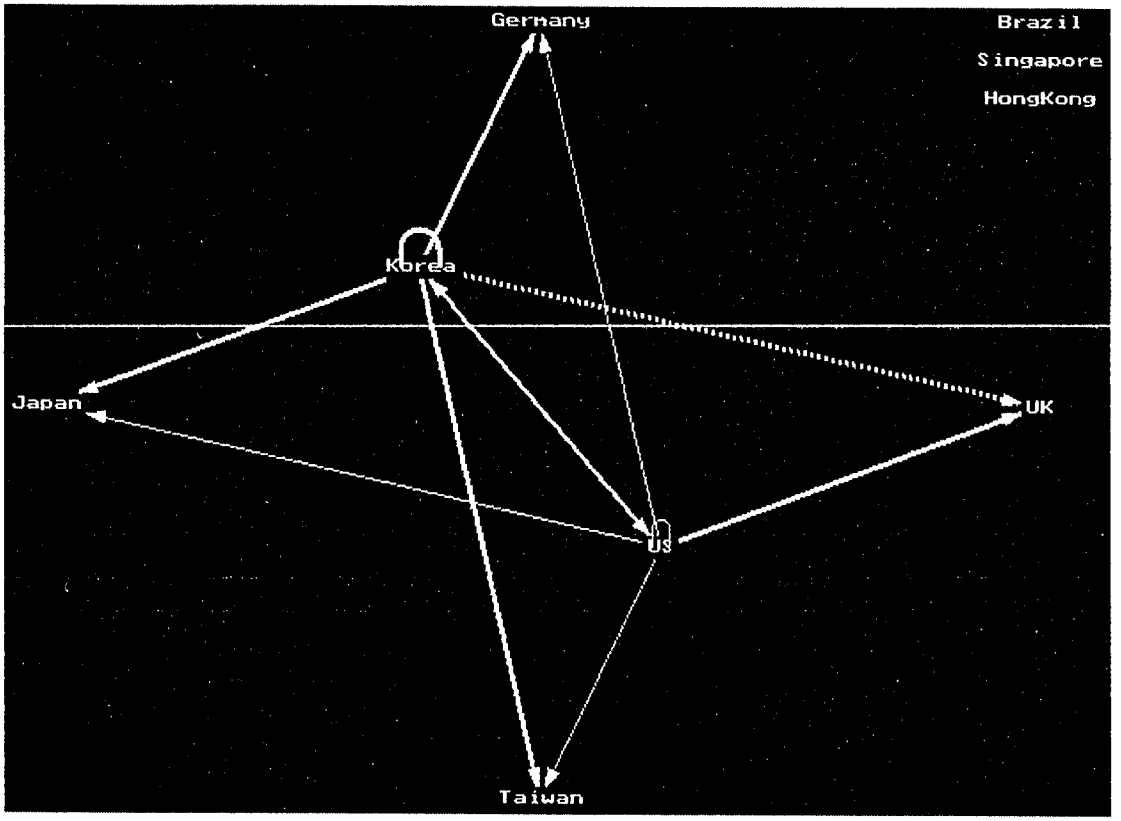


Figure 5.18. The Corporate Network of Hyundai's Semiconductor Business in 1995 (MDS Analysis)

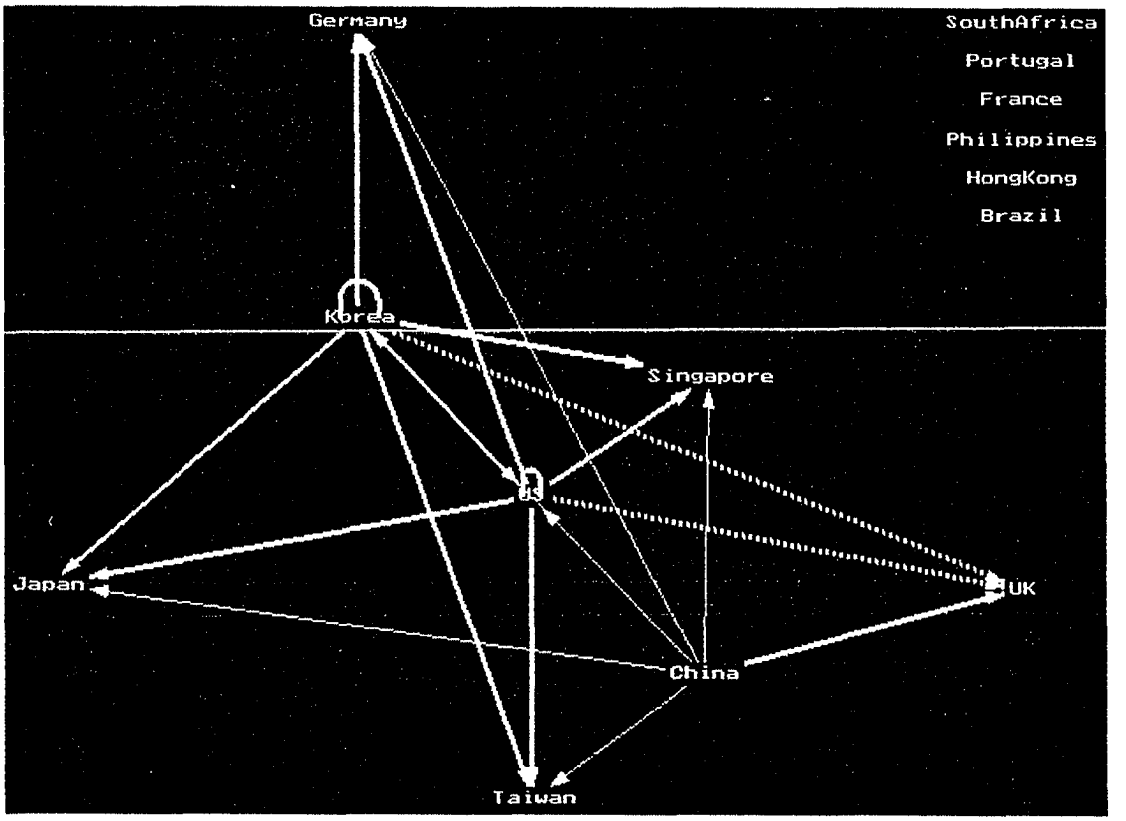


Figure 5.19. The Corporate Network of Hyundai's Semiconductor Business in 1999 (MDS Analysis)

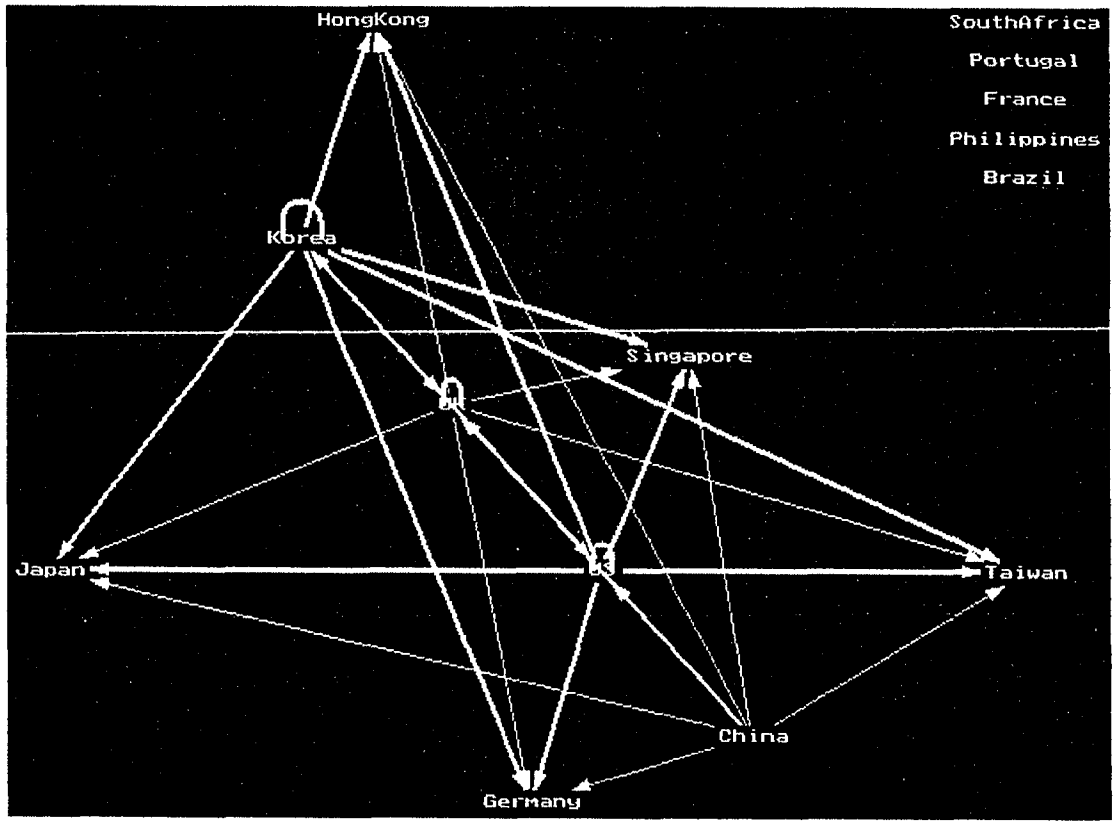


Figure 5.20. Network Sparseness of Korea's Semiconductor Industry, 1980-1999

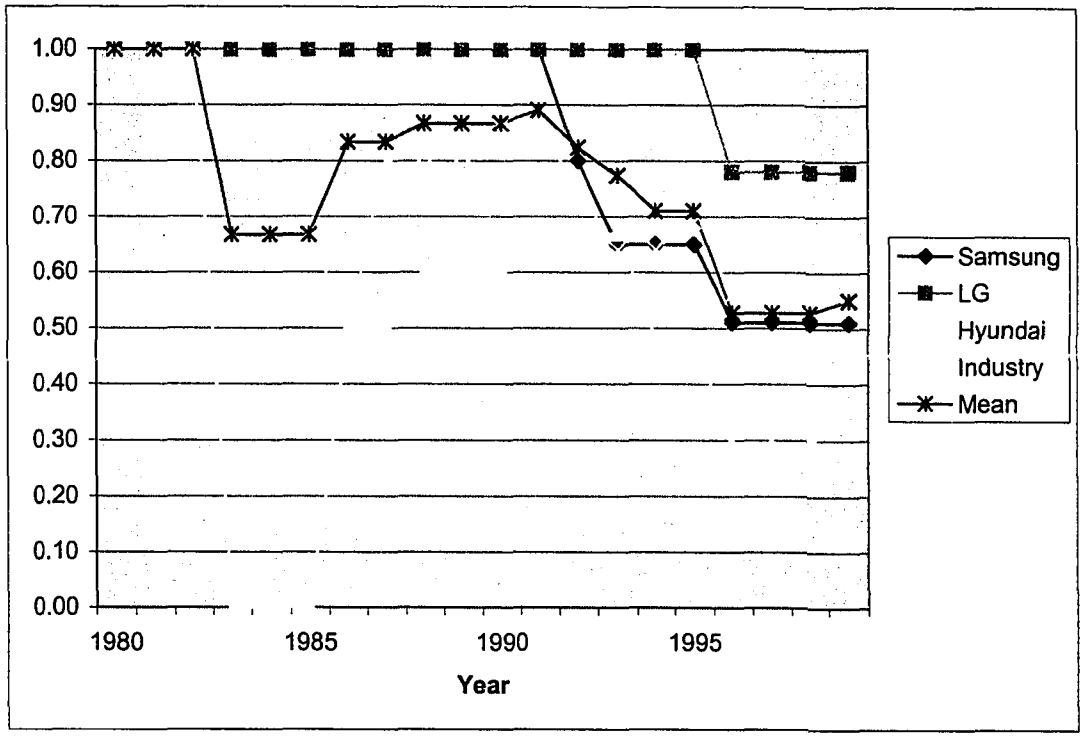


Figure 5.21. Network Hierarchy of Korea's Semiconductor Industry, 1980-1999

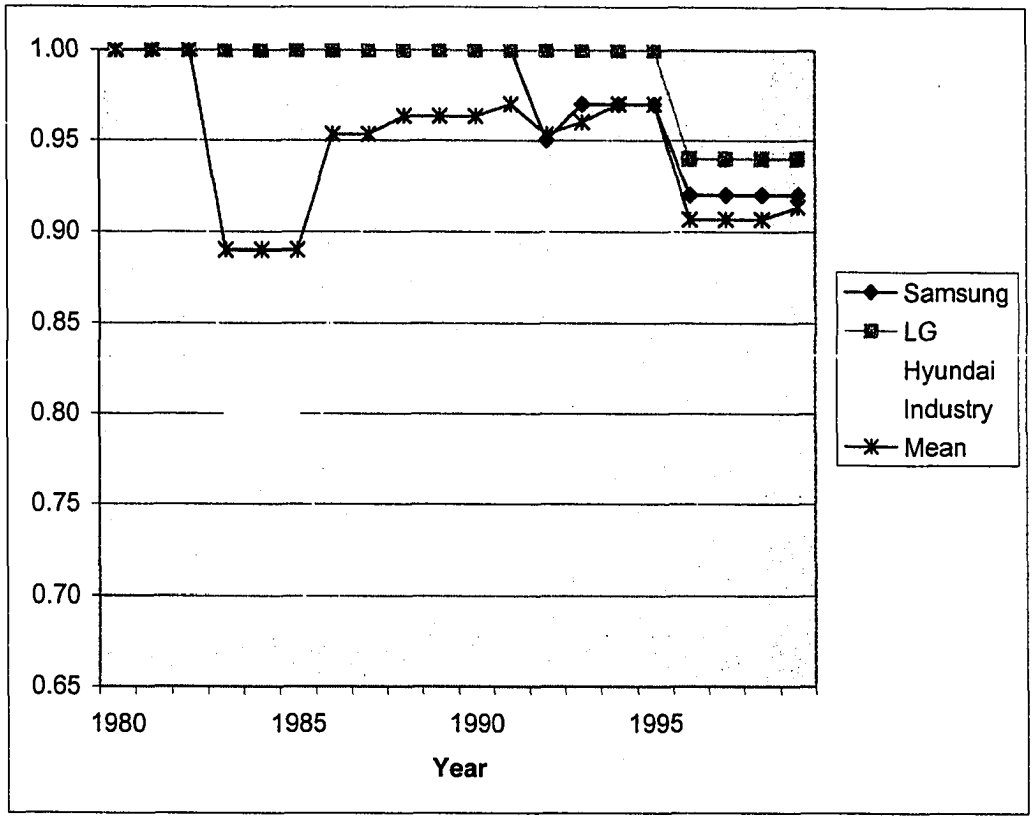


Figure 5.22. Network Reachability of Korea's Semiconductor Industry, 1980-1999

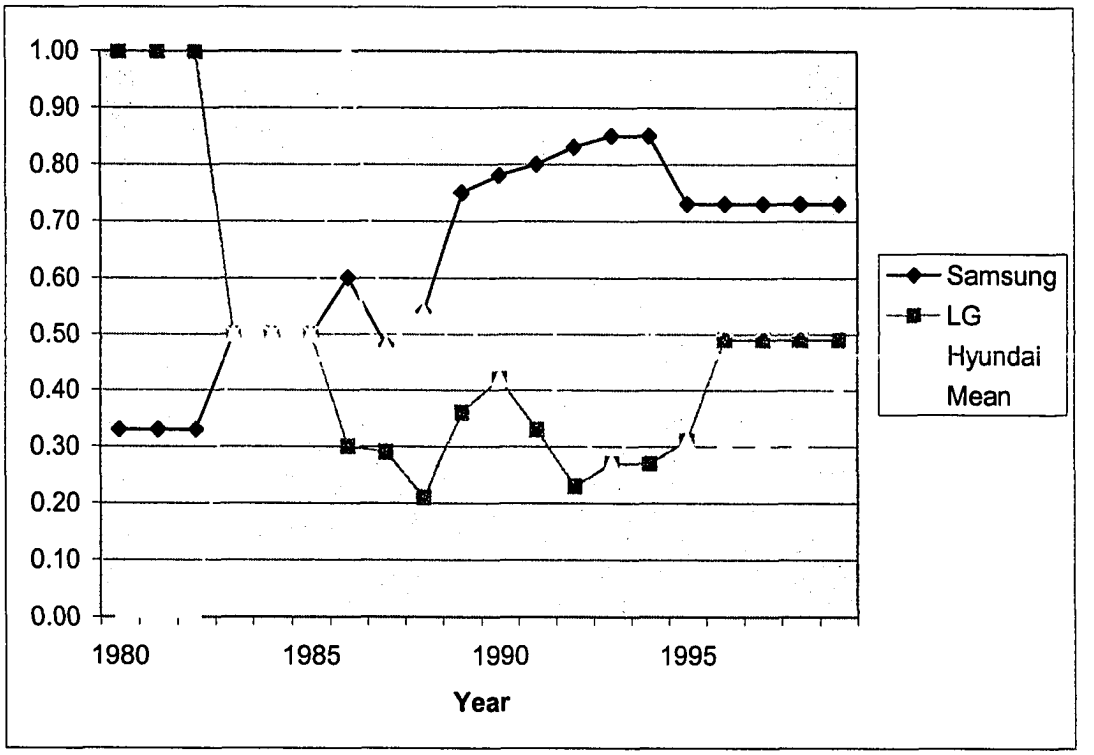


Table 5.1. Regression Analysis of Network Variables: Korea's Semiconductor Industry

Multiple Regression Model: Regression Coefficients and Standard Errors

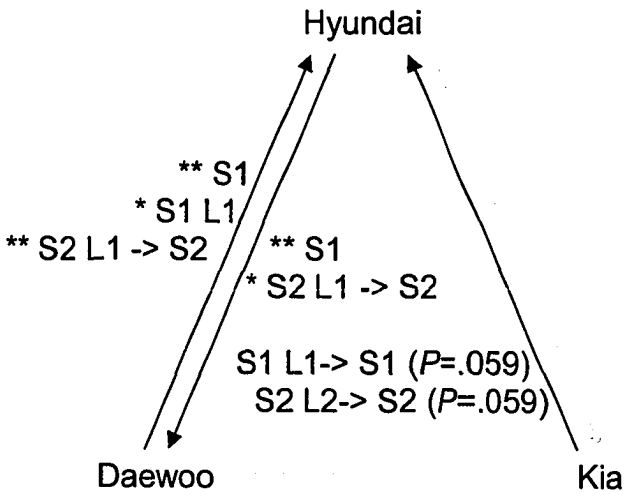
Network Measure	Dependent Variable	Independent Variables	Model 1: t		Model 2: t-1		Model 3: t-2	
Sparseness $_t$								
	Samsung	LG	1.886	(.362) ***	1.772	(.508) **	1.647	(.691) *
		Hyundai	-0.012	(.107)	-0.033	(.134)	-0.045	(.156)
	LG	Samsung	0.326	(.063) ***	0.360	(.066) ***	0.418	(.065) ***
		Hyundai	0.041	(.043)	0.034	(.043)	0.028	(.039)
	Hyundai	Samsung	-0.062	(.548)	0.188	(.532)	0.346	(.496)
		LG	1.211	(1.286)	0.514	(1.308)	-0.037	(1.323)
Hierarchy $_t$								
	Samsung	LG	1.129	(.136) ***	1.022	(.222) ***	0.910	(.308) *
		Hyundai	-0.082	(.039)	-0.133	(.058) *	-0.176	(.068) *
	LG	Samsung	0.737	(.089) ***	0.693	(.14) ***	0.667	(.187) **
		Hyundai	0.056	(.033)	0.012	(.048)	-0.032	(.057)
	Hyundai	Samsung	-2.879	(1.382)	-2.368	(1.426)	-2.051	(1.441)
		LG	3.021	(1.785)	2.450	(1.907)	2.061	(2.038)
Reachability $_t$								
	Samsung	LG	-0.749	(.145) ***	-0.757	(.122) ***	-0.649	(.117) ***
		Hyundai	-0.347	(.16) *	-0.435	(.134) **	-0.330	(.129) *
	LG	Samsung	-0.816	(.158) ***	-0.562	(.2) *	-0.299	(.188)
		Hyundai	-0.581	(.125) ***	-0.481	(.157) **	-0.416	(.146) *
	Hyundai	Samsung	-0.626	(.289) *	-0.753	(.367)	-0.765	(.367)
		LG	-0.965	(.207) ***	-0.697	(.261) *	-0.463	(.259)

Simple Regression Model: Regression Coefficients and Standard Errors

Network Measure	Dependent Variable	Independent Variable	Model 1: t		Model 2: t-1		Model 3: t-2	
Sparseness $_t$								
	Samsung	LG	1.872	(.333) ***	1.733	(.47) **	1.594	(.647) *
		Hyundai	0.168	(.159)	0.112	(.164)	0.053	(.171)
		Entire Network	0.872	(.243) **	0.755	(.279) *	0.610	(.316)
	LG	Samsung	0.340	(.061) ***	0.372	(.064) ***	0.426	(.064) ***
		Hyundai	0.096	(.066)	0.085	(.069)	0.070	(.072)
		Entire Network	0.321	(.113) *	0.296	(.124) *	0.299	(.133) *
	Hyundai	Samsung	0.349	(.329)	0.347	(.336)	0.336	(.342)
		LG	1.094	(.754)	0.866	(.825)	0.611	(.926)
		Entire Network	1.428	(.311) ***	0.864	(.399) *	0.130	(.433)
Hierarchy $_t$								
	Samsung	LG	1.188	(.138) ***	1.104	(.236) ***	1.021	(.348) *
		Hyundai	-0.111	(.093)	-0.148	(.09)	-0.186	(.085) *
		Entire Network	0.052	(.129)	-0.006	(.131)	-0.045	(.133)
	LG	Samsung	0.677	(.079) ***	0.679	(.113) ***	0.708	(.15) ***
		Hyundai	-0.025	(.075)	-0.057	(.076)	-0.095	(.075)
		Entire Network	0.059	(.097)	0.026	(.1)	-0.006	(.102)
	Hyundai	Samsung	-0.770	(.712)	-0.838	(.798)	-0.862	(.971)
		LG	-0.301	(.885)	-0.313	(.985)	-0.356	(1.166)
		Entire Network	1.805	(.147) ***	0.587	(.399)	-0.211	(.384)
Reachability $_t$								
	Samsung	LG	-0.530	(.114) ***	-0.482	(.109) ***	-0.440	(.097) ***
		Hyundai	0.229	(.178)	0.147	(.172)	0.170	(.156)
	LG	Samsung	-1.028	(.221) ***	-0.739	(.234) **	-0.460	(.215) *
		Hyundai	-0.768	(.186) **	-0.608	(.178) **	-0.487	(.146) **
	Hyundai	Samsung	0.366	(.285)	-0.021	(.284)	-0.268	(.256)
		LG	-0.633	(.153) **	-0.297	(.189)	-0.055	(.186)

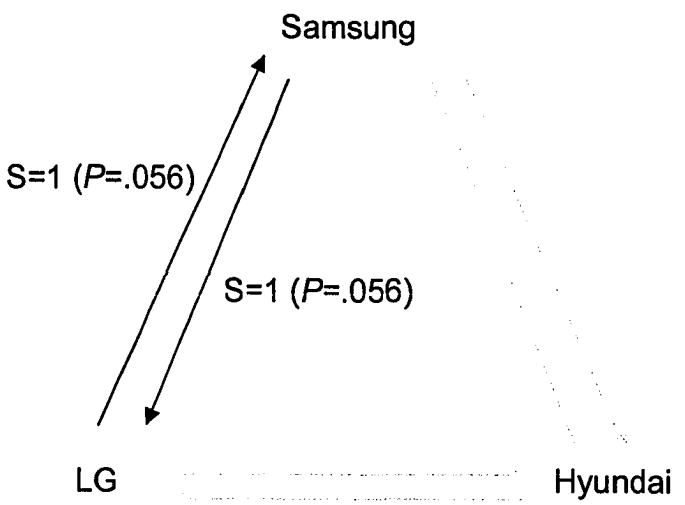
* $P < .05$; ** $P < .01$; *** $P < .001$.

Figure 5.23. Regression Analysis of Seasonal Difference Terms of Network Reachability: MNCs in Korea's Automobile Industry, 1980-1999



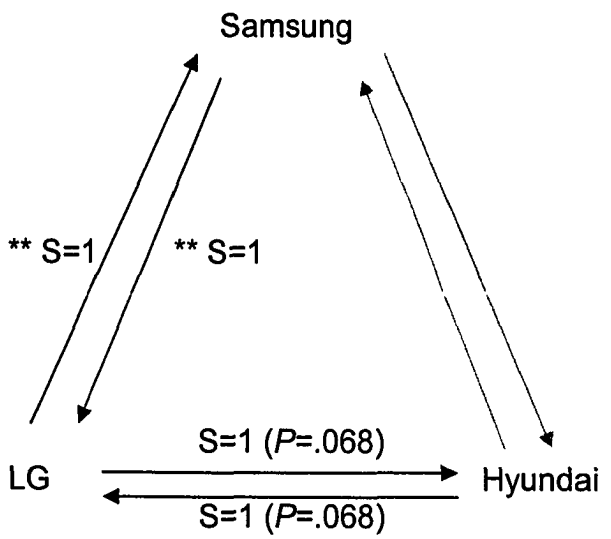
* $P < .05$; ** $P < .01$; S: seasonal difference; L: lag.

Figure 5.24. Regression Analysis of Seasonal Difference Terms of Network Sparseness: MNCs in Korea's Semiconductor Industry, 1980-1999



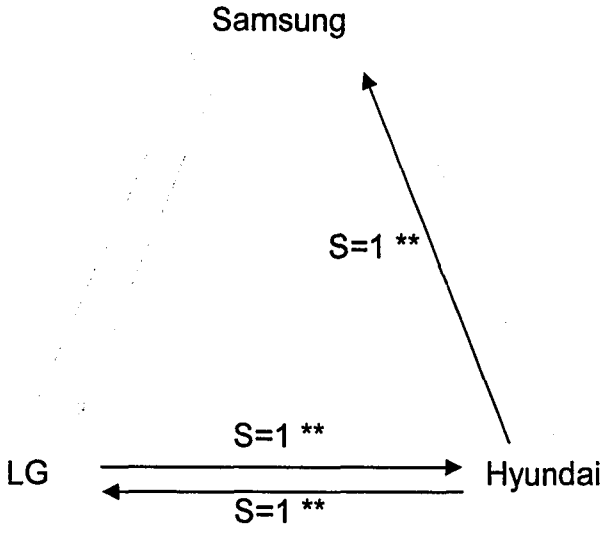
S: seasonal difference; L: lag.

Figure 5.25. Regression Analysis of Seasonal Difference Terms of Network Hierarchy: MNCs in Korea's Semiconductor Industry, 1980-1999



** $P < .01$; S: seasonal difference; L: lag.

Figure 5.26. Regression Analysis of Seasonal Difference Terms of Network Reachability: MNCs in Korea's Semiconductor Industry, 1980-1999



** $P < .01$; S: seasonal difference; L: lag.

Chapter Six

Conclusions and Further Discussion

This dissertation contributes to the study of development by examining Korea's industrial growth, based on the perspective of economic sociology and historical and network approaches, using the automobile and semiconductor industries (in the period 1980-1999 for network analysis) as comparative cases. The consequences of unsuccessfully implemented state intervention and the dynamics of intercorporate influence in the course of industrial growth were the main issues discussed. This chapter recapitulates major findings from the preceding analyses and further discusses their implications.

Comparison of Korea's Automobile and Semiconductor Industries from Network Perspectives

The MDS and statistical analyses based on the network data of the MNCs in Korea's automobile and semiconductor show that intercorporate influence explains the MNCs' structural growth in both industries to a degree. Yet, the semiconductor industry, which grew more rapidly than the automobile industry, shows greater similarities and more intercorporate influence as well.

Most basically, as clearly shown in the MDS analyses, in the case of the automobile industry, number of countries reached by each MNC differs greatly compared to the semiconductor industry. In 1990, Daewoo's network covers 18

countries while Hyundai's 14 and Kia's 2. At that time, the difference between Daewoo and Hyundai was relatively small. In 1999, however, the difference becomes larger: Daewoo's network reaches 47 countries while Hyundai's 20 and Kia's 8. In contrast, in the case of the semiconductor industry, in 1990, Samsung covers 8 countries, LG 6, and Hyundai 6, and, in 1999, 12, 19, and 9, respectively. In 1999, in the automobile industry, Daewoo, whose corporate network shows the greatest coverage in terms of numbers of countries reached, has almost 8 times as many countries as Kia that shows the least globalized status. Yet, in the semiconductor industry, that kind of difference does not exist among MNCs. In 1999, Samsung, whose network is the most globalized of the three MNCs, reaches only about 30% more countries than the least globalized MNC, Hyundai. Thus, this means that the degree of corporate globalization measured by the number of countries covered by an MNC's network does not strongly explain economic performance.

In addition to this kind of quantitative difference, the countries covered by Korea's automobile industry differ from the ones in the semiconductor industry in terms of their roles in the respective networks. As reported in the MDS analyses, Daewoo's network stand out not only by the number of countries reached by its corporate network in comparison to the other automobile MNCs, but also by its strong presence in Eastern Europe, Latin America, etc., outside advanced capitalist economies especially in the 1990s. The automobile industry's network consisted of much more diverse regions and countries unlike in the semiconductor industry, which means the automobile MNCs chose to structurally grow by avoiding intercorporate

competition. Comparatively, subsidiaries of the MNCs in the semiconductor industry are concentrated in advanced economies and export internationally as shown in the corresponding MDS analyses.

Daewoo is also unique in terms of production subsidiaries' role that was aimed for local consumption. As shown in Daewoo's MDS diagrams, until 1999, it is only the ones in Korea that export unlike in the case of Hyundai and Kia whose production subsidiaries mostly show transaction routes to other countries (except for Hyundai's production subsidiary in India). Thus, Daewoo's peculiar network characteristics contribute strongly to quantitatively and qualitatively differentiate the internal network structure of the automobile industry from that of the semiconductor industry.

Mutual influence in the form of mimetic isomorphism is seen in the expansion of the MNCs' network especially in establishing production subsidiaries outside Korea, more strongly in the semiconductor industry than in the automobile industry. In the case of the automobile industry, Hyundai established one by 1995 in China and Kia mimicked it by 1999. Hyundai also had established one in the United States by 1985, which no other automobile MNCs have mimicked yet. In the semiconductor industry, in the United States, Hyundai had done so in by 1985, and Samsung followed by 1999; in China, Hyundai and Samsung both did so by 1995; and in Western Europe, Samsung had done so by 1995 and the other two followed by 1999. Compared with the automobile industry, before reaching China, the semiconductor MNCs consistently preferred advanced capitalist countries to position their production subsidiaries. Thus, based on the MDS analyses, I conclude that, in terms of network structure, the

semiconductor industry shows greater similarities and stronger mutual influence among MNCs in the process of their structural expansion than the automobile industry, in part explained by mimetic isomorphism.

Statistical Tests of the Network Measures

When the MNCs in both industries were measured by the three network characteristics, sparseness, hierarchy, and reachability, some fluctuations in the three network measures seemed to indicate intercorporate influence. Particularly, the automobile industry's network reachability (Figure 4.23) and the semiconductor industry's network sparseness and hierarchy (Figures 5.20 and 5.21) respectively seemed to show a relatively strong correlation among the competing MNCs.

To test intercorporate influence in network change more rigorously, regression method-based statistical test were performed. The initial saturated VAR model results (Figures 4.24 through 4.26) showed that some autoregressive terms were statistically significant to hide the importance of intercorporate influence, which suggested further regression analyses without them. Yet, in the case of the semiconductor industry, some VAR results showed that some intercorporate influences based on each of the three network variables were statistically significant when the criterion, $P < .1$, was used. This shows that, in the semiconductor corporate networks, some intercorporate influence is already captured even before dropping the autoregressive terms.

The results of the multiple and simple regression analyses without the autoregressive terms (Tables 4.1 and 5.1) show the mechanism of intercorporate influence in the two industries in greater detail. The results of multiple and simple

regression models for the automobile industry show that statistically significant mutual influence existed between the two leader MNCs, Hyundai and Daewoo in terms of network reachability while Kia was somewhat left out. The results of the network sparseness and hierarchy-based models show that the entire network explains Hyundai.

In contrast, the same regression analyses of the semiconductor industry show more instances of intercorporate influence. As was the case in the automobile industry, both multiple and simple regression results show that, Samsung and LG, the two industry leaders influenced each other in terms of network sparseness and hierarchy while the entire network explaining both MNCs. The overall results of network reachability-based models show that the three member MNCs influenced one another to a greater degree than in the case of the automobile industry.

In addition to the state term-based regression analyses, when the seasonal difference terms were used to more specifically see how one MNC's network change dynamically affects another's, more intercorporate relationships turn out statistically significant in the semiconductor industry than in the automobile industry. In the automobile industry, it is only the network reachability-based regressions models that show some statistically significant intercorporate influence, especially, again, between the industry leaders, Hyundai and Daewoo. In the case of the semiconductor industry, the relationships between Samsung and LG turn out statistically significant in the network sparseness and hierarchy models by the criterion ($P < .06$). Additionally, in the network hierarchy-based models, intercorporate influence between LG and

Hyundai also turns out statistically significant by the criterion ($P < .07$). In the reachability-based models, LG and Hyundai explain mutually, and Hyundai Samsung, with statistical significance.

In sum, corresponding to the results of the MDS analyses, the results of various statistical tests of the three network variables lead to conclude that the semiconductor industry shows stronger and more instances of intercorporate influence than the automobile industry does in terms of network structure and change. Yet, in both industries, the two leaders, Hyundai and Daewoo and Samsung LG, explain each other more statistically significantly that they each or together explain the other follower status MNC in the concerning industry in terms of all three network characteristics.

Reconsidering the Validity of the Developmental State Concept in Explaining Contemporary Korea

Table 6.1 summarizes how mainstream economics, statism, institutionalism, and my intercorporate influence-stressing approach differ from one another in terms of unit of analysis, agents, reason for growth, consideration of globalization, theoretical background, and conclusion regarding convergence/divergence as a result of economic change.

The starting point of my investigation was reviewing statism that was successful in attracting a good number of social scientists engaged in the discussion of East Asian and Korean development including institutionalists who claimed to be of

non-political economic intellectual heritage. Statists found East Asian economies converged in the pattern of each showing a relatively long time coexistence of the developmental state and rapidly growing economy, led by Japan. It is historically accurate to a degree that the late or newly industrialized economy status binds the East Asian economies, such as Taiwan, Singapore, Korea, etc. into a similar path of development. However, as reviewed in Chapter One, some statists who with their own extensive original research on Korea started self-admitting that their developmental state perspective showed limitations in explaining corporate globalization (Evans 1995) and a sustained growth of chaebol groups (E. Kim 1997). In addition, recent statist discussion tends to consider the Korean case relatively untypical compared with other contemporary economies that still well fit the conventional statist framework.

I recognize the achievements of statism in the sense that they empirically and theoretically transcend the limitation of mainstream economics that stresses the ideal-typical and universal functions of the capitalist market, which was practically nonexistent as the Korean economy took off in the 1960s. Filling the vacuum in the market-centered paradigm, statism helps students of Korea's development understand the state-led economic groundwork of the early 1960s initiated by Park Chung Hee's developmental state that much reflects his complex background. As the United States reasonably assumed that he would unite South Korea with the North into one socialist country soon after his successful military uprising in May 1961, his involvement in the short-lasted Yósun uprising led by young communist-sympathizers in the late 1940s

and his strong nationalist ideology together explain his passion for socialist-style, centrally managed economic development and national reconstruction plans and their results accompanied by a long duration of political repression in explaining the process of Korea's initial economic modernization.

In understanding Park's period, locating an emphasis on state leadership, rather than on the internal dynamics of the industrial sector or more specifically corporate actors, is strategically efficient in my view. Yet, his era ends with his assassination by the Head of the Korea Central Intelligence Agency, Kim Chae Kyu, in 1979, quickly dismantling the structural center of the two-decade sustained developmental dictatorship. Afterwards, the private sector in the 1980s (E. Kim 1997) and the capitalist class (Kong 1993) gains significantly greater autonomy from the Korean state. Thence, the new military regime's compulsion-overloaded efforts to crackdown the Kwangju uprising in 1980 and to restructure core industries against the will of the major business group owners, followed by the unprecedented breakout of consecutive financial scandals with ties to the new military faction in the early 1980s (discussed in Chapter Two) indicate that the Korean state started to qualitatively change with clear signs of losing control over the economic sector since the early 1980s. It is additionally noteworthy that much of Chun's army buddy-based political foundation also ended up dissolving by a nation-wide, partly middle class-supported popular uprising in June 1987, as a consequence of which his long-time friend successor Roh Tae Woo strongly attempted to differentiate himself from Chun's circle by forcing him to be confined in a rural Buddhist temple. Thus, for elaborations of statism, I

suggest that the strong development state status should be overall reconsidered or only selectively applied to, e. g., government-overseen economic arrangements and ramifications of the 1988 Seoul Olympic Games, in discussing Korea's economic change in the 1980s and afterwards.

Corporate Globalization to More Positively Consider

Debates prevail regarding the phenomenon of globalization and its diverse aspects and consequences. Even about the newness of economic globalization, scholarly conclusions express disagreement pointing to different data (e. g., see Rodrik 1998: 4; Weiss 1998: 171). When it comes to the Korean case, due to its late industrialization status, to which development scholars from diverse backgrounds agree, I find it so much more important to look for links between industrial growth and economic globalization based on an overall increasing pattern in its overseas investments in the recent decades (presented in Chapter One). Hence, Korea's industrial growth and economic globalization should be considered inseparable. However, the statism-based discussion of the Korean economy was incapable of connecting the two meaningfully within a single explanatory scheme as Evans (1995) expressed.

In addition to the importance of considering economic globalization, based on the perspective economic sociology and borrowing from other arguments, I consider corporate action and intercorporate influence primarily important in explaining general capitalist economic dynamics and industrial growth as well, rather than state

intervention, which I consider an external thus indirect factor to changes in the industrial sector. In contemporary capitalist economies, private corporations are physically in charge of mass-producing of most consumer goods and services. In many countries, it is increasingly common that even the production and management of what used to be typical public goods and services, e. g., electricity, health insurance, etc., are transferred to private corporations from state-owned enterprises due to the thought that such privatization would be eventually more cost-effective to society. Such changes will make the role of private corporations as economic actors more central to national economies.

Unlike the theoretical structure of statism, in which corporations are considered passive, I maintain that they should be considered the main subjects in the explanation of industrial growth. Particularly, as Korea's economic structure is highly large corporation-centered and the automobile and semiconductor industries are so too, I examined how intercorporate influence had effects in product development and structural growth, which has been understudied. As the Korean business groups in the automobile and semiconductor industries are MNCs, their structural growth is conceptually equivalent to corporate globalization. Considering corporate globalization an important factor in the process of industrial growth integrates what statism overlooked, corporate initiatives and globalization, into one alternative perspective, which can diversify and elaborate the discussion of development as this dissertation exemplified in the preceding chapters.

Unintended Long-term Consequences of State Stimulus

Recently, a presidential candidate for the coming Korean election said that the era in which the government instructs to and interferes in corporations should end in the context of critically reviewing the status quo of the Korean economy (Lee 2002). As he pointed out succinctly, intervention by the state oftentimes turns into interference, which statism systematically excludes in its explanation of economic consequences of political stimulus. State intervention turning into interference is not a new or recent phenomenon, but has been recurring in the Korean economy.

In Chapter Two, I historically examined growth of the two industries to argue against statism's focus on positive economic results of government intervention as a way to assert the necessity of a non-statist alternative in explaining Korea's industrial growth. My point in the historical review was that government intervention in Korea often failed in achieving its officially announced, good will-dressed objectives at the corporate and industrial levels, and that, unlike the positive leadership role of the state in industrial development as stressed in statism, the state even discouraged the companies, which later became industry leaders such as Hyundai in the automobile industry and Samsung in the semiconductor industry, from entering into the industry while repeatedly showing favoritism toward others such as Daewoo Motor and its ancestral companies, which have never become as successful the leaders in the respective industries. The Korean state, in various ways, has been ineffective, poorly informed, and unfair when it comes to its relationships with corporations, which is an aspect almost unexplored by previous studies of Korea's development. My historical

review of the two industries offers ways for statism to rethink about such so-far overlooked aspects of state intervention in Korea's development so that the discussion of Korea's industrial growth can continue from more diverse perspectives. Table 6.2 summarizes how I compare the two industries based on the findings reported in the preceding chapters.

Historically, soon after the Park administration's Automobile Industry Protection and Promotion Law in 1962 officially prohibited the import of foreign cars, the regime in fact allowed Saenara to import-assemble the Blue Bird from Japan, which consequently bankrupted the then-only profitable Korean automobile producer, Kukje. In the late 1960s, all newly started automobile companies develop ties with foreign automakers and import-assemble just as Saenara had done earlier in the decade. It is ironic that in the aftermath of the implementation of a seemingly nationalist policy, Korea's automobile industry, in the late 1960s and afterwards, became structurally and technologically more foreign-dependent as the automakers chose to mimic the profit model of foreign model import-assembly. The Park regime's policy in the early 1960s contributed to the strategic changes of the companies in the automobile industry later in the decade by not achieving its originally intended goals.

The late 1960s is also when multiple chaebol groups start showing genuine interest in the production of automobiles, which later strengthens and stabilizes the industry financially and technologically unlike ever before. After all, however important state intervention may be for industrial growth, corporations are the subjects that actually engage in the mass-production and mass-marketing of private goods such

as cars, not the state itself. Most of all, it would be unnecessary to retrospectively question whether Korea's automobile industry has benefited from the then-increased participation of the chaebol groups.

The direct effect of state assistance on individual corporations is another point to note in reviewing statism with the case of Korea's automobile industry. While favoring Shinjin (an ancestral company of Daewoo Motor), the government exercised political pressures to stop Hyundai from starting an automobile subsidiary. In the early 1980s, as far as the automobile industry is concerned, Chun's new military faction again favors Daewoo over Hyundai in its forced industrial restructuring plan as Hyundai relinquishes the heavy industry facility to Daewoo, unlike Chun's personal promise to Chung, not thereafter receiving the half of General Motors Korea that became Daewoo Motor. The Automobile Industry Rationalization Measure of 1981 again ends up being of benefit to Daewoo as Kia is forced out of the profitable small car business. As soon as the government partly withdraws the size-related restrictions in the mid-1980s, Kia immediately returns to the small passenger car business and, thence, all three automakers start mass-exporting small cars produced in Korea as an epoch-making event. Clearly, the Korean government did not treat all corporations in the same industry equally. Thus, state assistance should be considered a variable rather than a presumed cause automatically resulting in positive results. My review of the instances of government failure in Chapter Two suggests that statism has yet to look into the issue to find ways to transcend its usual partial explanation of positive economic results based on state assistance and leadership, which misleads the readers

of its work to think as though the effect of state intervention were equally helpful for all companies in the same industry.

Similar to the size-related company-specific production restrictions imposed on the automakers in the early 1980s in the sense that the Korean government implemented policies on corporations inconsiderate of their individual wishes, in the case of the semiconductor industry too, what the Korean government had suggested for future product development in the Semiconductor Industry Promotion Detailed Plan of 1982 was quite different from what followed. Soon after the announcement of the Detailed Plan that emphasized IC-based products, the corporations in the semiconductor industry rather converged into the production of DRAMs although the government specifically advised against Samsung's intention of doing so. Only after, not before, the semiconductor MNCs were sued by prominent foreign semiconductor companies in the late 1980s, the government suggests they form a R&D consortium for cost-effective product development, which failed to materialize repeatedly. The government-supervised, nominal R&D consortium rather ended up the source for intercorporate conflict and further competition, let alone intercorporate cooperation.

In these instances, what the government suggested looked reasonable but eventually turned out unworking considering what the corporations actually pursued in their reactions thereto. Particularly, the product suggestion-related instances in both industries show that the Korean government in the early 1980s apparently lacked the capability to realistically assess what would happen in the immediate future, in sharp contrast to the way the developmental Korean state had been relatively successful in

leading, funding and coordinating the visionary infrastructure-related projects such as the construction of the 268-mile *Kyóngbu* (Seoul-Pusan) highway in the late 1960s. Also, the untimely consortium forming suggestion for the semiconductor industry shows that the government was too ignorant of the dispositions or corporate culture to correctly determine the semiconductor MNCs' collaborative potentials.

Yet, as an indirect, unintended effect of such state-originated stimuli, the automobile and semiconductor companies end up competing with one another in the respective contests of small-car mass-export and new DRAM development by the late 1980s. In my view, that type of intercorporate competition is what pushed the industries to grow and structurally globalize as well. Statists may wish to further explore such processes as an indirect, long-term result of government intervention as they elaborate on their previous achievements to go beyond their usual discussion of direct, simplistic causality-based, positive economic results of state intervention. As E. Kim (Kim 2000) briefly mentioned, studying the effect of government restriction removal will benefit the suggested elaboration. What this dissertation discusses about intercorporate influence in the relevant MNCs' structural growth may contribute too to the elaboration of statism if appropriate links are constructed from its perspective. The repeated pattern was that, despite the government's attempts to prevent over-competition and duplicate investment on the end of corporations in the same industry, they voluntarily recreated and return to more competition-demanding situations by choosing to work on similar business goals as shown in the reviews of large corporations' participation in the automobile industry in the late 1960s by import-

assembling foreign models, mass-exporting small cars in the late 1980s, and development of new DRAMs in the late 1980s. Some of Korea's major government polices in the long run influence the industries to grow by failing to achieve the initially, officially intended goals. Thus, the relationship between government policies and corporate/industrial reaction should be considered more complex than just positive, direct, and immediately effective.

In this regard, additionally noteworthy is that, unlike the way statists used to consider Korea a successful example of state-led growth, the financial crisis in the late 1990s, which resulted in the International Monetary Fund assistance eventually accompanied by several major business groups' bankruptcies, e. g., Daewoo, changed what the country represents in terms of economic policy implications. For instance, although the establishment of diplomatic relations between China and Korea in 1992 immediately stimulated Chinese leaders to learn Korea's government-led success as a model most relevant to their socialist economic structure governed by a strong state, following the late 1990s financial crisis, they started turning their attention to discussing the limitation of government-led growth from the Korean case. Yet, as some Korean business groups that survived the extreme difficulty recently resume performing well in areas such as cars, memory chips, color picture tubes, liquid crystal displays, mobile communications devices, and online services, Chinese entrepreneurs these days try to strengthen relationships with Korean companies involved in those fields welcoming their investment in China, as partly shown in the automobile and semiconductor industries' relatively recent structural expansion in Chapter Four. Last

year and in the first quarter of 2002 consecutively, Samsung Electronics and Hyundai Motor Company have earned record profit. As publicly traded companies, the stock market value of Samsung Electronics became greater than that of Japan's Sony as of April 2002 although Samsung's brand recognition has never been truly comparable to Sony's in the world market.

Convergence and Divergence in the Process of Corporate Globalization

Which of convergence or divergence is occurring as a result of globalization is a way to contrast various globalization-related arguments as briefly discussed in Chapter One (e. g., Guillén 2001a: 244-247). Regarding various modern institutions, Meyer and Hannan (1979) were among the first who comprehensively suggested increasing transnational similarities in organizational structures, and more recently conclude that even local peculiarities intensify, not weaken, isomorphism in the process (Meyer et al. 1997). In response such convergence-advocating generalizations, when it comes specifically to the discussion of industrial growth, Guillén (2001b: 228-230) finds that globalization encourages diversity based on his cross-national studies of the automobile industry that conclude the importance of country-specific paths. As such, the debate of the effect of globalization has so far mainly concentrated on which of convergence or divergence is more representative of the ongoing change in terms of organizational/institutional characteristics. Also, most studies dealing with this issue have been adopting national economies as the common unit of analysis. Yet, my studies (as presented in Chapters Two, Four, and Five), which adopted corporations

and industries as the units of analysis and network approaches as the methods, suggest that further inquiry is necessary before reaching too one-sided a conclusion.

My conclusion regarding the ongoing process of economic globalization in the case of Korea's automobile and semiconductor industries is that both convergence and divergence are empirically detectable in and explain the process of industrial growth (see Table 6.2).

First, I will specify in what aspect convergence has occurred from the comparison of the two industries. In Korea, major business groups have lead both industries since they grew into mature stages since which mass-production could start and stably continue, soon leading to the stage of mass-exporting and its continuation as well. In the case of the automobile industry, the rebuilding phase starts in 1945 but domestic production practically ceases in the early 1960s due the haphazard government policy that ended up in a lose-lose situation for both the Shibal and the Blue Bird. The late 1960s is when business groups genuinely started to position subsidiaries in the automobile industry collectively imitating the import-assemble business model previously shown by the short-lived instance of the Blue Bird. As domestic mass-production succeeds in the mid-1970s, and mass-exporting in the mid-1980s, the corporations converge as export-oriented finished car producers. Also in the case of the semiconductor industry, business groups start engaging in primitive wafer fabrication by the late 1970s, in the mass-production of DRAMs by the mid-1980s, and in mass-exporting by the late 1980s. By the mid-1980s and since then, all major business groups involved in the industry converge and remain as memory chip

producers. Thus, convergence explains the processes of business group participation, and, seemingly as a result of it in terms of time order, product specialization and the successful continuation of mass-production and exporting, which coincided with the accelerated growth of the three MNCs.

However, reviewing the economic globalization-related aspect of the two industries via network approaches (as presented in Chapter Four in detail), divergence is also conspicuous between the two industries. Most basically, as shown in the MDS analysis network diagrams by MNC (in Chapter Four), the way the automobile MNCs structurally grow shows much greater intercorporate difference than the semiconductor MNCs do mainly due to Daewoo that establishes far more inter-subsidiary transaction routes to far more countries than any other MNCs in the two industries. The analyses based on the three basic network variables also lead to the same conclusion. As shown in Figure 6.1 that compares the two industries in terms of mean and entire network sparseness, the automobile industry quite consistently shows a sparser network. In Figure 6.2, which that compares the two industries by network in terms of network hierarchy, again seen is quite a similar pattern: the network structure of the automobile industry is more vertical. In terms of network reachability (Figure 6.3), the inter-industrial difference is clear: the semiconductor industry stays in a higher range throughout the period, meaning that the semiconductor MNCs compete in a more geographically concentrated manner than the automobile MNCs do.

Consistent with these results, the statistical tests of the two industries' network characteristics (details presented in Chapter Four) suggest that intercorporate influence

is more detected in the semiconductor industry than in the automobile industry except that mutual influence in terms of network reachability between the two leaders in the respective industries, i. e., Hyundai and Daewoo in the automobile industry and Samsung and LG in the semiconductor industry, turns out statistically significant in both industries. Thus, the MNCs' network characteristics generally show that divergence has occurred between the two industries.

In sum, my reaction to the previous discussion of whether convergence or divergence is the main effect of economic globalization is that both have occurred even within one national economy's experience of industrial growth and can be as above further specified as to which aspect is more relevant to either of the two patterns of organizational change (see summary in Table 6.2). Statism and institutionalism, if willing, need further specify the applicability of their discussion of convergence and divergence in the process of industrial growth by readjusting or diversifying their units of analysis.

Further Discussion

Inter-network Influence, Intercorporate Competition and Industrial Growth

The findings in the preceding chapters suggest that the two industries show different patterns in intercorporate influences measured by network sparseness, hierarchy, and reachability although, in terms of product development, the MNCs in the respective industries converged to finished cars and memory chips. Yet, examination of MNCs' networks and their structural growth by industry leads to a

more complex conclusion. In the case of the automobile industry whose level of development is considered lower than that of the semiconductor industry, greater intercorporate difference and less intercorporate influence turned up in the comparative network analysis as presented by the network analyses in Chapter Four. While both industries show statistically significant intercorporate influence in terms of network reachability, compared to the automobile industry, intra-corporate transaction routes in the semiconductor industry were generally concentrated in similar locations, which means that the Korean semiconductor MNCs chose to compete with one another in a more geographically concentration manner than in the case of the automobile MNCs. This suggests that the degree of intercorporate competition (measured by intra-corporate network terms) is positively correlated with the degree and speed of development by industry.

This also implies for future research that, if more sophisticated theories and methods are devised to link intercorporate influence in network growth, intercorporate competition, and industrial growth, causalities among the three factors can be examined in greater detail to reach stronger generalization for the studies of networks and economic change. As network approaches can analytically capture the internal dynamics of organizations based on relationships and transactions among the members, organization and development studies can benefit from more enthusiastically adopting them in identifying more diverse factors explaining economic consequences to elaborate on their previous achievements as this dissertation exemplified a few unprecedented network-based methods. Such efforts will open up a new layer of

discussion that can further and possibly transcend the ongoing debate about which of organizational/institutional convergence or divergence is occurring as a result of economic change and globalization.

Discovering New Variables in Further Explaining Economic Phenomena: A Methodological Suggestion

The theoretical power of economic sociology, in my view, initially stems from turning rationality of economic actors, which mainstream economic considers equally given, into variables (see Smelser and Swedberg 1994) so that the propositions about mutual influence among economic actors would be theoretically much more important to look into. As introduced in Chapters One and Three, such a perspective also enables actors' mutual influence to be considered a variable explaining economic activities and results based on the theories about mans' interdependence, e. g., Polanyi's (1957a; 1957b), which also eventually lead to construct the foundation of network-related theories. Methodologically, suggesting new variables appears to be a good strategy to elaborate on achievements of any static theories in further specifying their applications so that they explanatory coverage could more comprehensive and consistent.

In this light, I suggest that previous explanations of economic/industrial growth turn their theoretically predetermined, built-in causes into variables with measures to more accurately specify how/where they are more, or less, applicable by adopting more units of analysis than just governments and national economies. For instance, for elaborations of statism, to go beyond discussing positive consequences of

state-provided input and regional convergence as a result of economic change, e. g., in East Asia, strength and effect of state intervention and area or beneficiary of intervention may be developed as variables to further explain the relationship between state intervention and economic consequences. This kind of elaboration of statism will enable to explain why—through what process—the actively intervening state consider certain industries or companies more important than the other, and also in what kind of situations, government intervention turns out more, or less, effective. The same applies to institutionalism. If it can modify its framework to consider strength of institutions and area of its effect distinct variables, its explanatory power will be greater, and their usual conclusion supporting divergence as a result of economic change at the level of countries can be reviewed from diverse perspectives. Analyses at the level of industries or corporations as presented in preceding chapters may function as bridges in doing so.

Figure 6.1. Network Sparseness: Comparison of the Automobile and Semiconductor Industries, 1980-1999

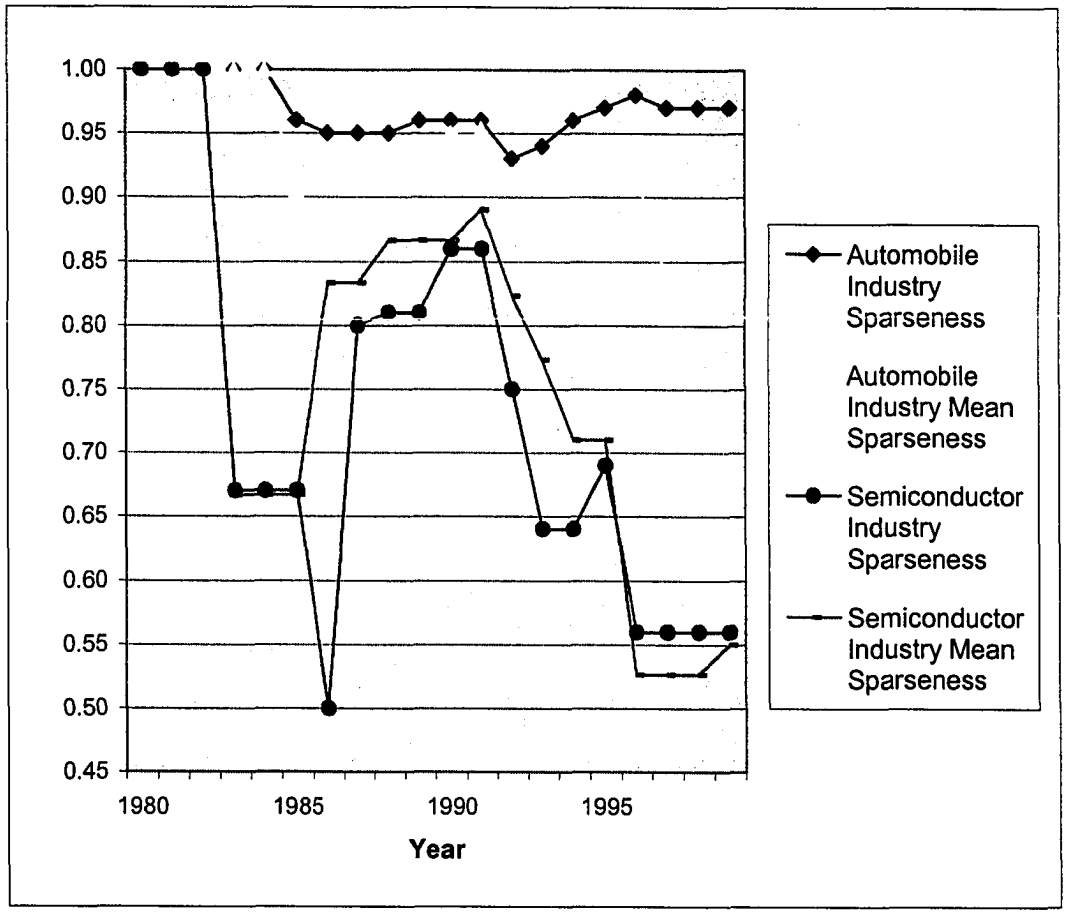


Figure 6.2. Network Hierarchy: Comparison of the Automobile and Semiconductor Industries, 1980-1999

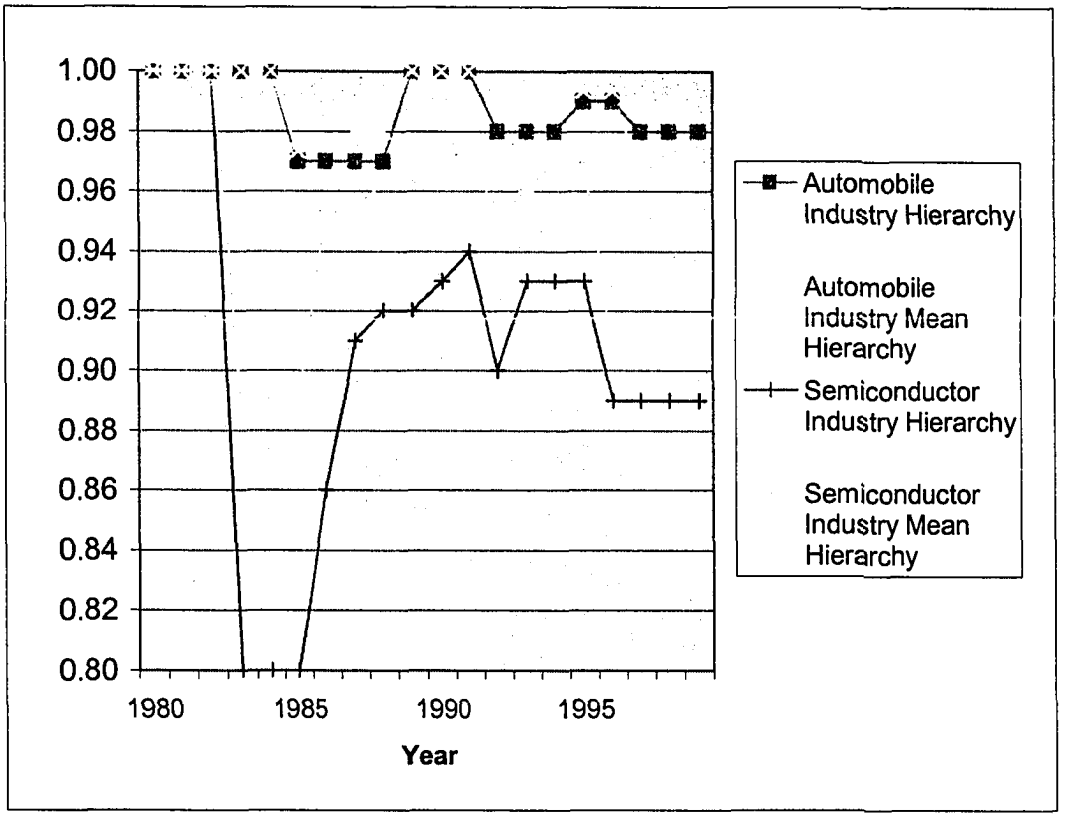


Figure 6.3. Network Reachability: Comparison of the Automobile and Semiconductor Industries, 1980-1999

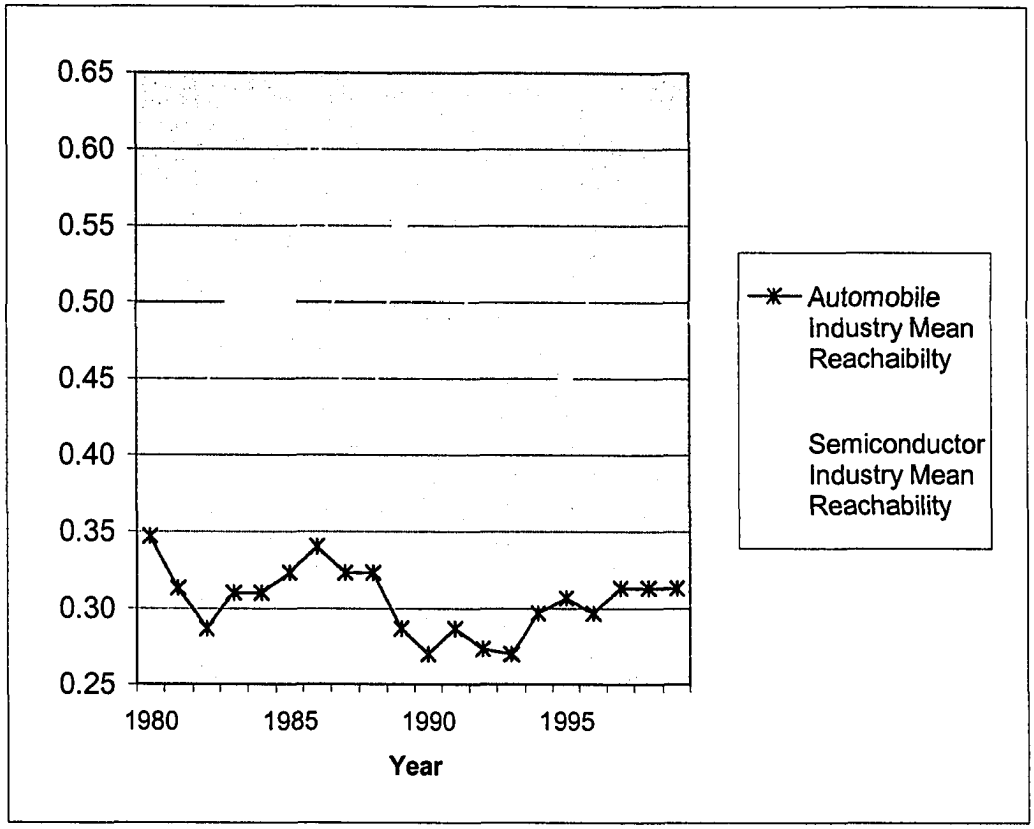


Table 6.1. Explanations of Korea's Industrial Growth

	Mainstream Economics	Statism	Institutionalism	Intercorporate Influence
Unit of Analysis	National economies as markets, various individual actors	Governments, national economies, regions	Institutions, national economies	Corporations (MNCs), industries
Agents	Rational/individual market participators	Governments, state apparatus	Social institutions, corporations	Corporations (MNCs)
Reason for Growth	Optimal adaptation to market	State leadership, support & coordination capability	Diverse institutions	Intercorporate influence & Competition
Globalization	Important	Minor	Important	Fully integrated
Theoretical Background	Economics	Political economy	Eclectic, comparative, Weberian	Economic sociology, network theory
Convergence	Yes	Yes	No	Yes and No

Table 6.2. Comparison of Korea's Automobile and Semiconductor Industries, 1980-1999

	Automobile	Semiconductor
Member MNCs	Hyundai, Daewoo, Kia	Samsung, LG, Hyundai
History in Korea Since	1945 (rebuilding)	1960s (packaging)
Business Group Involvement Since	late 1960s (Hyundai, Kia)	late 1970s (Samsung, LG)
Mass-production	early 1970s	mid-1980s
Mass-exporting	mid-1980s	late 1980s
Specialization	Finished passenger cars	Memory chips
Development	Middle	High
MNC Network Characteristics		
Structure	Different	Similar
Sparseness	High	Low
Hierarchy	High	Low
Reachability	Low	High
Overall Mutual Influence	Low	High
Leaders' Mutual Influence	Yes	Yes

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