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The Impact of Internal Coupling Structure and Environmental Scarcity on Business Group Performance

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The Impact of Internal Coupling Structure and Environmental Scarcity on Business Group Performance

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Abstract

The Impact of Internal Coupling Structure and Environmental Scarcity on Business Group Performance

By Jung Yeon Lee

A unique feature of business groups is that firms that are legally independent are bound together through various coupling ties. The role of internal coupling structure in business groups is a central concern in the business group literature. Yet we have an incomplete understanding of the coupling effects on the performance of business groups. Previous studies present conflicting arguments and provide mixed evidence on the topic, and most studies focus on the performance of affiliated firms, while little is known about group-level performance.

This dissertation investigates how the extent of coupling among affiliated firms in a group affects their performance and that of business groups. Coupling creates interdependence among group firms and facilitates supports within groups. Moreover, coupling buffers group firms from environmental selection so that coupled groups sustain weak firms that would have failed otherwise. Such mutual assistance and protection within tightly coupled groups are likely to increase group firms' survival chances, especially in resource-scarce environments, and stabilize firm profitability over time. However, such interdependence is a double-edged sword because tight coupling compounds risk within groups. Protecting weak firms also makes the whole group vulnerable to environmental selection. Therefore, tight coupling is likely to increase group failure rates.

Longitudinal analyses of 15,307 affiliated firms and 5,850 Korean business groups over a 20-year period, 1988–2007, support my predictions. Tight coupling among affiliated firms in a group through corporate governance (family ownership and intragroup shareholdings) and internal transactions decreases firm failure rate and increases group failure rate, especially in scarce environments. Also, tight coupling through corporate governance and internal transactions reduces the variance of firm profitability over time.

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CHAPTER 1:

INTRODUCTION

As a common organizational form in many emerging economies (e.g., China, India, Indonesia, Argentina), intermediate economics (e.g., Taiwan, Chile), and even developed economies (e.g., Sweden, Italy, Germany, Japan, South Korea), business groups have been a research focus in various academic disciplines such as economics, sociology, management, finance, accounting, political science, and business history. One of the most important reasons for the interest is that business groups are an intermediate, or hybrid, organizational form between a hierarchy and the market. Although the definition of business groups varies somewhat according to scholars' research interests, the internal coupling structure that binds affiliated firms together is largely recognized as the most important characteristic, making business groups a unique organizational form that is neither market nor hierarchy (Powell 1990; Khanna and Yafeh 2005).

Granovetter (1995: 454) defined business groups as "a collection of firms bound together in some formal and/or informal ways." On the basis of the Granovetter's definition, Khanna and Rivkin (2001) defined business groups as "a set of firms, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated actions" (p. 47). Similarly, Leff (1978: 663) conceptualized a business group as "a group of companies that does business in different markets under a common administrative or financial control," and "its members are linked by relations of interpersonal trust, on the basis of a similar personal ethnic or

commercial background." The definitions used by other scholars mostly mesh with these definitions and commonly highlight internal coupling structure as a unique organizational form that binds together affiliated firms and enables coordination and control of these legally independent firms in persistent ways.

This hybrid organizational form has been described as inefficient and unstable because it simultaneously includes conflicting features—market and hierarchy (Williamson 1991). Nevertheless, it has existed for a long time and has dominated the economy in many countries. For example, the top 30 Korean business groups, often referred to as *chaebols*, accounted for 40% of Korea's total output in 1996 (Chang and Hong 2000). Likewise, the top 100 Taiwanese business groups, known as *jituanquyie*, contributed 55.6% of Taiwan's GNP in 1998 (Chang, Chung, and Mahmood 2006). In Japan, the big six keiretsu groups accounted for 15% of total assets and 50% of total sales in their country's economy (Lincoln, Gerlach, and Takahashi 1992). In Sweden, the total stock value of Wallenberg and Handels bank groups accounted for 52% of the country's stock market (Collin 1998). These examples provide evidence that contrasts with prevailing conventional wisdom about organizational forms, and scholars are motivated to investigate how business groups specifically bind affiliated firms together and whether such coupling ties affect group outcomes in positive or negative ways.

Types of Coupling

Specifically, how do business groups bind their firms together? Affiliated firms in a business group are coupled in complex ways, including family ownership (e.g., Bertrand, Mehta, and Mullainathan 2002; Chung and Luo 2008; Douma, George, and Kabir 2006),

intragroup shareholding ownership (e.g., Bea and Jung 2007), internal product and financial trading (e.g., Chang and Hong 2000), and interlocking directors (e.g., Lincoln, Gerlach, and Takahashi 1992). These various coupling mechanisms can be classified into two categories: corporate governance and internal transactions.

Coupling through governance

Corporate governance is defined as "the internal organizations and power structure of the firm, the functioning of the board of directors, structure of the firm, and interrelationship among the management board, shareholders, and other stakeholders such as the company's workforce and creditors" (Chang 2003a: 20–21; Hopt et al. 1998). In essence, it is a set of mechanisms through which minor shareholders are protected against expropriation by managers and controlling shareholders.

Among several mechanisms governing business groups, concentrated ownership structure is suggested in the literature as important in governing business groups as an entire entity. The most distinctive feature of ownership structure is that controlling shareholders govern entire business groups through their equity stakes, and in many cases these shareholders are group founders or their family members. For example, in India (e.g., Bertrand, Mehta, and Mullainathan 2002), Korea (e.g., Chang 2003a, 2003b), and Taiwan (e.g., Luo and Chung 2005), family members have concentrated ownership in that they have almost total control over the firms within their groups. Moreover, the family members themselves are often simultaneously managers, as well as the owners. These owner-managers tend to make decisions according to their interests, while their

cash flow rights are often smaller than their voting rights (e.g., Bae, Kang, and Kim 2002; Baek, Kang, and Park 2004; Bernado, Luo, and Wang 2006). Such owner-managers' interests do not necessarily coincide with the profit maximization of the whole group and possibly conflict with minority shareholders' interests (Johnson et al. 2000).

Affiliated firms are also often coupled together through intragroup-shareholding ownership. Such intragroup-shareholdings occur either through direct equity shareholdings between pairs of affiliated firms or through a more complex interlocking ownership mechanism, often called *pyramids*, that involves more than two firms (La Porta et al., 1999; Almeida and Wolfenzon 2006). On the surface, coupling via intragroup-shareholding ownership appears different from coupling via family ownership, in that the former is a horizontal interconnection among affiliated firms, while the latter is a hierarchical linkage between controlling shareholders and affiliated firms. However, in many business groups, intragroup shareholdings are also used as one of the mechanisms by controlling shareholders, who are often family members, to expand their control over whole groups.

In addition, a business group often binds its affiliated firms through dispatching or interlocking directors (Lincoln, Gerlach, and Takahashi 1992). Through these mechanisms, the business group can not only monitor its affiliated firms, but also facilitate information exchange among them. In particular, interlocking directorships have attracted scholars' attention because of their advantages as information conduits (Davis 1991). For example, in Japanese keiretsu groups, directors are often dispatched to needy affiliates (Lincoln and Gerlach 2004). Because Japanese companies are not legally required to fill a certain portion of their board members with outside directors, senior

managers often serve as directors as well (Lincoln, Gerlach, and Takahashi 1992). Through these labor flows, information, training, and learning exchanges are facilitated among keiretsu member firms. Although this interlocking directorship system is not well developed in emerging economies (Chang 2006), it has increasingly become a popular governance structure in the business groups of many countries.

Coupling through internal trades

Affiliated firms are also coupled together through internal transactions. In internal markets, affiliated firms in a business group trade tangible and intangible resources with one another (e.g., Khanna and Rivkin 2000). Internal markets permit affiliated firms reduce transaction costs and increase efficiency in trading together, particularly when market uncertainty, the possibility of opportunistic behaviors, and asset specificity are high (Williamson 1975). While firms reduce transaction costs and trade with stable and certain partners through internal product transactions, they sometimes sell their products for less than the price of the products to other affiliated firms and buy products from other affiliates at a higher price (Hundley and Jacobson 1998). Moreover, business groups often tend to structure their pricing in order to minimize tax liabilities (Sharav 1974).

Business groups also create internal financial markets by pooling financial resources from other affiliated firms. The resource pool of these group-level markets is much larger than firm-level capital capacity. Transactions in internal financial markets usually take two forms. First, affiliated firms lend and borrow one another's money. Such

loans allow affiliated firms to access capital resources easily, thus enabling the whole group to allocate financial resources to firms in need. Second, strong affiliated firms in a group often guarantee the credit of weak affiliated firms that need to borrow money from banks but do not have strong credit. By leveraging strong member firms' credit and reputation, weak affiliated firms can obtain bank loans much more easily than independent firms. The use of mutual guarantees among affiliated firms enable weak firms to borrow more funds than they otherwise could because banks loan funds only to firms that can secure debt guarantees.

In addition to tangible resources such as capital, materials, and labor, business groups have internal markets for intangible resources such as brand name, reputation, and technology. Because the value of intangible resources does not depreciate with increased use, these resources are important sources for generating economies of scope (Barney 1986; Chatterjee and Wernerfelt 1991). First of all, through group-wide advertising, affiliated firms in a business group can share the brand name of the group. For example, Samsung Group annually makes a huge investment in building an excellent and friendly group image. It advertises itself as "another family of customers" through various media. By simply using the name of Samsung (e.g., Samsung electronics, Samsung insurance), affiliated firms can benefit from the group's highly respected brand name. Similarly, business groups in other countries such as India run many advertisements that enhance group identity (Khanna and Palepu 1997).

Affiliated firms are also coupled through their group's reputation. Like a brand name, reputation also operates as an endorsement of the quality and value of firms. Chang et al. (2006) suggested that firms in developed economies are more likely to make

technological contracts with firms that are under the umbrella of business groups than independent firms because business groups have a reputation for protecting property rights, which are absent in emerging economies. Moreover, affiliated firms in a group can easily access external financial resources because of the group's reputation (Chang and Hong 2000).

Business groups have internal markets for technology, in which knowledge transfer and sharing easily occur. In Korea, business groups operate group-level R&D centers (Chang and Hong 2000). Affiliated firms jointly invest in collective R&D efforts and share the results. They also trade technological knowledge by transferring each other's human resources.

Why Coupled Together?

Business groups may actively develop or passively become tightly or loosely coupled structures for many reasons. A focal business group may actively bind its firms tightly to exercise strong control in management (Chung and Luo 2005, 2008), enhance goal congruence (Khanna and Rivkin 2006), or facilitate resource sharing among group firms (Khanna and Palepu 2000; Guillén 2000). For example, by binding firms through common ownership ties, controlling shareholders exercise strong power in the management of business groups. When controlling shareholders are family members, agency problems between owners and managers can be reduced because family owners are often simultaneously managers in their group (Fama and Jensen 1983). In addition, common ownership contributes to goals being shared among a group's member firms.

This goal congruence can reduce opportunistic behaviors of members, thus establishing stable and reliable institutions that are especially valuable under high uncertainty in emerging markets (Geertz 1978). In addition, business groups may actively develop coupled structure to facilitate resource sharing among group firms. In the internal markets of business groups, member firms easily share each other's resources, capabilities, and information as well as access to group-level resource pools. Business groups sometimes develop coupled structures to transfer resources according to controlling shareholders' wealth interest (Bae, Kang, and Kim 2002).

On the other hand, business groups may passively become tightly coupled structures if external markets are imperfect due to high transaction costs (Williamson 1975) and institutional voids (Leff 1978). With respect to transaction cost economics, organizations create a product internally when making it is cheaper than buying it in the market (Coase 1937; Williamson 1975). Under the condition of high transaction costs in the market, business groups as a substitute organizational form of market or hierarchy internalize market failure and bind together firms involving in diverse industries, thereby seeking to overcome the difficulties of obtaining capital, labor, materials, technology, and transaction partners (e.g., Guillén 2000; Hoskisson, Hill, and Kim 1993; Khanna and Rivkin 2001). Moreover, when institutions setting the rules of a game in the market do not exist (North 1990), economic actors need to invest a considerable amount of money and time in searching for transaction partners and making contracts. To fill these deficiencies, a business group creates internal goods as well as service markets in which its affiliated firms buy and sell one another's products, thereby producing a tightly coupled structure.

Business groups may also become tightly or loosely coupled structures because of government regulations (e.g., Chang 2003a; Maman 2002; Keister 1998).When the government actively engages in resource allocation and promotes the development of certain industrial areas by establishing economic policies and regulations, it often selects a small number of business firms as its political partners, and thus encourages the formation of business groups by providing access to capital, such as loan guarantees and other favors like tax reduction (Amsden 1989; Guillén 2000). When the government changes its industrial focus, firms accordingly diversify into industries that the government prefers, thereby forming diversified business groups. In the process of combining such diversified portfolios, business groups become more coupled structures.

Lastly, business groups become coupled structures because of social and cultural patterns (Fields 1995), especially interpersonal relationships (Strachan 1976). Specifically, economic sociologists have examined how the structure of business groups emerges out of families, clans, and other interpersonal relationships. For example, Fields (1995) suggests an isomorphic tendency between business groups and the social orders governing extended families such as patriarchs, inheritance rules, and the mechanisms of discipline and control. In social settings characterized by vertical relationships (South Korea), business groups tend to emerge from single families and have coupled structures according to hierarchical systems on the basis of the patrimonial concept of authority and of inheritance rules that favor eldest sons. In contrast, business groups tend to become coupled structures on the basis of horizontal ties in countries where reciprocal (Japan) and horizontal (Taiwan) relationships are the social order.

Unclear Effects of Internal Coupling Structure on Business Groups

Because of the central role of internal coupling structure in business groups, scholars have actively examined how coupling affects the outcomes of business groups. Despite extensive research and well-documented evidence, our knowledge of coupling effects on business groups is incomplete. A key reason that we do not have a full understanding is that the performance implications of internal coupling structure on affiliated firms remain controversial. Studies have provided mixed evidence, as shown in Table 1, which summarizes previous studies with regard to whether coupling provides benefits or adds costs to group firms. Such evident disagreement is often characterized as a "paragons or parasites" (Khanna and Yafeh 2007) or "red barons or robber barons" (Perotti and Gelfer 2001).

[Insert Table 1 about here]

Scholars drawing upon the resource-based view (Guillén 2000), transaction cost economics (Luo and Chung 2005; Mahmood and Mitchell 2004), and exchange theory (Keister 2001) have largely suggested that business group firms enjoy benefits from resource sharing and transfers and reduce transaction costs through internal coupling. On the other hand, scholars relying on the perspective of agency theory have pointed out the weak governance structure of business groups and suggested that affiliated firms' performance is often constrained by internal coupling, especially if coupling is used to benefit a few controlling shareholders or specific firms at the expense of others (Bae,

Kang, and Kim, 2002; Lincoln, Gerlach, and Ahmadjian, 1996; Khanna and Yafeh, 2005). In business groups, controlling shareholders are often managers. The wealth of these owner-managers is proportional to the value of their business groups. In order to increase their wealth and maximize the value of their business groups, these owner-managers have strong incentives to transfer resources according to their own preference, even though such transfers often negatively affect the wealth of minority shareholders and the value of some affiliated firms (Bae et al. 2006; Baek et al. 2006).

Why do we have such an unclear understanding about the performance effects of coupling ties on firms? One possible explanation is that not all groups equally influence firms. Some groups may be beneficial for firms, while others may constrain firm performance. Although the effects of coupling on firms should depend on the internal coupling structure of groups, previous studies did not account for the variance of coupling across groups, mostly because of a lack of detailed data on coupling ties. Instead, they examined whether coupling effects exist by comparing group firms with independent firms that do not have coupled structures. The most common way to make such comparisons is to create a group dummy, which assigns a value of one to affiliated firms and a value of zero to independent firms. However, this approach not only fails to capture the variance of business groups, but it also fails to measure coupling ties directly. Given that both benefits and costs of coupling exist in business groups, as business group theories suggest, it is difficult to reconcile the conflicting arguments and mixed evidence without measuring coupling ties directly and incorporating the variance of ties across groups.

Another explanation is that boundary conditions exist for intragroup coupling ties. Rather than arguing whether business groups have a positive or negative effect on their affiliated firms' performance, scholars have increasingly shown in recent studies that not all affiliates benefit equally from their association. However, most of the studies have focused on the internal characteristics of affiliated firms such as the relatedness of diversification (Khanna and Palepu 2000), firms' prior performance (Lincoln, Gerlach, and Ahmadjian 1996), the power of affiliated firms (Kim et al. 2004; Chacar and Vissa 2005), the types of ownership (Douma et al. 2006), and whether firms receive or send resources in a group (Chang and Hong 2000). Only a few scholars have emphasized the importance of environmental conditions, especially institutional contexts, as boundary conditions for coupling effects. They usually conducted cross-country studies based on the assumption that countries vary with regard to institutional contexts (e.g., Hoskisson et al. 2004; Chang, Chung, and Mahmood 2006). Luo and Chung (2005) showed that institutional transitions even in a single country influence the role of coupling ties on business group performance. However, organizations as open systems are interdependent with the environment, over which they have only limited control (Katz and Khan 1966; Thompson 1967), and they rely on the environment for the critical resources necessary for their survival (Meyer and Rowan 1977; Pfeffer and Salancik 1978; DiMaggio and Powell 1983). Because intragroup coupling ties do not function in a vacuum, their effectiveness depends on the opportunities and constraints created by external environments. Therefore, a strong need still exists to incorporate external environments in our research models and examine the external environmental effects on the

performance outcomes of coupling ties to reconcile the opposing arguments and mixed evidence.

[Insert Table 2 about here]

Furthermore, our knowledge of the coupling effect on business group performance is significantly unbalanced; almost nothing is known about the impact of internal coupling on group-level performance because empirical research has primarily focused on firm-level performance, especially the financial performance of firms (see Table 2). Considering this lack of group-level research, the studies of Lincoln and his colleagues (1992) and Khanna and Rivkin (2006) have made important contributions. Although the researchers examined dyad-level phenomena (i.e., a pair of two firms instead of group-level outcomes), they tried to explore the boundaries of business groups by examining what types of ties distinguish business groups as pairs of affiliated firms from pairs of independent firms. Specifically, Lincoln and his colleagues found that keiretsu-affiliated firms in Japan are controlled by intragroup shareholding, interlocking directorship, and reciprocal commercial transaction ties. Similarly, Khanna and Rivkin (2006) suggested that a pair of firms is likely to belong to the same Chilean business group when these two firms share family and common ownership, interlocking directorship, and direct and indirect equity relationships.

Yet studies of group-level outcomes are very rare, although business group theory addresses group-level behaviors. The only exception might be Chung and Luo's (2008)

study that examines the relation of the portion of family versus foreign shares on the divestiture decision-making of business groups. Although a few scholars like Hoskisson and his colleagues (2005) and Khanna and Yafeh (2007) provide several group-level propositions, their predictions have not been empirically examined. As the main decision makers, groups focus on maximizing group-level utility (Coplan and Hikino 2010), and they structure coupling among their firms according to the groups' interests. Such group-level decisions are not necessarily consistent with firm-level interests, however. Even though the performance of affiliated firms might not be separate from that of their groups, inferring group-level performance only from empirical evidence at the firm level is not intuitive because of the complexity of this kind of system, in which the whole entity is composed of individual parts interacting in a complex manner (Simon 1962).

Dissertation Overview

Motivated by these research gaps and our need to understand the performance effects of coupling on both group firms and business groups, I investigate how the extent of coupling among affiliated firms affects the performance outcomes of group firms and business groups. In Chapter 2, I propose that coupling among group firms positively affects firm survival performance, and therefore decreases firm failure rates. As a form of interdependence (Thompson 1967; Perrow 1984), coupling facilitates supports among the firms (Weick 1976). Coupling also buffers group firms from environmental selection. Acting as a safety net, a tightly coupled group sustains weak firms that would have failed if they had been outside the group (Hannan and Freeman 1977; Davis 1996; Lincoln,

Gerlach, and Ahmadjian 1996; Khanna and Yafeh 2005). Therefore, the greater the coupling of group firms, the lower the group failure rate. This beneficial effect of coupling on firm failure rates is likely to be accentuated in resource-scarce environments in which acquiring resources is difficult and the selection pressures are more intense. Moreover, due to mutual assistance and buffering through coupling ties, affiliated firms are likely to stabilize their performance variance over time. By analyzing a unique longitudinal data set of 15,307 affiliated firms belonging to 4,593 Korean business groups for the period of 1988–2007, I found strong supports for my predictions.

In Chapter 3, I turn my attention to how the extent of coupling among affiliated firms affects group-level performance and propose that coupling among group-affiliated firms negatively affects group survival performance. Due to the interdependent nature of coupling, risk is compounded within a group. Consequently, tightly coupled groups are more vulnerable to collective collapse and are the most likely to fail. In addition, protection for group firms, especially weak ones, would weaken the group as a whole and make it sensitive to selection processes, thereby increasing its failure rate. Therefore, the greater the coupling of group firms, the higher the group failure rate. Such detrimental effects of coupling on group failure rates are likely to be accentuated in resource-scarce environments. Analyses of 5,850 Korean business groups from 1988 to 2007 provide strong supports for my hypotheses. Tight coupling among affiliated firms in a group through corporate governance and internal transactions increases the failure rate of business groups, especially in scarce environments.

CHAPTER 2:

BEING TIGHTLY COUPLED: INTERNAL COUPLING STRUCTURE, ENVIRONMENTAL SCARCITY, AND THE PERFORMANCE OF AFFILIATED FIRMS IN BUSINESS GROUPS

Introduction

Despite the central role of internal coupling structure, its effects on the performance of affiliated firms remain controversial, and studies have provided mixed evidence as I discussed above. Some authors argue that tight coupling helps to lower transaction costs (Williamson 1975) and enhances the utilization of resources within groups. For example, tight coupling through common ownership ties reduces agency problems (Fama and Jensen 1983), encourages information dissemination (Khanna and Palepu 2000), and contributes to goals being shared among affiliates (Geetz 1978). In addition, internal trade relationship provides an efficient way to transfer and share resources (Guillén 2000; Hoskisson, Hill, and Kim 1993; Khanna and Rivkin 2001), thereby allowing affiliated firms to access group-level resource pools that are much larger than firm-level capacity. Others point out that family owners destroy the value of the firms because they tend to be risk adverse (Thomsen and Pedersen 2000) and put family reputation before economic profitability (Chung and Luo 2008). Also, coupling through common ownership and internal trades may be used to cross-subsidize resources, often resulting in the wealth of high performers and minority shareholders being sacrificed (Bea, Kang, and Kim 2002).

To reconcile the seemingly opposite conclusions and contribute to our understanding of firm-level performance, I in Chapter 2 examine how the coupling effects on firm-level performance depend on the extent of coupling among affiliated firms in a group and how such effects are contingent on environmental conditions. Specifically, I propose that coupling among affiliated firms in a group positively affects firm survival performance, and therefore decreases firm-level failure rate. We might observe such a positive relationship between coupling and firm failure rates as follows. First, coupling is a form of interdependence (Thompson 1967; Weick 1976; Perrow 1984). With the quality of group firms held constant, interdependence facilitates supports among the firms, thereby increasing the survival chances of the firms. Second, even if the quality of group firms is not held constant, coupling buffers group firms from environmental selection. Acting as a safety net, a tightly coupled group sustains weak firms that would have been selected out if they had not been part of the group (Hannan and Freeman 1977; Davis 1996; Lincoln, Gerlach, and Ahmadjian 1996; Khanna and Yafeh 2005). Such protection for group firms would decrease firm failure rates. Together, regardless of the quality of group firms, the greater the coupling of group firms, the lower the firm failure rate. Moreover, due to mutual assistance and buffering through coupling ties, affiliated firms would stabilize their performance variance over time.

Examining the boundary conditions of coupling ties, I also suggest that the performance effects of coupling ties depend on environmental scarcity, which has been suggested as a critical environmental factor (Aldrich 1979; Dess and Beard 1984; Delacroix and Swaminathan 1991; Hawley 1950). Given the difference in terms of resource acquisition and environmental threats experienced in scarce vs. munificent

environments, it is not obvious how internal coupling structure will affect the performance of affiliated firms. When the environment is scarce, resource acquisition is difficult, demand is stagnant, and environmental threats are prevalent. In such crisis situations, affiliated firms in a tightly coupled group can efficiently support one another and are protected by their parent group from the environmental selection. The benefits of mutual assistance and buffering from the environment are greater in these bad times, compared to good times. Therefore, the coupling effect on firm failure rates and the variance in firm profitability will be accentuated in scarce environments.

I test my theory in the context of South Korea. South Korea offers a good setting for my analysis for several reasons. First, a large sample of business group firms is available because of the dominance of business groups in the country (e.g., Chang 2003a; Khanna and Rivkin 2001; Kim 2010). Second, South Korean business groups employ various coupling mechanisms binding affiliated firms together; as a result, rich and detailed coupling data, which are generally very rare, are systematically documented. Specifically, I explore the influences of coupling by considering two types of ties widely employed by business groups: corporate governance and internal transactions. Third, South Korea has experienced dynamic environmental changes for the last few decades. In particular, the Korean economic crisis from 1997 to 1999 significantly affected the economic environment of Korea, enabling study of the coupling effects under an environmental scarcity condition. To test my hypotheses, I collect a unique longitudinal data set of 15,307 affiliated firms belonging to 4,593 Korean business groups for the period of 1988–2007 that spans contexts before and after the environmental crisis. I employ a piecewise constant hazard rate model and a variance function model. The results indicate

that tight coupling among affiliated firms in a group decreases the failure rate of affiliated firms, and it also reduces the variance of firm profitability over time. The beneficial effect of tight coupling on firm survival performance is more salient in scarce environments. Below, I theorize why one might expect these results.

Internal Coupling Structure and the Performance of Group Affiliated Firms

Coupling, defined as the relationship among elements in a system (Weick 1982), is a form of interdependence (Thompson 1967); the greater the coupling among firms, the stronger the interdependence. Through tight coupling, affiliated firms are involved in a strong interdependent network; they are responsive and act in interconnected ways, affecting each other continuously, constantly, directly, and immediately (Weick 1982). What happens in one firm affects what happens in other firms within the same group (Perrow 1984) so that the performance of one group firm heavily relies on that of the others. Firms in a tightly coupled group can expect assistance from other affiliated firms when they are in danger. With the quality of group firms held constant, interdependence compounds the performance problem of a firm and diffuses it into other firms in the same group unless the troubled firm is bailed out by them. Thus, other affiliated firms in the same group would be likely to help the troubled firm by utilizing or sacrificing their own resources so that local performance difficulties may be absorbed by all firms together. Moreover, assistance from other firms is likely to be efficient and rapid due to the efficiency of tight coupling (Weick 1976).

On the other hand, firms in a loosely coupled group are responsive, but independent of one another, influencing each other suddenly, occasionally, indirectly, and

eventually (Weick 1982). The performance of affiliated firms is loosely interdependent. One firm's failure may somewhat affect other firms' longevity, but not in a significant way. In such groups, firms with performance problems are less likely than those in tightly coupled groups to be bailed out by other affiliated firms. Moreover, loose coupling is inefficient and slow in coordination, risk diversification, and resource allocation (Weick 1976). In a loosely coupled group, a firm's risk tends to be localized, thereby increasing the firm's failure rate.

Even if the quality of group firms is not held constant, coupling buffers group firms from environmental selection. The environment selects organizations on the basis of the fit between the environment and organizations; unfit organizations are deselected, and thus fail, while fit firms are selected and survive (Hannan and Freeman 1977). However, even unfit firms may not always fail in a tightly coupled group. Because of the high interdependence among firms, such firms in this group may have a strong willingness or obligation to support one another. Acting as a safety net, a tightly coupled group sustains weak firms that would have been selected out if they had not been within the group (Hannan and Freeman 1977; Davis 1996; Lincoln, Gerlach, and Ahmadjian 1996; Khanna and Yafeh 2005). Such protection for group firms would make the firms less sensitive to selection processes, thereby decreasing the failure rate of the firms in scarce environments. On the other hand, firms in a loosely coupled group may not be as well cushioned from selection processes as firms in a tightly coupled group because of the low interdependence among group firms. Building on these ideas, I propose a negative relationship between coupling and firm failure rates.

Proposition 1: The greater the coupling among firms in a business group, the lower the firm failure rate.

In addition, firms in tightly coupled groups will also show more stable profitability (lower variance in profitability) than those in loosely coupled groups. Firms in a tightly coupled group can stabilize their performance over time by receiving support and protection from other affiliated firms in the same group when they are in danger. Such protection implies that unfit firms benefit at the expense of fit ones, thereby constraining the performance of fit firms because resources are transferred from well-performing firms to those performing poorly (Bae, Kang, and Lee. 2006). As a result, tightly coupled groups may make weak firms not as weak as they would otherwise be, while placing a ceiling on the performance of their strong firms (Lincoln, Gerlach, and Ahmadjian 1996; Khanna and Yafeh 2005). No matter which affiliated firms in a tightly coupled group are positively or negatively influenced, such mutual assistance and protection are likely to reduce the variance in profitability of firms in a tightly coupled group. In other words, firms in a tightly coupled group will be likely to show more reliable performance over time than those in a loosely coupled group in scarce environments. For this reason, I propose a negative relationship between coupling and the variance in firm profitability.

Proposition 2: The greater the coupling among firms in a business group, the lower the variance of firm profitability.

Moderating Effect of Environmental Scarcity

Emphasizing the influence of the environment, contingency theorists argue that "there is no one best way to organize" (Galbraith 1973, 2) because the best approach is contingent on the environment in which an organization is embedded (e.g., Lawrence and Lorsch 1967). Organizational ecologists also agree that the fit between organizations and the environment is important, and they suggest that an organizational form with an ideal fit in one environment may be inappropriate in a different environment and thus likely to be selected out in that environment (e.g., Hannan and Freeman 1977). To examine the contingent effects of the environment on coupling impacts, I specifically focus on the level of environmental scarcity, which has been suggested as an important determinant affecting organizational survival (Aldrich 1979; Castrogiovanni 1991; Dess and Beard 1984; Hawley 1950).

Environmental scarcity is the opposing construct of munificence, which generally refers to an environment's ability to support sustained growth of an organization (Aldrich 1979). In his theoretical discussion on munificence, Castrogiovanni (1991) identifies three different kinds of munificence: capacity, growth/decline, and opportunity/threat. Capacity refers to the level of resources available to firms; growth/decline refers to the change in capacity; and opportunity/threat refers to the extent of unexploited capacity. In munificent environments, resources are abundant, demand is increasing, and environmental opportunities exist. Organizations face low competition and easily acquire resources to create more demand and secure further growth (Aldrich 1979; Pfeffer and Salancik 1978). In such environments, it is not difficult to accumulate resources, and

environmental selection pressures themselves are weak in these environments, thereby allowing most firms to survive.

However, in scarce environments, resource acquisition is more difficult, demand is stagnant, and environmental threats are prevalent. Such environmental scarcity threatens the continued viability of organizations by increasing competition for dwindling resources (Dess and Beard 1984). Because these environmental conditions present crisis-like situations, any losses associated with risky decisions may be highly damaging to organizations' continued viability, thereby forcing organizations to avoid excessive risk-taking and pay greater attention to the conservation of resources (Yasai-Ardkani 1989; Goll and Rasheed 2005). In these environments, the pressures of environmental selection will intensify, and therefore the fate of organizations is subject to uncertainty. Unless organizations have enough slack to adapt to environmental changes and therefore survive in the face of adversity (Cyert and March 1963), they are exposed to severe selection processes.

All else being equal, coupling is more likely to facilitate supports among firms within tightly coupled groups and protection from selection when environmental scarcity occurs. Such mutual supports and protection would increase the survival performance of firms. On the other hand, when environments are munificent, coupling may not significantly decrease the firm failure rate because abundant resources and low competition allow many firms to perform well and environmental selection pressures themselves are weak. In such favorable times, the beneficial effects of coupling on affiliated firms will likely be attenuated. Based on these ideas, I propose that the

beneficial effects of coupling on firm survival performance are more salient in scarce environments.

Proposition 3: The negative effect of coupling on firm failure rate will be accentuated in scarcer environments.

Types of Coupling

Affiliated firms in a business group are coupled in complex ways, including family ownership (e.g., Bertrand, Mehta, and Mullainathan 2002; Chung and Luo 2008; Douma, George, and Kabir 2006), intragroup shareholding ownership (e.g., Bea and Jung 2007), internal product and financial trading (e.g., Chang and Hong 2000), and interlocking directors (e.g., Lincoln, Gerlach, and Takahashi 1992). As I discussed in Introduction, these various coupling mechanisms are classified into two categories: corporate governance and internal transactions. In this paper, corporate governance includes both family ownership and intragroup-shareholding ownership, and internal transactions represent internal product trades. All these coupling mechanisms are widely employed by business groups. In following sections I discuss how each type of coupling creates interdependence among group firms, and thus supports within groups, and also buffers group firms from environmental selection, thereby lowering the failure rate of firms and reducing the variance of firm profitability, especially in scarce environments.

Coupling through governance. Among several mechanisms governing business groups, concentrated ownership structure is important in governing business groups as an entire entity. In business groups, controlling shareholders govern entire business groups

through their equity stakes, and in many cases they are group founders or their family members. Family members have concentrated ownership inasmuch as they have almost total control over the firms within their groups. These family members exercise strong control in the management of business groups, while their cash flow rights are often smaller than their voting rights (e.g., Bae, Kang, and Kim 2002; Baek, Kang, and Park 2004; Bernado, Luo, and Wang 2006).

Coupling through family ownership is likely to negatively influence the firm failure rate and variance of firm profitability for several reasons. First, coupling through family ownership creates interdependence and facilitates supports among affiliated firms when some do not perform well. According to the principle of solidarity (Granovetter 1995), family ties serve as the source of group solidarity, and thus create strong interdependence among firms within a group. Based on these informal norms, affiliated firms linked through family ties have strong obligations to support each other unconditionally when any of them needs help. The failure of one firm in a family-centered business group has emotional meaning for other affiliated firms, which is more than the bankruptcy of a business; in a larger sense, it means the failure of their brother or sister.

Second, some family-owned business groups in particular resemble a hierarchical relationship between parents and children, in that parents direct their children, and the children obey their parents (Guillén 2000; Chang 2003a, 2003b). If an affiliated firm owned by their son or daughter were to experience difficulties, the parents would likely direct their other children operating affiliated firms to assist their endangered brother or

sister. If the children defy their parents, however, not only would they be considered undutiful, but they would also be disinherited or excluded from successorship.

Third, a family tends to put reputation and inheritance issues before economic profitability (Luo and Chung 2005; Chung and Luo 2008), which is also likely to encourage support among affiliated firms. For example, Chung and Luo (2008) suggest that because family owners fear degrading the family name, they are reluctant to divest their businesses, even if such divestitures are economically efficient. They also point out that there is a considerable amount of tension and conflict among the children of family owners because these children expect equal inheritances from their parents, thereby making efficient decision processes even more difficult. This equal inheritance expectation among children makes affiliated firms keep in a group (Wong 1985) because redistributing family property is difficult (Luo and Chung 2005; Ghemawat and Khanna 1998).

If coupling through family ownership tends to create interdependence among group firms, thus facilitating supports among firms within a group and protecting firms from environmental selection, then firms in a tightly coupled group should be less likely to fail than those in loosely coupled groups. This negative relationship between coupling and firm failure rate will be accentuated in scarce environments. Also, the variance of a firm's profitability in a tightly coupled group will likely be lower.

Hypothesis 1a: The greater the coupling through family ownership in a business group, the lower the firm failure rate.

Hypothesis 2a: The greater the coupling through family ownership among firms in a business group, the lower the variance of firm profitability in scarce environments.

Hypothesis 3a: The negative effect of coupling through family ownership on firm failure rate will be accentuated in scarcer environments.

Affiliated firms are also often coupled together through intragroup-shareholding ownership. Such intragroup-shareholdings occur either through direct equity shareholdings between pairs of affiliated firms or through a more complex interlocking ownership mechanism, often called *pyramids*, that involves more than two firms (La Porta et al., 1999; Almeida and Wolfenzon 2006). In many business groups, intragroup shareholdings are also used as one of the mechanisms by controlling shareholders to expand their control over whole groups.

Intragroup-shareholding ownership couples affiliated firms together by equity relations; thus, the wealth of affiliated firms is interdependent. If an unfit firm fails, it will negatively influence the other firms investing in that firm. Through this equity participation, affiliated firms holding stakes in the unfit firm have a strong incentive to protect their investees from takeover threats and competition if they are in danger (Lincoln, Gerlach, and Takahashi 1992; Lincoln, Gerlach, and Ahmadjian 1996). For these reasons, when affiliated firms are tightly coupled through intragroup-shareholding relations, unfit firms are likely to be supported and protected from environmental selection. Consequently, tight coupling through intragroup shareholdings will likely decrease the failure rate of firms, especially in scarce environments. Also, the variance of firm in profitability will be low when firms are tightly coupled through such equity relations.

Hypothesis 1b: The greater the coupling through intragroup-shareholding ownership in a business group, the lower the firm failure rate.

Hypothesis 2b: The greater the coupling through intragroup-shareholding ownership among firms in a business group, the lower the variance of firm profitability in scarce environments.

Hypothesis 3b: The negative effect of coupling through intragroup-shareholding ownership on firm failure rate will be accentuated in scarcer environments.

Coupling through internal trades. Affiliated firms are also coupled together through internal transactions. Business groups create internal markets for products in which affiliated firms trade with one another, thereby reducing transaction costs and increasing efficiency in trading together (Khanna and Rivkin 2001; Williamson 1975). In such internal product markets, affiliated firms, which are sellers and buyers of each other's products, generate direct ties between two parties and form a symbiotic relationship (Audia, Freeman, and Reynolds 2006; Hawley 1950). Such a relationship creates strong interdependence among firms in a group. Because sellers provide inputs to buyers and buyers purchase sellers' outputs, the performance of transaction partners is highly intercorrelated. Such interdependence facilitates supports and protection within groups because the failure of one party likely leads to the failure of the other.

This aforementioned idea would especially be true if one party failed and the other was unable to find an alternative transaction partner. Business groups tend to create internal markets especially when institutional voids exist (Leff 1978) and/or transaction costs are high in external markets (Williamson 1975). By internalizing market failure, business groups seek to overcome the difficulties of obtaining transaction partners (e.g., Guillén 2000; Hoskisson, Hill, and Kim 1993; Khanna and Rivkin 2001). For instance, LG, one of the largest business groups in South Korea, has grown through diversification due to a lack of appropriate suppliers and buyers in the market (Kim et al., 2004). LG

initially started out as a cosmetic skin cream manufacturer and entered the plastic industry because, at that time, no company was producing plastic products, such as plastic caps for skin cream jars. To create suppliers and buyers by itself, LG has sequentially launched electric fan blades and telephone cases and entered the electronic product and telecommunications markets. Thus, firms tightly coupled through internal trades should be likely to support one another if any of them has performance problems, not only for the sake of the unfit firms, but also for themselves. Such protection for group firms will be likely to decrease the failure rate of affiliated firms in a tightly coupled group, especially in scarce environments, and stabilize firm profitability over time.

Hypothesis 1c: The greater the coupling through internal trade in a business group, the lower the firm failure rate.

Hypothesis 2c: The greater the coupling through internal trade among firms in a business group, the lower the variance of firm profitability in scarce environments.

Hypothesis 3c: The negative effect of coupling through internal trade on firm failure rate will be accentuated in scarcer environments.

Methods

Context: South Korea

The context of this study is South Korea, which offers a good setting for several reasons. First, because of business groups' dominance in South Korea (e.g., Chang 2003a; Khanna and Rivkin 2001; Kim 2010), I could construct a large sample of affiliated firms in such groups. Although scholars in most previous studies have examined only the largest Korean business groups, such as the top 30 or 100, often referred to as "chaebols"

(e.g., Bae, Kang, and Kim 2002; Guillén 2000; Chang, Chung, and Mahmood 2006), a far larger number of business groups exist in Korea. These groups meet the criteria for business group classification as defined by the Korean Fair Act Trade (KFAT): "a group of companies, more than 30 percent of whose shares are owned by some individuals or by companies controlled by those individuals." Second, Korean business groups employ various coupling mechanisms, including family ownership, intragroup-shareholding ownership, and internal transactions, which make up the scope of this study. Third, rich and detailed data exist for business groups and their affiliated firms in Korea. These data include a comprehensive list and profiles of business groups and their affiliated firms. Also data about governance and internal transactions, as well as systematic financial data, are well documented. Last, but not least, the level of macro environmental scarcity dramatically changed during the 1988–2007 observation period because the Korean economic crisis in 1997 led to a sudden and significant shortage of resources, plummeting demand, and environmental threats. This setting enables us to study how the effects of coupling on affiliated firm performance are moderated by environmental scarcity.

Economic crisis in South Korea. In late 1997, the Korean economy was hit by the Asian economic crisis, which was essentially a financial crisis caused by a currency shock. It began in Thailand in July 1997 and spread rapidly to other Southeast Asian countries. South Korea was one of the biggest victims of this financial crisis. In one year, the won-dollar exchange rate doubled; the interest rates of bank loans, Korean Treasury Bonds, and call rates skyrocketed; and the GDP per capita plummeted. Most foreign investors withdrew their investment funds from the Korean economy out of fear about

unstable economic conditions. Foreign and domestic banks also pushed firms to pay back their debts. As a result, a number of companies and banks went bankrupt. Even the largest chaebols once believed to be "too big to fail" did indeed fail during this period. On November 21, 1997, the Korean government publicly declared the country's bankruptcy and the urgent need for a bailout by the International Monetary Fund (IMF). A few days later, the IMF agreed to assist Korea; in addition, other foreign financial institutions such as the World Bank and the Asian Development Bank started to support Korea. The Korean economic crisis lasted until the end of 1999, when the Korean government repaid its debt to the IMF. This crisis dramatically changed the level of environmental munificence.

Figure 1 illustrates how macroeconomic conditions significantly changed during the period of 1988–2007. A continuous measure of environmental scarcity is used: the Korea Composite Stock Price Index (KOSPI) for each year. KOSPI reflects the Korean stock market conditions. Environmental scarcity is the negative function of KOSPI. In Figure 1, KOSPI plummeted in 1997, but subsequently increased and has been completely restored since 2004.

[Insert Figure 1 about here]

Data sources

I derived most of my data from the KISLINE database (www.kisline.com) provided by NICE (formerly Korean Information Security [KIS]). Because of its reliability and comprehensiveness, the NICE database has been used in many previous

studies examining Korean firms or employing Korean firms as their sample (e.g., Chang and Hong 2000; Chang 2003b; Kim, Kim, and Lee 2008). NICE constructs its corporate database by using data from the Financial Supervisory Service, whose primary function is to examine and supervise financial institutions in Korea. Through several validity checking processes, NICE provides more accurate and reliable data to its customers (Chang and Hong 2000).

From this data source, I derived a list of affiliated firms that had ever belonged to Korean business groups that existed with at least two affiliated firms during 1988–2007. This firm list is very comprehensive in that it encompasses all kinds of companies. The list includes not only listed and audited firms, but also general and individual firms; not only large-sized firms, but also middle- and small-sized ones; and not only survivors, but also failures. In contrast, most existing studies in the business group literature have considered only the top business groups and large and surviving affiliated firms during the time period, thereby failing to represent the entire population of business groups and group firms (e.g., Khanna and Palepu 2000; Chang and Hong 2000; Guillén 2000). This KISLINE database also provides profile information for groups and firms and contains comprehensive time-varying information on the key characteristics of firms and groups, including ownership structures, internal transactions, and financial data. In addition, the KISLINE database provides systematic data on industry-level financial information on the basis of Korean Standard Industry Classification (KSIC) codes as the definitions of industry groups. The only information that I could not collect from the KISLINE database was Korean GDP per capita and KOSPI, which I acquired from the Bank of Korea database.

Sample

My sample included affiliated firms in business groups listed in the KISLINE database from 1988 to 2007, inclusively. All these firms belonged to groups corresponding to the definition of business groups set by the KFAT. I restricted my sample to business groups that had at least two affiliated firms by following previous studies (Chang and Hong 2000; Chang 2003b). By using the firm list from the KISLINE database, I constructed my group sample as follows.

I first annually extracted all business group firms listed in the KISLINE database that belonged to groups with at least two affiliated firms in a group within a given year. These firms appeared for at least two consecutive years. From 1988 to 2007, 343,745 firm-year observations and 20,192 firms belonging to 4,906 groups were found in the KISLINE database. Among these, I excluded firm-year observations when full information about coupling and financial and industry data were incomplete, dropping 226,891 group-year observations (66%). Since I lost many observations in this step, I checked whether any systematic differences existed between the dropped firms and those remaining in my sample. The results of the two-sample comparison showed that the firms in my final sample tended to be older than the dropped firms and belong to older and larger groups. On average, the firms in my final sample existed for 17.60 years and their groups existed for 22.04 years, and these groups' asset amounted to 25 billion won. The excluded firms existed for 8.61 years and belonged to groups existing 14.65 years, with an asset amount of 13 billion won. Also, listed (14.17%), audited (45.83%), and general (35%) firms were more common than other types of firms in my sample. However, my sample was still far more representative than any used in previous studies, which examined only large and

surviving affiliated firms belonging to the largest business groups, ranging from the top 10 to, at most, the top 100. Therefore, the sample used in this study was much closer to the whole population of group-affiliated firms.

In conclusion, my final sample comprised 116,854 firm-year observations and 15,307 distinct group firms. Figure 2 shows the distribution of the number of total firms and newly entered firms in the sample over time. In 1988, the number represents the number of groups initially observed in my data set.

[Insert Figure 2 about here]

Dependent Variables

Firm failure. I considered a firm as being active when it appeared in the KIS data in a given year. On the other hand, I considered a firm as having failed at year *t* if the firm disappeared from the data afterward. The data on live firms at the end of the observation period, in 2007, were treated as right-censored because our observation period ended in 2007. I recorded group survival information as a series of binary outcomes, 1 or 0, denoting whether or not the event of failure occurred at the observation point.

The variance of firm profitability. The variance of firm profitability is the firm-level variance of the return-on-assets (ROAs).

Independent Variables

Group-level coupling through corporate governance. To analyze the effects of coupling through governance on group survival rates, I measured *family ownership* and *intragroup-shareholding ownership* at year $t - 1$. In Korea, most business groups are family centered. Family members as controlling shareholders obtain their dominant stakes in order to govern their whole group. Family members, as controlling shareholders, also often obtain their dominant stakes of a business group through cross-shareholdings because direct investment is not always possible. Intragroup shareholdings represent equity holding relating to the equity trade between affiliated firms in a group. To measure the degree of family ownership and intragroup-shareholding ownership at the group level, I first annually computed the portion of family and intragroup-shareholding ownership in each affiliated firm in a group by following the firm-level measures developed by Chang and Hong (2000). Then, I created a valued network of each group, a N*N network composed of its affiliated firms with the value of the family ownership portion or intragroup-shareholding ownership portion, and measured the group-level coupling through each ownership mechanism by using the density formula of a valued network (Wasserman and Faust 1994).

Using controlling shareholder data from the KISLINE database, I specifically identified family members in a group if the large shareholders of the affiliated firms were the founders, chairmen, or presidents of the group and their direct family members. I also assumed that the large shareholders of an affiliated firm were family members if they shared the same name syllable with a family member(s) already classified as a family member(s) in the above step. In Korea, family members of the same generation (i.e.,

siblings and cousins) tend to share the first or second character in a given name. For example, in the Hyundai group, Mong-Gu Chung (the president of Hyundai and Kia Automobile Corporation) shares the same syllable, "Mong," with his brothers, Mong-Keun Chung (the president of Hyundai Department Store) and Mong-Il Chung (the president of Hyundai Corporate Finance). After figuring out the family shares of each affiliated firm within a group, I calculated the extent of family ownership within a group as follows:

$$\text{Family ownership in group } i = \frac{\sum_{j=1}^{N} FP_j}{N}$$

N: the number of firms within a group

FP_j: the portion of the family share of the jth firm in a group

In the same way, *intragroup-shareholding ownership* within a group was measured as the portion of inside ownership held by other affiliated firms within a group at time $t - 1$ as follows. This intragroup-shareholding ownership captures not only symmetric but also asymmetric shareholdings between two firms in a group.

$$\text{Intragroup-shareholdings in group } i = \frac{\sum_{j=1}^{N} IP_j}{N}$$

N: the number of firms within a group

IP_j: the portion of the other affiliated firms' shares of the jth firm in a group (0–1)

Group-level coupling through internal transaction. To operationalize internal transaction, I followed the firm-level measure developed by Chang and Hong (2000), and then created the group-level measure of internal transaction on the basis of the firm-level measures. Specifically, I measured internal transaction as the sum of internal sales and purchases within a group, divided by the total sales of the group. After calculating each firm-level internal transaction by summing the internal sales and purchases of each affiliated firm in a group, I summed the amount of all affiliated firms belonging to the group. Afterward, I divided this sum value by the total sales of the group. These group-level sales are the aggregated sum of the sales of all affiliated firms in the group. This internal transaction variable was lagged by one year.

Moderating Variable

Environmental scarcity. I used the Korea Composite Stock Price Index (KOSPI) to measure environmental scarcity. Rather than using the original values of KOSPI, I normalized this variables to reduce the multicollinearity of the interaction terms of the coupling variables and this variable, both of which are on a positive scale. I first rescaled the KOSPI variable by dividing by 1,000 so that it would fall into the range between 0 and 1; I then centered each variable by subtracting the mean of KOSPI from all of the values of this variable.

Estimation

Estimation models of firm failure rate

I used piecewise exponential models with firm age dependence to estimate the failure rate of firms. The piecewise constant exponential model splits the time axis into time periods and assumes that baseline failure rates are constant in each of these intervals, but can vary across them (Blossfeld, Golsch, and Rohwer 2007). Here firm age was calculated as the number of years that elapsed since a group's year of establishment. For 2.35% of firms, my sample did not have information about the establishment years; thus, I calculated their ages as the number of years that elapsed since they first appeared in the data set. On the basis of firm age, I split the time axis into several time periods. To find the appropriate cutoff points and decide the parsimonious number of time periods, I conducted an exploratory analysis by examining how the failure rate of groups varies with group age in my sample. I used the time periods with group ages of 0–22, 22–35, 35–47, and more than 47. Given these time periods, the failure rate of firms is defined by:

$$r(t) = \exp\{\bar{\alpha}_l + A\alpha_l\} \quad \text{if } t \in l$$

where $\bar{\alpha}_l$ is a constant coefficient associated with the lth time period. A is a vector of covariates associated with the lth time period, and α_l is the corresponding vector of coefficients. All estimates were obtained using STATA 11.0. Figure 3 shows the number of firm failure events during the observation period of 1988–2007. In total, 1,722 firms (11.25%) failed in my sample.

[Insert Figure 3 about here]

Control Variables

Firm characteristics. I controlled for several firm characteristics that might influence the likelihood of firm failure. First, I controlled for *firm size*, measured by the value of firm assets. The greater the size of firms, the lower their failure rate might be. I also controlled for *firm ROA* (return-on-asset) because firm profitability is likely to positively affect firm survival performance. In addition, I controlled for the *export dependency* of firms and measured the variable as the ratio of firms' export sales to total sales. Because the Korean economic crisis was essentially a crisis of exchange rates, the depreciation of the Korean won against foreign currencies, the effect of the crisis on export-oriented firms was not as serious as the impact on import-oriented firms. *Firm liquidity* is also controlled for and measured as affiliated firms' current assets divided by their current liabilities. Because the Korean crisis was also an interest rate crisis, firms with low liquidity would show higher failure rates. All of these variables were lagged by one year. Some firms were already in existence at the beginning of the study period, so I also created a "left-censored" dummy variable. Lastly, I controlled for the portion of a focal firm in its group's coupled structure because firm survival performance might be influenced by the degree of the connections of the firm with other affiliates. The higher the portion of a firm in its group's coupled structure, the lower the firm failure rate might be. The portion of firm family ownership in a group was measured as a firm's family ownership divided by total family ownership for each group. In the same way, the portion of firm intragroup shareholdings in a group was measured as a firm's intragroup shareholdings in relation to total intragroup shareholdings for each group, and the portion

of firm internal transaction was measured as the ratio of a firm's internal transaction to the total internal transaction of its group.

Business group characteristics. Because the performance of group firms is significantly influenced by groups, I controlled for several group characteristics. First, I controlled for *group size*, measured by the number of affiliated firms in a group. If groups are larger, they would more likely protect and support their member firms, thereby increasing firm survival performance. I also controlled for *group ROA* which was measured as the ratio of the sum of the net profit of affiliated firms in a group to the sum of their assets. As groups perform better, they will be more likely to have capabilities and resources to support and protect their affiliated firms. In addition, I controlled for *group failure* at time *t* by creating a dummy variable because all affiliated firms in a group disappeared from my sample regardless of the effects of coupling after their parent group failed.

Business group industry. I also controlled for the degree of industry relatedness among affiliated firms in a group because the level of structural coupling in a group could be associated with the extent to which affiliated firms are related in their business areas. Following Fan and Lang (2000), I constructed group-level relatedness in two ways: vertical relatedness and complementarity relatedness. Vertical relatedness represents the input and output flow between two industries. Complementarity indicates the extent to which two industries share their input and output.

One of the biggest challenges in creating this measure is that we first need to match the industry codes used in the KSIC system published by the Korean Statistical Information Service and the Korean Input–Output (KIO) tables published by the Bank of

Korea. The information of firms' industry affiliations is based on the KSIC system, while input–output coefficients are provided in the KIO tables. However, both systems classify industries on the basis of different codes. Moreover, to my knowledge, no matching table between the two systems exists. Therefore, I created a matching table by mapping all five-digit KSIC codes of the industries of all affiliated firms in business groups into the second broadest classification codes in the KIO table. Each KSIC code is matched to only one industry code in the KIO tables, while one industry code has multiple KISC code matches. For example, the gas and water industry was coded as a single code, 60, in the 2003 KIO table, while the water industry (KSIC code: D360), and the gas industry (KSIC code: D350) existed separately in the KSIC code system. Thus, I assigned all five-digit KIS codes starting with D350 or D360 to the KIO code 60 in 2003.

Because the relatedness variables are one year lagged, I constructed KIO-KSIC matching tables from 1987 to 2006. Because the KIO tables are not published every year and the industry codes in the KIO tables have changed over time, I created my matching table by mapping all KSIC codes to each industry code in the KIO tables of 10 years for which they were published: 1987–1990, 1993, 1995, 2000, 2003, 2005–2006.[1] Based on the matching table, I transformed all KSIC codes to industry codes in the KIO tables and measured group-level vertical relatedness (*V*) and complementarity relatedness (*C*) as follows:

$$V(\text{Vertical Relatedness}) = \sum_{j} V_{ij}$$

and

[1] I am preparing a methodology paper in which I provide a matching table between the KSIC codes and the industry codes in the KIO tables and the specific criteria that I used for the code matching. The paper is not yet complete, but it will be available in the future.

$$C(\text{Complementarity relatedness}) = \sum_j C_{ij}$$

where V_{ij} and C_{ij} are the vertical relatedness and complementarity coefficients associated with the pair of KIO industries to which the primary industry i and jth secondary segments belong.[2] The primary industry of a group is the industry of a group in which the largest number of its affiliated firms operates. All other industries of the group are treated as secondary industries.

I adopted the measure developed by Fan and Lang (2000), but I made modifications and used a cruder measure in that both V_{ij} and C_{ij} were not weighted by w_j, the ratio of the jth firm sales to the total sales of all secondary segments in their original measures. Among affiliated firms belonging to the groups in my final sample, only 35% of affiliated firms had sales data; thus, a large number of affiliated firms had to be dropped in the calculation of the relatedness variable if I used their original measures. For this reason, I considered only vertical and complementarity coefficients without each firm's sales weight. Since these two variables had values only for the 10 years that the KIO tables were published, I used the ipolate method, which creates a linear interpolation of the relatedness variables by year to fill in the missing values for these variables in other years.[3]

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[2] V_{ij} is defined as the average of the two input coefficients of industries i and j: $V_{ij} = ½(v_{ij} + v_{ji})$. The formula of C_{ij} is ½[corr(b_{ik}, b_{jk}) + corr(v_{ki}, v_{kj})]. k indicates an intermediate industry, b_{ik} or b_{ji} denotes the percentage of i or j output supply to each intermediate industry, k. For each pair of i and j, the correlation coefficient between b_{ik} and b_{jk} across all k except for i and j is computed. Also, corr(v_{ki} and v_{kj}) is computed by calculating the correlation of input requirement coefficients across all k, except for i and j, v_{ki} and v_{kj}. All input requirement coefficients were obtained from the KIO tables.

[3] The missing values filled through the ipolate method might be affected by the year gaps between the KIO tables. To check the sensitivity of the analysis results of this study due to the year gaps, I created a duration variable by assigning the length between the year of each KIO table. For instance, this variable was coded as 2 for the year 1991 and 1992 because the length of duration between 1990 and 1993 is 2. The analysis of the models, including this duration variable, showed the same results with the analysis of the models without this variable. Thus, the analysis results of this study were robust.

Industry characteristics. For the industry-level variables, I included *industry density*, *profitability*, and *export dependency* on the basis of two-digit KSIC codes. Industry density was measured as the number of firms of the industry, where a firm operated. If industry density is high, the failure rate of firms will likely increase because of fierce competition among firms operating in an industry (Carroll and Hannan 2000). Industry profitability was measured by the ROA of the industry in which a firm operated. Also, I controlled for industry export dependence and measured it as the ratio of a focal industry's export sales to the industry total sales.

Economic development. To control for the economic development of Korea, I included the annual Korean GDP per capita in US dollars.

Estimation models of the variance of firm profitability

To estimate the effect of coupling on the variance of firm profitability (hypotheses 2a, 2b, and 2c), I employed a multiplicative heteroscedasticity, or variance function model, by following Sorenson and Sørensen (2001) and Hsu et al. (2011). This model decomposes firm profitability (the ROA of a firm) into the mean and the variance of firm profitability as follows.

$$ROA_{ijt} = \mu_{ijt} + \sigma_{ijt} + \varepsilon_{ijt}$$
$$\mu_{ijt} = E(ROA_{ijt}) = \beta X_{ijt}$$
$$\sigma_{ijt} = Var(ROA_{ijt}) = \exp(rZ_{ijt})$$
$$j: j\text{th firm},\ i = \{1, 2, ..., N_1\}$$
$$i: i\text{th group},\ i = \{1, 2, ..., N_2\}$$
$$t: t\text{th year},\ t = \{1, 2, ..., T\}$$

Here ROA_{ijt} is the profitability of the *i*th firm within the *j*th group at time *t*. μ_{ijt} is the expected profitability of firm *i* within group *j* at time *t*, X_{ijt} is a vector of covariates associated with the *t*th time period, and β is a coefficient vector corresponding to X_{ijt}. σ_{ijt} is the variance of firm profitability, Z_{ijt} is a vector of covariates associated with the *t*th time period, and r is a coefficient vector corresponding to Z_{ijt}. This model simultaneously estimates the coefficients of the mean and variance of firm profitability by using maximum likelihood methods (Weesie 1998). The second variance function allows testing the effect of covariates on the variance of firm profitability.

Control Variables

In addition to the independent variables, the mean function is influenced by control variables at the group, firm, industry, and macroeconomic levels. Similar to the models of firm failure rate, these models include several control variables including the asset size, export dependency, and liquidity of firms, and the number of firms, ROA, vertical and complementarity relatedness of groups. Industry density, ROA, and export dependency were also controlled for. Finally, the annual Korean GDP per capita was included as a control variable.

The variance function model, my main interest model, also includes several multi-level variables that might significantly affect the variance of firm profitability. As firm-level control variables, I included asset size, export dependency, liquidity, and age. Firm age was included because it is correlated with performance reliability (Hannan and

Freeman 1984). In addition, the portions of a firm in its group's coupled structure generated through family ownership, intragroup shareholdings, and internal trade were included as control variables. As group-level variables, I included ROA, export dependency, liquidity, and vertical and complementarity relatedness. Industry density, ROA, and export dependency were controlled for as well as the annual Korean GDP per capita.

Results

Table 3 reports descriptive statistics. I rescaled the variables so that the values of each variable would fall within a similar range for convenience in interpreting the results. Multicollinearity problems were not found among variables. Figures 4 and 5 show the average composition of each coupling type over time. On average, 17.31% of the shares are owned by family members, and 3.20% is owned by other affiliated firms in the same group. Intratrade occupies only 0.12% of group sales. Among these three coupling ties, family ownership is a dominant way binding affiliated firms together in Korean business groups.

[Insert Table 3, Figures 4 and 5 about here]

Table 4 presents the results of the estimates of the piecewise exponential models of the firm failure rates. Model 1 is the baseline. In model 2, including the group-level coupling variables improves the overall model fit (d.f. = 3, $p < 0.05$). The addition of the interaction terms between each coupling and environmental scarcity improves the overall fit for model 3 (d.f. = 3, $p < 0.05$). I used the estimated results of model 2 to test

hypotheses 1a, 1b, and 1c, which predict the main effects of group-level coupling on firm failure rate. The estimates of model 3 were used to test hypotheses 3a, 3b, and 3c, which predict the moderating effects of environmental scarcity.

[Insert Table 4 about here]

The results of model 2 strongly support hypotheses 1a, 1b, and 1c. Coupling through family ownership, intragroup shareholdings, and internal transactions is negative and significant. These results suggest that firms are less likely to fail when affiliated firms in a group are more tightly coupled together through the three coupling ties. The estimates of model 3 show the results of the hypotheses 3a, 3b, and 3c, which predicted the moderating effects of environmental scarcity on the coupling effects on firm performance. The estimated results show that the interaction terms of environmental scarcity and the degree of coupling at the group level through family ownership and internal trade are negative and significant. Because environmental scarcity is the negative function of KOSPI, these results mean that the beneficial effects of family ownership and internal trade on firm survival performance are attenuated in less scarce environments, while their impacts are accentuated in scarcer environments. However, the interaction term of environmental scarcity with intragroup shareholdings is not significant. Given these results of model 3, hypotheses 3a and 3c are strongly supported, while hypothesis 3b is not supported.

Analysis of the control variables (model 3) shows that firm profitability measured as firm ROA at year $t - 1$ affects current survival performance. Higher profitability is

related to lower failure rates of firms. Also, the left-censored dummy variable shows a negative and significant effect, suggesting that firms established earlier than 1988 tend to survive longer. All three firm-level coupling variables, which represent the extent to which a firm is involved in its group's internal coupling structure, show negative and significant effects. These results imply that firms are less likely to fail when they have more connections with other affiliates through family ownership, intragroup shareholdings, and internal trade. Moreover, group failure is positive and significant, and the number of member firms in a group is negatively associated with firm failure rates. Group-level vertical relatedness has a positive and significant effect, while complementarity relatedness has a negative and significant effect, suggesting that firms are more likely to survive longer if they belong to groups that are diversified in horizontally related industries rather than those with vertically related diversified portfolios. All three industry variables, density, profitability, and export dependency, show positive and significant effects. This suggests that firm survival performance tends to be suppressed for firms involved in competitive, attractive, and export-oriented industries. However, firm survival performance tends to be improved when the economic conditions are good, as the negative and significant effect of the GDP per capita variable and the negative and significant effect of KOSPI show.

As a robustness check, I estimated the firm failure models by using a different measure of environmental scarcity. Because the Korean economic crisis was caused by an exchange rate shock and the annual exchange rate reflects the Korean currency market conditions, I analyzed the same model by using the won-dollar exchange information. Environmental scarcity is the positive function of the exchange rate. As Figure 6 shows,

the exchange rate skyrocketed when the Korean economic crisis occurred in 1997; it has decreased since then and has been completely stable since 2004. I used the normalized variable of the exchange rate to avoid multicollinearity.

[Insert Figure 6 and Table 5 about here]

As shown in model 2 of Table 5, the direct effects of family ownership, intragroup shareholdings, and internal trade are negative and significant, providing strong support for hypotheses 1a, 1b, and 1c. The estimates of model 3 in Table 5 show the same results as those in Table 4. The interaction term of the exchange rate and internal trade is negative and significant. The interaction effect of the exchange rate and family ownership is negative, but its effect is not strong. However, the effect of intragroup shareholdings on firm-level performance does not depend on the extent of environmental scarcity. Because environmental scarcity is the positive function of the exchange rate, these results suggest that the detrimental effects of coupling through family ownership and internal trade are accentuated in scarcer environments, while the impacts are attenuated in less scarce environments. Therefore, the estimates given in model 3 of Tables 4 and 5 provide strong support for hypotheses 3a and 3c. These results are robust.

Table 6 presents estimates of the variance function models of firm profitability. In Table 6, model 1 as the baseline model includes only control variables, and model 2 shows the estimates of the effect of coupling variables on firm profitability. Because our interest is in the variance of firm profitability, the variance function model estimates speak to hypotheses 2a, 2b, and 2c. The estimates of model 2 in the variance function model were used for hypothesis testing. As shown in model 2, the effects of all three

coupling variables are negative and significant. These results provide strong support for hypotheses 2a, 2b, and 2c, and suggest that firms in more tightly coupled groups tend to have lower variance in their profitability. In other words, the profitability of these firms tends to be more stable over time.

[Insert Table 6 about here]

Although the mean of firm performance is not our main interest, Table 6 shows interesting results regarding the effect of the degree of coupling on the mean of firm profitability. In the mean function, the effects of both family ownership and internal transactions are positive and significant, while the effect of intragroup shareholding is insignificant. These results imply that the coupling effects on firm profitability may depend on the types of coupling, and belonging to groups with a greater degree of coupling may not necessarily increase firm performance. In particular, the results of intragroup-shareholding ownership suggest that firms in a tightly coupled group through intragroup shareholdings may achieve performance stability at the cost of performance. This evidence would be consistent with the interdependence arguments that I theorized, given that firms in danger can be supported by other firms in the same group; thus, their survival performance can be increased and their profitability can be stabilized over time. However, put differently, firms in a group have to support other firms when they perform well or have superior resources that other firms need. Such mutual assistance among affiliate firms in tightly coupled groups has beneficial effects on firm survival and profit stabilization, but it does not necessarily increase firm profitability itself.

Discussion and Conclusions

This chapter examines how internal coupling structure affects the performance of affiliated firms in business groups. Specifically, I predicted that the greater the coupling of group firms, the lower the firm failure rate. I also predicted that such beneficial effects of tight coupling on firm failure rates are accentuated in scarce environments. Further, I predicted that tight coupling will reduce the variance of firm profitability over time. The longitudinal analyses of affiliated firms in Korean business groups show that firms in tightly coupled groups show higher survival performance, especially under scarce environments, and lower variation in their profitability. This study contributes to research in business groups and organizational ecology in several ways.

Although the effects of internal coupling structure on group firms have been at the center of business group research, such coupling effects on firms are still controversial and empirical evidence is mixed. One possible explanation for this unclear understanding is that most scholars in previous studies failed to account for the variance of coupling in among business groups, mainly because of a lack of detailed data on coupling ties. Instead, many scholars theoretically assumed that being members of groups automatically brings the benefits and costs of coupling to member firms and tested their predictions by creating a dummy variable of group firms vs. independent firms (e.g., Chang and Hong 2000; Baek, Kang, and Lee 2006). Also, their samples were limited to a small set of business groups, ranging from the top 5 to the top 100 groups. However, we cannot adequately assess the benefits and costs of coupling structure in business groups without examining the variance of coupling in business groups by measuring coupling ties directly because the coupling effects on firm performance should depend on the internal

coupling structure of groups. Also, we cannot generalize findings more strongly into the population of business groups without examining more representative samples. By using detailed information of coupling ties and a large sample of Korean business groups, this study provides more convincing evidence of coupling structure on group firm performance.

This study also contributes to business group research by suggesting a boundary condition of the performance effects of coupling. By focusing on environmental scarcity, I suggest that how coupling structure affects the performance of affiliated firms in business groups is contingent on environmental conditions, which have rarely been accounted for in the business group literature. The results of my analyses reveal that firms are more likely to survive in scarce environments if they belong to tightly coupled groups. Such results suggest that business groups do not operate in a vacuum.

In addition, this study provides additional understanding of the coupling effects on firm performance by examining the coupling effects on both firm survival and financial performance, while scholars in existing studies largely employed financial profitability, such as ROA (e.g., Khanna and Palepu 2000; Khanna and Rivkin 2001; Lincoln, Gerlach, and Ahmadjian 1996), ROIC (return-on-invested capital) (Chang and Hong 2000), or market value (Bae, Kang, and Kim 2002; Baek, Kang, and Park 2004; Bae and Jeong 2007). However, these financial measures only reflect short-term performance and do not tell how coupling influence long-term performance like survival, which is often the ultimate goal of organizations.

This study also contributes to our understanding of business groups by offering a sociological account of how coupling affects group-level performance. Drawing from sociological organization theory like organizational ecology, this study provides a complementary account to existing business group studies, which have largely focused on economic and rational perspectives such as agency theory, transaction cost economics, and resource-based views. As Guillén (2000) points out, there is a strong need to examine the outcomes of business groups from various disciplines, including sociological, historical, cultural, and political perspectives. Thus, our study contributes to building a comprehensive understanding of business groups.

Moreover, this study contributes to research in organizational ecology by shedding light on the controversial question of whether selection process can apply to general organizations like business group firms. According to Davis (1996, 514), organizational ecology cannot be generalized to firms that are embedded in large economic groups such as the Big-Six Japanese Keiretsu because Keiretsu membership is more like a safety net protecting member firms from failure and poor performance. Yet this study provides clear evidence that group firms in business groups, even in large ones, are not immune to selection process. Specifically, I theorize and show that firms in loosely coupled groups compared with those in tightly coupled groups are more likely to be selected against by the environments, especially in bad times. This suggests that even group firms are not free from environmental selection, but they tend to be under different selection pressures according to their groups' internal coupling structure.

This paper also has several limitations that need to be addressed in future studies. Considering the idiosyncratic nature of Korean business groups, caution is warranted in

generalizing my findings. The dynamics of business groups may be different from those of other forms of organizations, such as M-form corporations (Granovetter 1994). Further, Korean chaebols have a distinct governance mechanism that is particularly characterized by the highly centralized control of member companies, which may prevent the findings of this study from being applicable to business groups in other countries (Shin and Kwon 1999). In addition, compared to existing studies, my sample is much more comprehensive in that survivors and failures are included—large and small group firms and good and poor performers. Yet I mainly relied on a single data source, the KISLINE database, and had to exclude many observations because of the lack of financial information of firms. Although I examined three types of coupling ties (family ownership, intragroup shareholdings, and internal transaction), Korean business groups have used other coupling mechanisms, such as internal directorship. Therefore, there is a need to test my predictions by examining other types of coupling ties and to obtain more robust results.

CHAPTER 3:

DIVIDED WE STAND, UNITED WE FALL: INTERNAL COUPLING STRUCTURE, ENVIRONMENTAL SCARCITY, AND BUSINESS GROUP FAILURE

Introduction

In Chapter 2, I presented and tested a theory on how the extent of coupling among firms in a business group influences the performance of group firms. I proposed that tight coupling increases the survival probability of group firms, especially in scarce environments, and reduces the variance of firm profitability over time. Supporting these predictions, the results of the previous chapter showed that tight coupling through corporate governance and internal trade decreases firm failure rates, especially in scarce environments, and is associated with the low variance of firm profitability. These results suggest that tight coupling brings benefits to group firms by increasing the survival chances of firms and stabilizing firm profitability. Such beneficial effects of tight coupling on firm performance are more salient in bad times.

In this chapter, I turn my attention to the effects of coupling on group-level survival performance. Despite extensive research, our knowledge of the coupling effect on business group performance is significantly unbalanced; that is, almost nothing is known about its impact on group-level performance, while evidence on firm-level performance has been well documented (see Tables 1 and 2). Completing our picture of how coupling affects business groups necessitates a clear understanding of how coupling

influences group-level performance. Business group theory addresses group-level behaviors. As main decision makers, groups primarily consider group-level utility maximization (Coplan and Hikino 2010) and structure coupling among firms within groups according to these interests. Such group-level decisions are not necessarily consistent with firm-level interests. Even though the performance of affiliated firms might not be separate from that of their groups, inferring group-level performance only from empirical evidence at the firm level is not intuitive because of the complexity of this kind of system, in which the whole entity is composed of individual parts interacting in a complex manner (Simon 1962). Complex interactions among affiliated firms through various coupling mechanisms employed by business groups can generate a totally different consequence at the group level. Given such different performance implications of coupling, according to the level of interests, how does coupling affect group-level performance?

Motivated by this research question and intending to contribute to our understanding of group-level performance, I propose that coupling among group-affiliated firms negatively affects group survival performance, and therefore increases group failure rates. We might observe such a positive relationship between coupling and group failure rates simply because of the nature of coupling. As I discussed in Chapter 2, coupling is a form of interdependence (Thompson 1967; Weick 1976; Perrow 1984). However, such interdependence is a double-edged sword; it can bring costs as well as benefits to business groups. Holding the quality of group firms constant, interdependence compounds risk within a group so that tightly coupled groups are more vulnerable to collective collapse and consequently are most likely to fail. Second, even if the quality of

group firms is not held constant, coupling buffers group firms from environmental selection. Such protection for group firms, especially weak ones, would make a group itself weak and sensitive to selection processes, thereby increasing the failure rate of the whole group. Together, regardless of the quality of group firms, the greater the coupling of group firms, the higher the group failure rate.

The magnitude of the coupling effect on group-level performance should be moderated by environmental conditions. In resource-scarce environments, the pressures of environmental selection intensify; thus, many firms become unfit. Because one firm's performance relies on the others in a tightly coupled group, such tight coupling compounds the risk of having many unfit firms, which would lead to the collective collapse of the whole group in bad times. On the other hand, when environmental resources are munificent, selection pressures themselves are weak, allowing many firms in a group to thrive. Dependencies among fit firms are less likely to lead to problems because their associated risk is low. Even when a few firms are weak, other firms in the same group can easily protect the weak firms during good times. Therefore, the coupling effect on group failure rates will be accentuated when environmental resources are scarce.

Building on these ideas, I theorize about the effects of the degree of coupling among firms in a group on group-level performance; moreover, I discuss how the coupling effect is moderated by environmental scarcity. Specifically, I explore the influences of coupling by considering two types of mechanisms widely employed by business groups: corporate governance and internal transactions. Empirically, I test my theory by analyzing a unique longitudinal data set of 5,850 South Korean business groups for the period of 1988–2007. In 1997, in the middle of the study period, the Korean

economic crisis occurred, which provides an opportunity to study the coupling effects in the environmental scarcity condition. My analyses indicate that the extent of coupling significantly increases the failure rate of the entire group, especially in scarce environments. In the following sections, I develop my theory about why one might expect these results.

Effects of Internal Coupling Structure on Business Group Failure

The degree of coupling significantly influences the ways in which group firms interact (Weick 1976, 1982), which therefore likely affects the performance of groups. Coupling, defined as the relationship among elements in a system (Weick 1982), is a form of interdependence (Thompson 1967); the greater the coupling among firms, the stronger the interdependence. Through tight coupling, affiliated firms are involved in a strong interdependent network; they are responsive and act in interconnected ways, affecting each other continuously, constantly, directly, and immediately (Weick 1982). Because what happens in one firm affects what happens in the other firms within the same group (Perrow 1984), the performance of group firms heavily relies on one another. As I discussed in the previous chapter, such interdependence facilitates supports within groups, thereby increasing the survival probability of group firms.

However, just due to interdependence, risk can be compounded within groups under the condition that the quality of group firms is held constant. One firm's risk is likely to rapidly diffuse into the whole group, thereby generating cascading risk, consequently leading to the collective collapse of the group (Hannan, Polos, and Carroll

2003). On the other hand, firms in a loosely coupled group are responsive, but independent of one another, influencing each other suddenly, occasionally, indirectly, and eventually (Weick 1982). In such a group, the performance of affiliated firms is less interdependent, and therefore, endangered firms are less likely to be supported by other firms than those in a tightly coupled group. Moreover, loosely coupled groups are inefficient and slow in coordination, risk diversification, and resource allocation (Weick 1975). When a firm does not perform well, other firms in the same group cannot help the troubled firm rapidly, thereby letting the troubled firm fail. As a result, a firm's risk tends to be localized, thereby saving the whole group (Weick 1976).

Coupling also buffers group firms from environmental selection even if the quality of group firms is not held constant. As I discussed in the previous chapter, even unfit firms may not fail in a tightly coupled group because of the high interdependence among firms. When a firm experiences performance problems, other affiliated firms in the same group are likely to help the troubled firm by utilizing or sacrificing their own resources. As a result, the troubled firm is likely to survive as part of the group with other fitter firms, even if it would have failed otherwise. Such protection implies unfit firms' benefit at the expense of fit ones, thereby imposing constraints on the performance of fit firms and making the group itself weak and vulnerable to selection processes (Barnett 1997). As a result, tightly coupled groups may make weak firms not as weak as they would have been otherwise, while they place ceilings on the performance of their strong firms (Lincoln, Gerlach, and Ahmadjian 1996; Khanna and Yafeh 2005). On the other hand, firms in a loosely coupled group may not be as well cushioned from selection processes as firms in a tightly coupled group because of the low interdependence among

group firms. Offering less protection to unfit firms would increase the survival chance of the whole group. Abandoning support for unfit firms and letting them cope with environmental selection processes rather than containing them within a group can save the whole group. Based on these ideas, I propose a positive relationship between coupling and group failure rates.

Proposition 1: The greater the coupling among firms in a business group, the higher the group failure rate.

Moderating Effect of Environmental Scarcity

As I theorized and tested in the previous chapter, the coupling effects on business group performance depend on the environment in which business groups operate. Specifically, the results of analyses in Chapter 2 show that the positive coupling effects on firm survival performance are accentuated in scarce environments. Likewise, one might argue that coupling may not always negatively influence the survival performance of business groups in that groups often couple affiliated firms for functional purposes, such as efficient resource sharing and reducing transaction costs. I do not disagree that groups as well as group firms might sometimes find it beneficial to be tightly coupled. Especially, if all or at least most group firms are performing well and/or the pressures of environmental selection processes themselves are weak, then coupling would be unlikely to reduce the survival chances of groups. For these reasons, environmental conditions affecting the performance of group firms and the magnitude of environmental selection

should be considered in testing the main effect of coupling. Following the previous chapter, I focus on environmental scarcity as a boundary condition of the coupling effects on group-level performance and examine how the extent of environmental scarcity affects the detrimental effects of coupling on group survival performance.

When the environment is scarce, resource acquisition is difficult, demand is stagnant, and environmental threats are prevalent, thereby increasing competition for dwindling resources among organizations and consequently reducing the continued viability of organizations by increasing competition for such dwindling resources (Dess and Beard 1984; Yasai-Ardkani 1989; Goll and Rasheed 2005). In such hostile environments, many firms in groups tend to suffer from low performance and thus become unfit while the pressures of environmental selection intensify. Even strong firms, whose fitness level is above the threshold of selection, may run the risk of becoming weak if they support other unfit firms. In such bad times, tight coupling should become extremely and unexpectedly vulnerable. All else equal, coupling is more likely to compound risk prevalent in firms within tightly coupled groups because of the interdependence among them. Moreover, it buffers weak firms from environmental selection so that tightly coupled groups are more likely than loosely coupled groups to retain unfit firms that would have otherwise failed. Such protection should make groups themselves weak and highly likely to lead to the collective collapse of the whole group. On the other hand, when environments are munificent, coupling may not significantly increase the failure rate of groups because abundant resources and low competition allow many firms to perform well and environmental selection pressures themselves are weak. In such favorable times, the detrimental effect of coupling will likely be attenuated. Building on this discussion, I

propose that the positive effects of affiliated coupling on the failure rate of business groups will be accentuated in less munificent environments.

Proposition 2. The positive effect of coupling on group failure rate will be accentuated in scarcer environments.

Types of Coupling

In Chapter 2, I translated my general propositions to testable hypotheses by considering two types of coupling mechanisms: corporate governance and internal transactions. In the same way, I now discuss how each type of coupling creates interdependence among group firms and thus compounds risk within groups and also buffers group firms from environmental selection, thereby increasing the failure rate of business groups. Based on this discussion, I will propose predictions.

Coupling through governance. The most distinctive feature of ownership structure in business groups is that controlling shareholders govern entire business groups through their equity stakes. Like the study of Chapter 2, this study focuses on the extent to which affiliated firms are coupled by the governance of controlling shareholders in a group and examines how coupling through *family ownership* and *intragroup-shareholding ownership* affects group failure rates.

Coupling through family ownership is likely to create strong interdependence among firms within a group, thereby compounding risk within groups and buffering even weak firms from environmental selections. As a result, coupling through family ownership is likely to positively influence the group failure rate. As the source of group

solidarity (Granovetter 1995), family ties create strong interdependence among firms within a group. Based on these informal norms, affiliated firms linked through family ties have strong obligations to support each other unconditionally when any of them needs help. The failure of one firm in a family-centered business group has emotional meaning for other affiliated firms, which is more than the bankruptcy of a business. Family-owned business groups often resemble a hierarchical relationship between parents and children (Guillén 2000; Chang 2003a, 2003b). If an affiliated firm owned by their son or daughter experienced difficulties, it is likely that the parents would direct their other children operating other affiliated firms to assist their endangered brother or sister. As their dutiful children and potential successors, children have to obey their father. Also, family members tend to have greater concern for their family's reputation and inheritance issues than the economic success of their business so they strive to keep all firms, including poor performing ones (Luo and Chung 2005; Chung and Luo 2008). Because of this nature of family ties, coupling through family ownership creates strong interdependence among firms, thereby compounding risk within a group and protecting group firms from environmental selection. Therefore, one should expect tightly coupled groups to be more likely to fail than loosely coupled groups. Such detrimental effects of tight coupling will be likely to be accentuated in scarce environments.

Hypothesis 1a: The greater the coupling through family ownership in a business group, the higher the group failure rate.

Hypothesis 2a: The positive effect of coupling through family ownership on group failure rate will be accentuated in scarcer environments.

Coupling through intragroup-shareholding ownership also creates strong interdependence among affiliated firms in a group. Intragroup-shareholding ownership couples affiliated firms together by equity relations; thus, the wealth of affiliated firms is heavily interdependent. If an unfit firm fails, it will negatively influence the other firms investing in that firm. Through this equity participation, affiliated firms holding stakes in the unfit firm have a strong incentive to protect their investees from takeover threats and competition if their investees are in danger (Lincoln, Gerlach, and Takahashi 1992; Lincoln, Gerlach, and Ahmadjian 1996). For these reasons, when affiliated firms are tightly coupled through intragroup-shareholding relations, unfit firms are likely to be protected from environmental selection, and the risk caused by unfit firms is likely to spread within groups. Consequently, tight coupling through intragroup-shareholding will likely increase the failure rate of business groups.

Hypothesis 1b. The greater the coupling through intragroup-shareholding ownership in a business group, the higher the group failure rate.

Hypothesis 2b. The positive effect of coupling through intragroup-shareholding ownership on group failure rate will be accentuated in scarcer environments.

Coupling through internal trades. Business groups create internal markets for products in which affiliated firms reduce transaction costs and increase efficiency in trading together, particularly when market uncertainty, the possibility of opportunistic behaviors, and asset specificity are high (Williamson 1975). In the internal product market of business groups, affiliated firms, which are sellers and buyers of each other, generate direct ties between two parties and form a symbiotic relation (Audia et al. 2006;

Hawley 1950). Because sellers provide inputs to buyers and buyers purchase sellers' outputs, the performance of these transaction partners is highly intercorrelated: the failure of one party can lead to the failure of the other, thereby generating a domino effect with regard to failures. Thus, firms tightly coupled through internal trades have strong willingness to support and protect one another. However, such protection for group firms will be likely to increase the failure rate of tightly coupled groups.

Hypothesis 1c. The greater the coupling through internal trade in a business group, the higher the group failure rate.

Hypothesis 2c. The positive effect of coupling through internal trade on group failure rate will be accentuated in scarcer environments.

Methods

Context, Data Sources, and Sample

The context of this study is South Korea, and my main data source is the KISLINE database that was used in Chapter 2. From this data source, I derived a list of all Korean business groups that existed with at least two affiliated firms in a group during 1988–2007. Because business group survival is directly related to the presence of affiliated firms in a group, I also needed to extract a list of affiliated firms that had ever belonged to these groups during this period. This firm list is very comprehensive in that it encompasses all kinds of companies. The list includes not only listed and audited firms, but also general and individual firms, large-sized and middle- and small-sized firms, and survivors and failures. From this database, I also obtained information on the profiles of

groups and firms and comprehensive time-varying information on the key characteristics of Korean business groups, including ownership structures and internal transactions. Macroeconomic information like KOSPI, and Korean GDP per capita was taken from the Bank of Korea database.

My sample included business groups listed in the KISLINE database from 1988 to 2007. All of these groups met the definition of business groups set by the Korean Fair Act Trade (KFAT). I restricted my sample to business groups that had at least two affiliated firms by following previous studies (Chang and Hong 2000; Chang 2003b). By using the group list drawn from the KISLINE database, I constructed my group sample as follows.

I first annually extracted all business groups listed in the KISLINE database that had at least two affiliated firms in a group within a given year and that appeared for at least two consecutive years. From 1988 to 2007, 102,135 group-year observations and 6,115 groups were found in the KISLINE database. Among these, I excluded group-year observations when full information about coupling and financial data was incomplete, dropping 39,257 group-year observations (38.44%). To check whether any systematic differences existed between the dropped groups and the remaining ones in my sample, I conducted two-sample comparison tests. The results of the two-sample comparison showed that the groups in my final sample tended to be larger and older than the dropped groups. On average, the groups in my final sample had 4.04 firms in a group and existed for 18.4 years, while the excluded groups had 2.47 firms in a group and existed for 6.85 years. My final sample comprised 62,878 group-year observations and 5,850 distinct business groups. Figure 7 shows the distribution of the number of total groups and newly

entered groups in the sample over time. In 1988, the number represents the number of groups first observed in my data set.

[Insert Figure 7 about here]

Analysis Model and Dependent Variable

I used piecewise exponential models with group age dependence to estimate the failure rate of groups. Here group age was calculated as the number of years elapsed since a group's establishment year. A total of 4.7% of groups in my sample did not have information about their establishment years; thus, I calculated their ages as the number of years elapsed since they first appeared in the data. On the basis of group age, I split the time axis into several time periods. To find the appropriate cutoff points and decide the parsimonious number of time periods, I conducted an exploratory analysis by examining how the failure rate of groups varies with group age in my sample. I used the time periods with group ages of 0–40, 40–50, 50–70, 70–85, and more than 85. Given these time periods, the failure rate of groups is defined by the following:

$$r(t) = \exp\{\bar{\alpha}_l + A\alpha_l\} \quad \text{if } t \in l$$

where $\bar{\alpha}_l$ is a constant coefficient associated with the lth time period. A is a vector of covariates associated with the lth time period, and α_l is the corresponding vector of coefficients. All of the estimates were obtained using STATA 11.0.

In these group survival analyses, the dependent variable is the survival state of a group with two destinations: survival or failure. Specifically, I recorded group survival information as a series of binary outcomes, 1 or 0, denoting whether or not the event of

failure occurred at the observation point. I considered a group as surviving when it had at least two affiliated firms in a group and appeared in the data in a given year. On the other hand, I considered a group to have failed at year *t* if the group transformed to a single-firm group from a multi-firm group from year $t + 1$, or if the group dissolved such that it did not appear in the data from year $t + 1$. When groups disappeared from the KISLINE database via acquisition by other groups, I did not consider them as dissolved. Only two groups were acquired. The data on groups appearing at the end of the observation period in 2007 were treated as right-censored because my observation period was terminated in 2007; thus, we do not know whether these groups survived or failed after this year.

When a group failed and then reappeared as a multi-firm group a few years later, I treated it as a new group and assigned it a new group ID (800 obs); I then constructed a new series of survival outcomes from the year that it reappeared in the data set. On average, it took three years for these groups to reappear in the database. I chose to consider a reemerged multi-firm group as new because I assumed that this organization was not the same as the original one.[4] In total, of the 5,850 groups in my sample, 1,020 (17.4%) groups failed during the observation period. Among these, 881 groups transformed from a multi-firm group to a single-firm group, and 209 groups were dissolved.

[Insert Figure 8 about here]

[4] I checked the sensitivity of the analysis results of this study, due to the ways that I assigned new group IDs to the groups that had disappeared at a certain time and reappeared later in the data set. Comparing the results with the original group IDs and those with new group ID specifications, I found that the results were robust in both cases.

As Figure 8 shows, the number of group failure events jumped in 1997 when the Korean economic crisis occurred and started to decrease in 1999, the last year of the crisis. However, group failure events increased again from 2000. This phenomenon may have arisen from the changed economic environment since the crisis in Korea. Recognizing the distorted market systems and the weakness of the corporate and financial sectors of Korea, the IMF and other foreign financial institutions demanded market liberalization in return for a bailout and imposed several requirements (Chang 2003a). For instance, the government was required to eliminate regulations on the Korean exchange rate and had to adopt a free market approach and intervention in the lending decisions of banks and direct governmental subsidies to firms. Also, the institutions exerted pressure on the Korean government to restructure the corporate sector. As a consequence, the Korean economy has shifted to market-based systems from government-centered systems, creating a new environment that is far more competitive and dynamic than before the crisis, consequently increasing the risk of group failure.

In contrast with the post-crisis period, business groups rarely failed in the pre-crisis period. Only 28 failure events were found before the crisis in my sample. However, it is not surprising when we consider the protective and less competitive environment of the pre-crisis period. Before the crisis occurred, the Korean economy grew on the support and protection of the government rather than on the basis of market systems and firms. In addition, business groups were encouraged to expand aggressively without restrictions or appropriate supervision (Song 1990; Chang 2003a). Under these circumstances, the concept of firms restructuring themselves did not exist in the mindset of businesspeople.

Even when some affiliated firms did not make any profit at all, business groups tended to keep rather than divest them.

Independent Variables

The coupling variables, *family ownership*, *intragroup shareholdings*, and *internal trade*, are the same as those used in the previous chapter, and therefore, I measured these variables in the same ways. I calculated the extent of family ownership within a group as follows:

$$\text{Family ownership in group i} = \frac{\sum_{j=1}^{N} FP_j}{N}$$

N: the number of firms within a group

FP_j: the portion of the family share of the *j*th firm in a group

Also, intragroup shareholdings within a group were measured as the portion of inside ownership held by other affiliated firms within a group at time $t - 1$ as follows.

$$\text{Intragroup-shareholdings in group } i = \frac{\sum_{j=1}^{N} IP_j}{N}$$

N: the number of firms within a group

IP_j: the portion of the other affiliated firms' shares of the *j*th firm in a group (0–1)

Lastly, I measured internal transaction at time $t - 1$ as the aggregated sum of internal sales and purchases within a group, divided by the total sales of the group. These group-level sales are the aggregated sum of the sales of all affiliated firms in the group.

Moderating Variable

Environmental scarcity. This variable is measured identically to the way it was measured in the previous chapter. First I rescaled KOSPI by dividing by 1000, and then centered this variable by subtracting its mean value. Because greater KOSPI represents more munificent economic conditions, the measured KOSPI variable is the negative function of environmental scarcity.

Control Variables

Business group characteristics. Following existing studies in business groups, I controlled for several group characteristics that might influence the likelihood of group failure. Specifically, I controlled for the size, ROA, export dependency, and liquidity of groups. I measured these variables in the same ways as in the previous chapter. First, *group size* was measured by the number of affiliated firms in a group. The greater the size of groups, the lower the failure rate might be of the groups. *Group ROA* was measured as the ratio of the sum of the net profit of affiliated firms in a group to the sum of the firms' assets. As groups perform better, they will be less likely to fail. *Export dependency* of business groups was measured as the ratio of the sum of affiliated firms' export sales to the sum of the firms' sales. *Group liquidity* is the sum of affiliated firms' current assets divided by the sum of the firms' current liabilities. All of these variables

were lagged by one year. Lastly, some business groups were already in existence at the beginning of the period of this study, so I created a "left-censored" dummy variable.

Business group industry relatedness. I also controlled for the degree of industry relatedness among affiliated firms in a group because the level of structural coupling in a group could be associated with the extent to which affiliated firms are related in their business areas. Both vertical and complementarity relatedness variables were generated in the same ways as in the previous chapter.

Economic development. The economic development of Korea was measured as the annual Korean GDP per capita.

Results

The summary statistics and correlations for the variables in the group failure analyses are presented in Table 7. For convenience in interpreting the results, I rescaled the variables so that the values of each variable fall within a similar range. Although many intercorrelations are significant, multicollinearity does not appear to be a problem. Figures 9 and 10 show the average extent of each coupling type over time. On average, 10.88% of the shares are owned by family members, and 1.35% are owned by other affiliated firms in the same group. In Figure 10, internal transactions occupy only small portions in group sales. On average, intratrade accounts for 0.9% of group sales. These results show that family ownership is a dominant governance mechanism in Korean business groups. Another marked trend is that both portions of family ownership and intragroup-shareholdings have increased since the Korean economic crisis, while the extent of internal transactions has dropped from that point on.

[Insert Table 7, Figures 9 and 10 about here]

Table 8 presents the estimates of the piecewise exponential models of the group failure rates. In Table 8, model 1 provides a baseline model with control variables only. Model 2 includes my coupling measures. I used the estimated results of this model to test hypotheses 1a, 1b, and 1c, which predict the main effects of coupling on the failure rate of business groups. Model 3 has additional interaction terms between each coupling mechanism and environmental scarcity. The estimated results of these models were used to test hypotheses 2a, 2b, and 2c.

[Insert Table 8 about here]

The estimated results of Model 1 show that the size, profitability, and liquidity level of business groups significantly reduce the failure rate of these groups, as expected. In addition, the effect of group age on group failure rate is positive and significant in all age pieces; groups are less likely to fail as they age. This result provides supporting evidence for the liability of newness argument (Stinchcombe 1965). The results also show that vertical relatedness increases the failure rate of a group, while complementarity increases the survival chances of a group. As indicated by the negative and significant coefficient on KOSPI in Table 8, the risk of group failure increases in scarcer environments.

Based on model 2, both family ownership and intragroup-shareholding ownership are positive and significant, suggesting that groups are more likely to fail if their affiliated firms are more tightly coupled together in a group through both types of ownership ties. Internal trade is also positive and significant. These results provide strong

support for hypotheses 1a, 1b, and 1c and suggest that the greater the coupling in a group, the higher the failure rate of the group.

In model 3, the interaction terms of KOSPI and three coupling variables (family ownership, intragroup-shareholdings, and internal trades) are positive and significant. Because environmental scarcity is the positive function of the measured KOSPI, these results suggest that the detrimental effects of coupling through family ownership, intragroup-shareholding ownership, and internal trade are accentuated in scarcer environments, while its impacts are attenuated in less scarce environments. Therefore, the estimates given in model 3 of Table 8 provide strong support for hypotheses 2a, 2b, and 2c.

Figures 11, 12, and 13 depict changes in the failure rate associated with the level of environmental scarcity represented by KOSPI and the extent of coupling among affiliated firms through family ownership, intragroup-shareholding ownership, and internal trade on the basis of the coefficients in model 4 of Table 8. Specifically, these graphs depict the multiplier of the predicted group failure rate at three different coupling levels: the mean level, the mean level plus 1 SD, and the mean level plus 2 SD. The baseline hazard is set to one when each coupling variable equals zero and the centered KOSPI has its minimum value (−0.55) which represents the scarcest environments. The greater the KOSPI is, the less scarce the environment is. All of these figures clearly show that tight coupling increases the failure rate of business groups at all levels of environmental scarcity, and its impacts are accentuated in scarcer environments.

[Insert Figures 11, 12, and 13 about here]

In Figure 11, at the mean level of KOSPI (0), a 1 SD greater family ownership (from 0.11 [mean] to 0.34) increases the group failure rate by 11.7% and a 2 SD greater family ownership (from 0.11 to 0.57) increases the failure rate by 27.1%. The moderating effect of environmental scarcity on the group failure rate can also be inferred from this figure. At all levels of coupling through family ownership, the group failure rate is higher when the environment is scarcer. Specifically, when KOSPI is 1 SD smaller than its mean (from 0 to −0.39), a 1 SD greater family ownership than its mean increases the group failure rate by 8.6% and a 2 SD greater family ownership increases the failure rate by 18.5%. On the other hand, when KOSPI is 1 SD greater than its mean (from 0 to 0.39), an increase of family ownership decreases the group failure rate; a 1 SD greater family ownership drops the group failure rate by 7.4%. Therefore, I infer that the positive effects of tight coupling through family ownership on the failure rate of business groups are especially strong in scarcer environments.

Figures 12 and 13 also show patterns similar to those of Figure 11. In Figures 12 and 13, at the mean of KOSPI, a 1 SD greater intragroup-shareholding ownership (from 0.01 to 0.07) increases the group failure rate by 2.7% and a 1 SD greater internal trade (from 0.01 to 0.05) increases the failure rate by 0.9%. The greater the coupling through intragroup-shareholding ownership and internal trade, the higher the group failure rate. The effects of tight coupling through both coupling mechanisms on the group failure rate are greater when the environment is scarcer. At a −0.39 level of KOSPI, a 1 SD greater intragroup-shareholding ownership and internal trade increase the group failure rate by 4.1% and by 2%, respectively. In contrast, at a 0.39 level of KOSPI, a 1 SD greater

intragroup-shareholding ownership increases the group failure rate only by 1.2% and a 1 SD greater internal trade rather slightly decrease the failure rate by 0.4%.

Based on these results, I conclude that tight coupling among affiliated firms in a group increases the group failure rate, and its detrimental effects on the group failure rate are accentuated in scarcer environments.

Robustness check

To check if the results are sensitive to a measure of environmental scarcity, I reran the same models for a robustness check by using the exchange rate measure as in the previous chapter. Table 9 presents the estimated results. In the results of model 2 in Table 9, family ownership, intragroup shareholdings, and intratrade are positive and significant, suggesting that tightly coupled groups are more likely to fail through these three ties. Also, in model 3 of Table 9, the exchange rate and coupling interaction terms for all three coupling ties are positive and significant. Since environmental scarcity is the positive function of the exchange rate, these results suggest that the detrimental effects of coupling on group failure rates are more salient in scarcer environments.

[Insert Table 9, Figures 14, 15, and 16 about here]

The specific changes in the failure rate related with the exchange rate are depicted in Figures 14, 15, and 16. These multiplier figures were generated based on the coefficients in model 3 of Table 9. The baseline hazard is set to one when each coupling variable equals zero and the centered won-dollar exchange rate has its minimum value (−0.38). The greater the exchange rate is, the scarcer the environment is. All of these figures clearly show that tight coupling increases the failure rate of business groups at all

levels of environmental scarcity, and its impacts are accentuated in scarcer environments. For instance, when the exchange rate is 1 SD greater than its mean (from 0 to 0.20), a 1 SD greater family ownership increases the group failure rate by 4.5% and a 2 SD greater family ownership increases the failure rate by 7.5%. Also, at a 0.20 level of the exchange rate, a 1 SD greater intragroup-shareholding ownership and internal trade increase the group failure rate by ~5.5% and by 6.3%, respectively. In contrast, at a −0.02 level of the exchange rate, a 1 SD greater intragroup-shareholding ownership increases the group failure rate only by 1.9% and a 1 SD greater internal trade increases the failure rate by 2.1%.

Moreover, I conducted another sensitivity analysis to check whether or not my results were driven by the way that I operationalized the dependent variable of this study. Specifically, I analyzed the same models displayed in Table 8 by separating group failure events into group dissolution and group transformation to a single firm group. Group dissolution refers to groups that do not exist anymore in the KISLINE database, and group transformation to a single firm group is captured when groups cease to be multi-firm groups and become a single firm group. Group dissolution is a conservative measure of group failure. On the other hand, groups do not necessarily fail when they become a single firm group because such a phenomenon may simply come about by decisions via organizational design. For example, groups could decide to merge their affiliated firms and operate one single large firm to concentrate their capabilities and focus on their strategic areas, even when they do perform well.

[Insert Tables 10 and 11 about here]

The estimated results of group dissolution are presented in Table 10, and those of group decline are in Table 11. As the results of shows, the coupling effects on group dissolution and transformation to a single firm are largely consistent with the results shown in Table 8. Specifically, in the results of Table 10, coupling through family ownership, intragroup-shareholdings, and intra trades has positive and significant effects on group dissolution and the interaction effects of family ownership and intragroup-shareholdings with KOSPI show negative and significant. These results suggest that the greater coupling through family ownership and intragroup-shareholdings the higher group dissolution, especially in scarce environments. However, the interaction term of intra product trade with KOSPI does not significantly affect group dissolution. In addition, the results of Table 11 show that coupling through family ownership and intra product trade positively and significantly affects the likelihood of group transformation to a single firm. As the interaction effects of these two coupling ties and KOSPI are negative and significant, such deleterious effects of coupling through these two ties are less salient when the environment is more munificent. The direct and interaction effects of intragroup-shareholding on group transformation are not significant in the results of Table 11. Based on the results of these sensitivity analyses, I found that the coupling effects on group failure in Table 8 that I used for hypothesis testing were not overly driven by either group dissolution or group transformation to a single firm events although the effects of coupling had a stronger effect for predicting dissolution. Therefore, the results reported in Table 8 are not biased.

Based on these results, I conclude that tight coupling among affiliated firms in a group increases the group failure rate, and its detrimental effects on the group failure rate are accentuated in scarcer environments. These results are quite robust.

Discussion and Conclusions

This study considered how the extent of coupling among firms in a business group affects group-level performance and how the impact depends on the environmental conditions that business groups face. The analyses reveal that the greater the coupling of group firms, the higher the group failure rate, and such detrimental effects of tight coupling on group failure rates are accentuated in resource-scarce environments.

By examining group-level performance, this study significantly contributes to the business group literature. Although business group theory addresses group-level behaviors, the lack of group-level research is a general and critical problem in the literature (Carney et al., 2011). In investigating the coupling effect on group failure rates, this study provides a starting point for group-level performance research.

This study also contributes to our understanding of business groups by offering a sociological account of how coupling affects group-level performance. Drawing from sociological organization theory, this study also provides a complementary account to existing business group studies, which have largely focused on economic and rational perspectives such as agency theory, transaction cost economics, and resource-based views (Guillén 2000).

Despite extensive empirical study in the business group literature, our understanding has been limited to large business groups, ranging from the top 10 to, at most, the top 100.

Accordingly, selection bias has been serious in prior studies. Through analyses of a far more representative sample than any used in prior studies, the findings of this research can be generalized more strongly to the population of business groups.

This study also contributes to research in organizational ecology. Although organizational ecology is now a well-established theory in organization studies, there remains a controversial question of whether selection processes can apply to all kinds of organizations, especially large ones. Many scholars argue that organizational ecology is suited well for the study of small organizations, but not for the study of large ones (Aldrich and Pfeffer 1976; Aldrich 1979; Perrow 1986). Hannan and Freeman (1989, 39) refute this claim by arguing that, in fact, their empirical studies contain large as well as small organizations, and they show that even large ones are selected out. They also emphasize that the selection process of large organizations can be observed if scholars increase the span of their observation periods. By examining the selection processes in the population of Korean business groups over a 20-year period, this study provides clear evidence that business groups, as large organizations, are not immune to selection processes. Indeed even very large business groups fail, which sheds light on the controversial issue of whether the selection theory of organizational ecology can be generalized to large organizations, as well as to smaller ones.

This study's limitations highlight opportunities for future research. This paper is among the first studies of group-level outcomes; as a result, far more attention should be paid to group-level research. It is especially true that, according to the findings of this study, coupling developed by business groups actually affects group survival negatively. This study urges business group scholars to ask a fundamental question: If this is so, why

do business groups couple their firms tightly? One answer to this question may be that coupling does not always negatively influence the performance of affiliated firms forming such groups because prior studies have suggested mixed evidence for the coupling effect on firm financial performance: positive (e.g., Guillén 2000; Khanna and Rivkin 2001), negative (e.g., Almedia and Wolfenzon 2006; Baek, Kang, and Park 2004), and contingent effects (e.g., Lincoln, Gerlach, and Ahmadjian 1996). Moreover, in examining the coupling effect of the survival performance of group firms, I in the previous chapter found that coupling indeed decreases the failure rate of group firms, especially in scarce environments. Specifically, I suggest that merely due to interdependence, coupling facilitates support among affiliated firms within a group and protects them from environmental selection, thereby reducing firm failure rates. However, the findings of these studies do not directly answer the research question, but rather indicate a stronger need for group-level research. They show that the performance implications of coupling are likely different according to the level of interest. Therefore, future researchers should pay much more attention to group-level outcomes and should investigate the effects of coupling on various group outcomes and its boundary conditions.

This study also did not isolate the endogenous effects of coupling on group failure rates, in that the coupling structure might be an outcome of group performance, as well as a cause. If groups change the degree of coupling among their firms to improve their performance or if they become certain coupled structures because of their performance problems, then group performance would affect the internal coupling structure, rather than vice versa. Or, there could be a complex feedback process between performance and

the coupling structure. Future studies aiming to isolate these endogenous effects would be insightful.

Finally, considering the idiosyncratic nature of Korean business groups, external validity should be probed in future research. Korean business groups have been formed in the unique historical context of Korea; therefore, they have developed many distinctive characteristics, which may make my findings nonapplicable to business groups in other countries.

References

Aldrich, H. E. 1979 Organizations and Environments. Englewood Cliffs, New Jersey: Prentice-Hall.

Aldrich, H. E. and J. Pfeffer 1976 "Environments of organizations." Annual Review of Sociology, 2: 79-105.

Almeida, H. and D. Wolfenzon 2006 "Should business groups be dismantled? The equilibrium costs of efficient internal capital markets." Journal of Financial Economics, 79: 99-144.

Amsedn, A. H. 1989 Asia's Next Giant. New York, Oxford University.

Audia, P. G., J. H. Freeman, and P .D. Reynolds 2006 "Organizational foundings in community context: Instruments manufacturers and their interrelationship with other organizations." Administrative Science Quarterly, 51: 381-419.

Bae, K. H. and S. W. Jeong 2007 "The value-relevance of earnings and book value, ownership structure, and business group affiliation: Evidence from Korean business groups." Journal of Business Finance and Accounting, 34: 740-766.

Bae, K.-H., J.-K. Kang, and J.-M.. Kim 2002 "Tunneling or value added? Evidence from mergers by Korean business groups." The Journal of Finance, 57(6): 2695-2740.

Bae, K.-H., K.C. J. Wei, C.-W. Lim 2006 "Corporate governance and conditional skewness in the world's stock markets." Journal of Business, 79(6): 2999-3028.

Baek, J. S., J. K. Kang, and K. S. Park 2004 "Corporate governance and firm value: evidence from the Korean financial crisis." Journal of Financial Economics, 71: 265-313.

Baek, J.-S., J.-K. Kang, and I. Lee 2006 "Business groups and tunneling: Evidence from private securities offerings by Korean chaebols." Journal of Finance, 61(5): 2415-2449.

Barnett, W. P. 1997 "The dynamics of competitive intensity." Administrative Science Quarterly, 42: 128–160.

Barney, J. B. 1986 "Strategic factor markets: Expectations, luck, and business strategy. " Management Science, 32(10): 1231-1241.

Bernardo, A. E., J. Luo, and J. J.-d Wang 2006 "A theory of socialistic internal capital markets." Journal of Financial Economics, 80: 485-509.

Bertrand, M., P. Mehta, and S. Mullainathan 2002 "Ferreting out tunneling: An application to Indian business groups." The Quarterly Journal of Economics, 117: 121-148.

Blossfeld, H.P, Golsch, K, and G. Rohwer 2007 Event History Analysis with STATA. U.S., Lawrence Erlbraum Associates.

Carney, M., Gedajlovic, E. R., Heugens, P., M. Van Essen, and Van Oosterhout 2011 "Business group affiliation, performance, context, and strategy: A meta-analysis." Academy of Management Journal, 54: 437-460.

Carroll, G. and M. T. Hannan 2000 The Demography of Corporations and Industries. Princeton, N.J., Princeton University Press.

Castrogiovanni, G. J. 1991 "Environmental munificence: A theoretical assessment." Academy of Management Review, 16(3):542–565.

Chacar, A. and B. Vissa 2005 "Are emerging economies less efficient? Performance persistence and the impact of business group affiliation." Strategic Management Journal, 26(10): 933-946.

Chang, D. 2006 "Transplanting outside directors to the Korean financial market, 1999-2000." Development and Society, 35(2): 148-171.

Chang, S. J. 2003a Financial Crisis and Transformation of Korean Business Groups: The Rise and Fall of Chaebol. New York: Cambridge University Press.

Chang, S. J. 2003b "Ownership structure, expropriation, and performance of group-affiliated companies in Korea." The Academy of Management Journal, 46: 238-253.

Chang, S. J. and J. Hong 2000 "Economic performance of group-affiliated companies in Korea: Intragroup resource sharing and internal business transactions." The Academy of Management Journal, 43: 429-448.

Chang, S. J., C. N. Chung, and I. P. Mahmood 2006 "When and how does business group affiliation promote firm innovation? A tale of two emerging economies." Organization Science, 17: 637-656.

Chatterjee, S. and B. Wernerfelt 1991 "The Link between Resources and Type of Diversification: Theory and Evidence." Strategic Management Journal, 12(1): 33-48.

Chung, C. N. and X. Luo 2008 "Institutional logics or agency costs: The influence of corporate governance models on business group restructuring in emerging economies." Organization Science, 19: 766-784.

Coase, R. H. 1937 "The Nature of the Firm." Economica, 4(16): 386-405.

Collin, s.-O. 1998 "Why are these Islands of conscious power found in the ocean of ownership? Institutional and governance hypotheses explaining the existence of business groups in sweden." Journal of Management Studies, 35(6): 719 - 746.

Coplan, A. M. and T. Hikino 2010 "Foundations of business groups: Toward an integrated framework." In A.M. Coplan, T. Hikino, and J. Lincoln (eds.), The Oxford Handbook of Business Groups: 15-66. New York: Oxford University Press.

Cyert, R. M. and J.G. March 1963 A Behavioral Theory of the Firm. Cambridge, MA: Blackwell.

Davis, G. 1996 "Reviewed work(s): Evolutionary dynamics of organizations." by J. A.-c. Baum and J. V. Singh. Administrative Science Quarterly, 41: 538-543.

Davis, G. F. 1991 "Agents without principles? The spread of the poison pill through the intercorporate network." Administrative Science Quarterly, 36(4): 583-613.

Delacroix, J and A. Swaminathan 1991 "Cosmetic, speculative, and adaptive organizational change in the wine industry: A Longitudinal study." Administrative Science Quarterly, 36: 631-661.

Dess, G. G. and D. W. Beard 1984 "Dimensions of organizational task environments." Administrative Science Quarterly, 29: 52–73.

DiMaggio, P. J. and W. W. Powell 1983 "The iron cage revisited-Institutional isomorphism and collective rationality in organizational fields." American Sociological Review, 48(2): 147-160.

Douma, S., R. George, and R. Kabir 2006 "Foreign and domestic ownership, business groups and firm performance: Evidence from a large emerging market." Strategic Management Journal, 27: 637-657.

Fama, E. F. and M. C. Jensen 1983 "Separation of ownership and control." Journal of Law and Economics, 26(2): 301-325.

Fan, J. and L. Lang 2000 "The measurement of relatedness: An application to corporate diversification." The Journal of Business, 73: 629-660.

Fields, K. 1995 Enterprise and the State in Korea and Taiwan. Ithaca, New York: Cornell University Press.

Galbraith, J. R. 1973 Designing Complex Organizations. Boston, MA, Addison-Wesley Longman Publishing Co., Inc.

Geertz, C. 1978 "The bazaar economy: Information and search in peasant marketing." The American Economic Review, 68(2): 28-32.

Ghjemawat, P. and T. Khanna 1998 "The nature of diversified business groups: A research design and two case studies." Journal of Industrial Economics, 46: 35-61.

Goll, I., and A. A. Rasheed 2005 "The relationships between top management demographic characteristics, rational decision making, environmental munificence, and firm performance." Organization Studies, 26: 999–1023.

Gompers, P., and J. Lerner 2001 "The venture capital revolution." The Journal of Economic Perspectives, 15: 145-168.

Granovetter, M. 1995 "Business groups and social organizations." In N. Smelser, J and R. Swedberg (eds.), The Handbook of Economic Sociology: 429-450. New York: Princeton University Press.

Guillén, M. F. 2000 "Business groups in emerging economies: A resource-based view." The Academy of Management Journal, 43: 362-380.

Hannan, M. T. and J. Freeman 1977 "Population ecology of organizations." American Journal of Sociology, 82: 929-964.

Hannan, M. T. and J. Freeman 1984 "Structural inertia and organizational change." American Sociological Review, 49(2): 149-164.

Hannan, M. T. and J. Freeman 1989 Organizational Ecology. Cambridge: Harvard University Press.

Hannan, M. T., L. Polos, and G. R. Carroll 2003 "Cascading organizational change." Organization Science: 14: 463-482.

Hawley, A. H. 1950 Human Ecology. New York: Ronald Press.

Hopt, K., H. Kanda, M. R,-e. Wymeersch, and S. Prigge 1998 "Comparative corporate governance: Evidence from Japanese industrial group." Quarterly Journal of Economics, 106: 33-60.

Hoskisson, R. E., A. A. Cannella. Jr, L. Tihanyi, and R. Faraci 2004 "Asset restructuring and business group affiliation in French civil law countries." Strategic Management Journal, 25(6): 525-539.

Hoskisson, R. E., C. W.-l. Hill, and H. Kim 1993 "The multidivisional structure: Organizational fossil or source of value?" Journal of Management, 19: 269-298.

Hoskisson, R. E., R. A. Johnson, L. Tihanyi, and R.E. White 2005 "Diversified business groups and corporate refocusing in emerging economies." Journal of Management, 31(6): 941-965.

Hsu, G., P. W. Robert, and A. Swaminathan. 2012 "Evaluative schemas and the mediating role of critics." Organization Science, 23(1): 83-97.

Hundley, G. and C. K. Jacobson 1998 "The Effects of the keiretsu on the export performance of Japanese companies: Help or hindrance?" Strategic Management Journal, 19(10): 927-937.

Johnson, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer 2000 "Tunneling." The American Economic Review, 90(2): 22-27.

Katz, D. and R. Kahn. 1966 The Social Psychology of Organizations. New York: Wiley

Keister, L. A. 1998 "Engineering growth: Business group structure and firm performance in China's transition economy." The American Journal of Sociology, 104(2): 404-440.

Keister, L. A. 2001 "Exchange structures in transition: Lending and trade relations in Chinese business groups." American Sociological Review, 66(3): 336-360.

Khanna, T. and J. W. Rivkin 2001 "Estimating the performance effects of business groups in emerging markets." Strategic Management Journal, 22: 45-74.

Khanna, T. and J. W. Rivkin 2006 "Interorganizational ties and business group boundaries: Evidence from an emerging economy." Organization Science, 17: 333-352.

Khanna, T. and K. Palepu 1997 "Why focused strategies may be wrong for emerging markets." Harvard Business Review, 75(4): 41-51.

Khanna, T. and K. Palepu 2000 "The future of business groups in emerging markets: Long-run evidence from Chile." Academy of Management Journal, 43: 268-285.

Khanna, T. and Y. Yafeh 2005 "Business groups and risk sharing around the world." The Journal of Business, 78: 301–340.

Khanna, T. and Y. Yafeh 2007 "Business groups in emerging markets: Paragons or parasites?" Journal of Economic Literature, 45: 331-372.

Kim, H. 2010 "Business groups in South Korea." In A.M. Coplan, T. Hikino, and J. Lincoln (eds.), The Oxford Handbook of Business Groups: 157-179. New York: Oxford University Press.

Kim, H., H. Kim, and P.M. Lee 2008 "Ownership structure and the relationship between financial slack and R&D investments: Evidence from Korean firms." Organization Science, 19: 404-418.

Kim, H., R. E. Hoskisson, L. Tihamyi, and J. Hong 2004 "The evolution and restructuring of diversified business groups in emerging markets: The lesson from chaebols in Korea." Asia Pacific Journal of Management, 21: 25-14.

La Porta, R., Lopez-deSilanes, F., Shleifer, A., and R. W. Vishny 1999 "Investor protection and corporate valuation." http://papers.ssrn.com/paper.taf?abstract_id=227583.

Lawrence, P. R. and J. W. Lorsch 1967 "Differentiation and integration in complex organizations." Administrative Science Quarterly, 12(1): 1-47.

Leff, N. H. 1978 "Industrial organization and entrepreneurship in the developing countries: The economic groups." Economic development and cultural change, 26: 661-675.

Lincoln, J. R., M. L. Gerlach, and C. L. Ahmadjian 1996 "Keiretsu networks and corporate performance in Japan." American Sociological Review, 61: 67-88.

Lincoln, J. R., M. L. Gerlach, and P. Takahashi 1992 "Keiretsu networks in the Japanese economy: A dyad analysis of intercorporate iies." American Sociological Review, 57: 561-585.

Luo, X and C. N. Chung 2005 "Keeping it all in the family: The role of particularistic relationships in business group performance during institutional transition". Administrative Science Quarterly, 50:404-439.

Maman, D. 2002 "The emergence of business groups: Israel and South Korea compared." Organization Studies, 23: 737-758.

Meyer, J. W. and B. Rowan 1977 "Institutionalized organizations: Formal structure as myth and ceremony." The American Journal of Sociology, 83(2): 340-363.

North, D. C. 1990 Institutions, institutional change, and economic performance. New York Cambridge University Press.

Perotti, E. C. and S. Gelfer 2001 "Red barons or robber barons? Governance and investment in Russian financial-industrial groups." European Economic Review, 45(9): 1601-1617.

Perrow, C. 1984 Normal Accidents: Living with High-Risk Technologies. New Jersey: Princeton University Press.

Perrow, C. 1986 Complex Organizations: A Critical Essay (3rd eds.). New York: Random House.

Pfeffer, J. and G. R. Salancik. 1978 The External Control of Organizations: A Resource Dependence Perspective. H. a. Row. New York, Harper and Row.

Powell, W. W. 1990 "Neither market nor hierarchy: Network forms of organization." In L.L. Cummings and B. M. Staw (eds.). Research in Organizational Behavior:12: 295-336. Greenwich, CT: JAI Press.

Sharav, I. 1974 "Transfer pricing--diversity of goals and practices." Journal of Accountancy, 137(4): 56-62.

Shin, D. and Kwon, K. 1999 "Demystifying Asian business networks: The hierarchical core of interfirm relations in Korean Chaebol groups." In F. J. Ritcher(ed.), Business network in Asia: 113-146. Greenwich, CT: Westview Press.

Simon, H. A. 1962 "The architecture of complexity." Proceedings of the American Philosophical Society, 106: 467–482.

Song, B. N. 1990 The Rise of the Korean Economy. New York: Oxford University Press.

Sorenson, O. and J. B. Sørensen 2001 "Finding the right mix: franchising, organizational learning, and chain performance." Strategic Management Journal, 22(6-7): 713-724.

Stinchcombe, A. L. 1965 "Social structure and organizations." In J. G. March (eds.), Handbook of Organizations : 142-193. Chicago: Rand-McNally.

Strachan, H. W. 1976 Family and Other Business Groups in Economic Development : The Case of Nicaragua. New York: Praeger.

Thompson, J. 1967 Organizations in Action: Social Science Bases of Administrative Theory New York, McGraw Hill.

Thomsen, S., and T. Pedersen 2000 "Ownership structure and economic performance in the largest European companies." Strategic Management Journal, 21(6): 689-705.

Wasserman, S. and K. Faust 1995 Social Network Analysis: Methods and Applications. Cambridge: Cambridge University Press.

Weesie J. 1998 "Regression analysis with multiplicative heteroscedasticity." Stata Technical Bulletin, 42: 28–32.

Weick, K. E. 1976 "Educational organizations as loosely coupled systems." Administrative Science Quarterly, 21: 1-19.

Weick, K. E. 1982 "Management of organizational change among loosely coupled elements." In P. S. Goodman and Associates (Eds.), Change in Organizations: 375-408. San Francisco: Jossey-Bass.

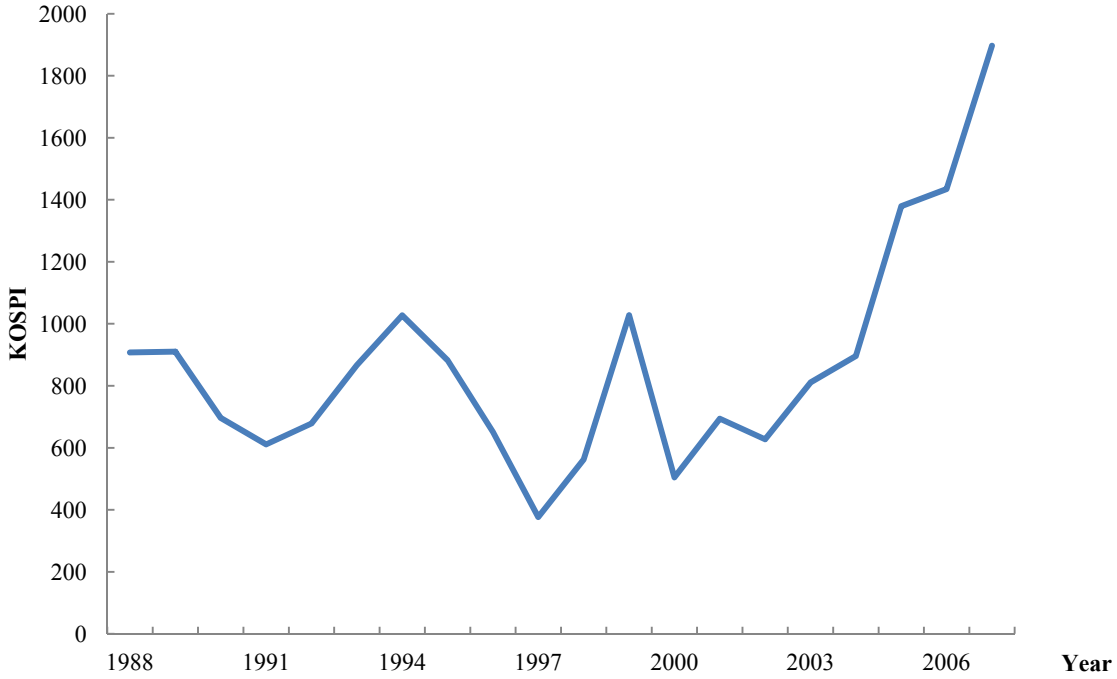
Williamson, O. E. 1975 Markets and Hierarchies: Analysis and Antitrust Implications. New York: Free Press.

Williamson, O. E. 1991 "Comparative economic organization: The analysis of discrete structural alternatives." Administrative Science Quarterly, 36(2): 269-296.

Wong, S. L. 1985 "The Chinese family firm: A model." British Journal of Sociology, 36: 58-72.

Yasai-Ardekani, M. 1989 “Effects of environmental scarcity and munificence on the relationship of context to organizational structure.” Academy of Management Journal, 32: 131–156.

Figure 1. The Korea Composite Stock Price Index (KOSPI), 1988 - 2007



Source: Bank of Korea

Figure 2. The number of firms in Korean business groups, 1988-2007

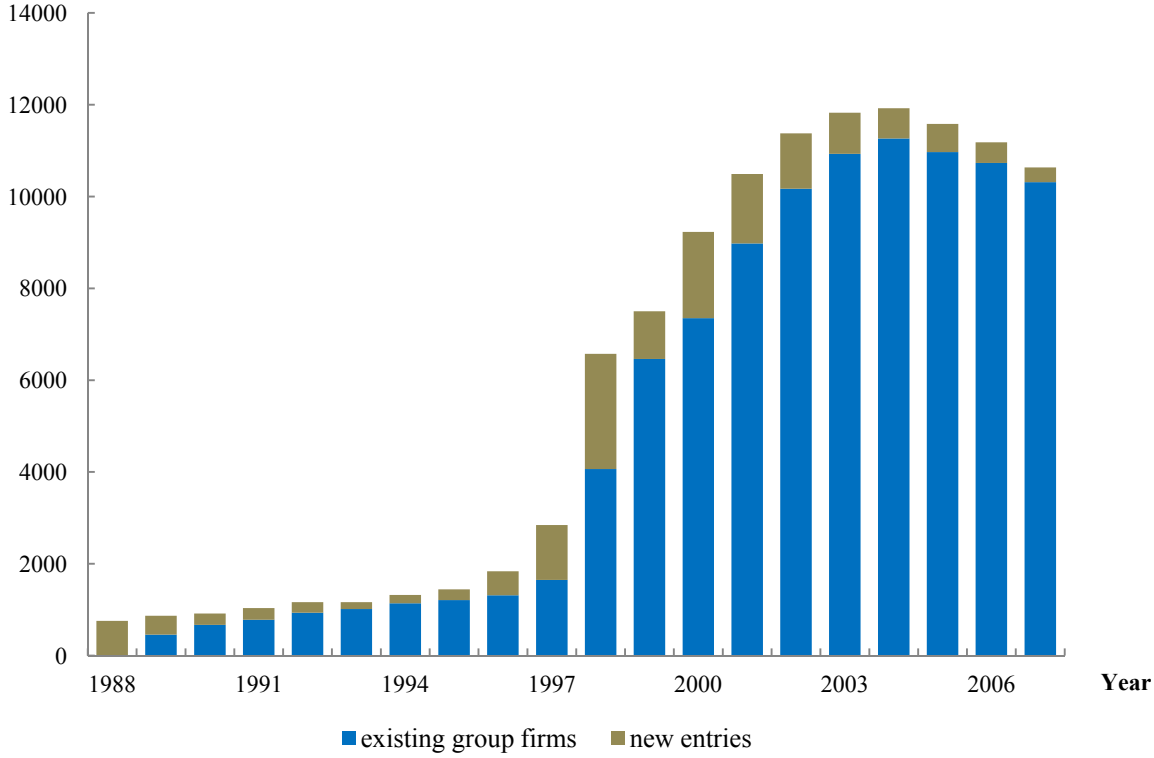


Figure 3. The distribution of firm failure events, 1988-2007

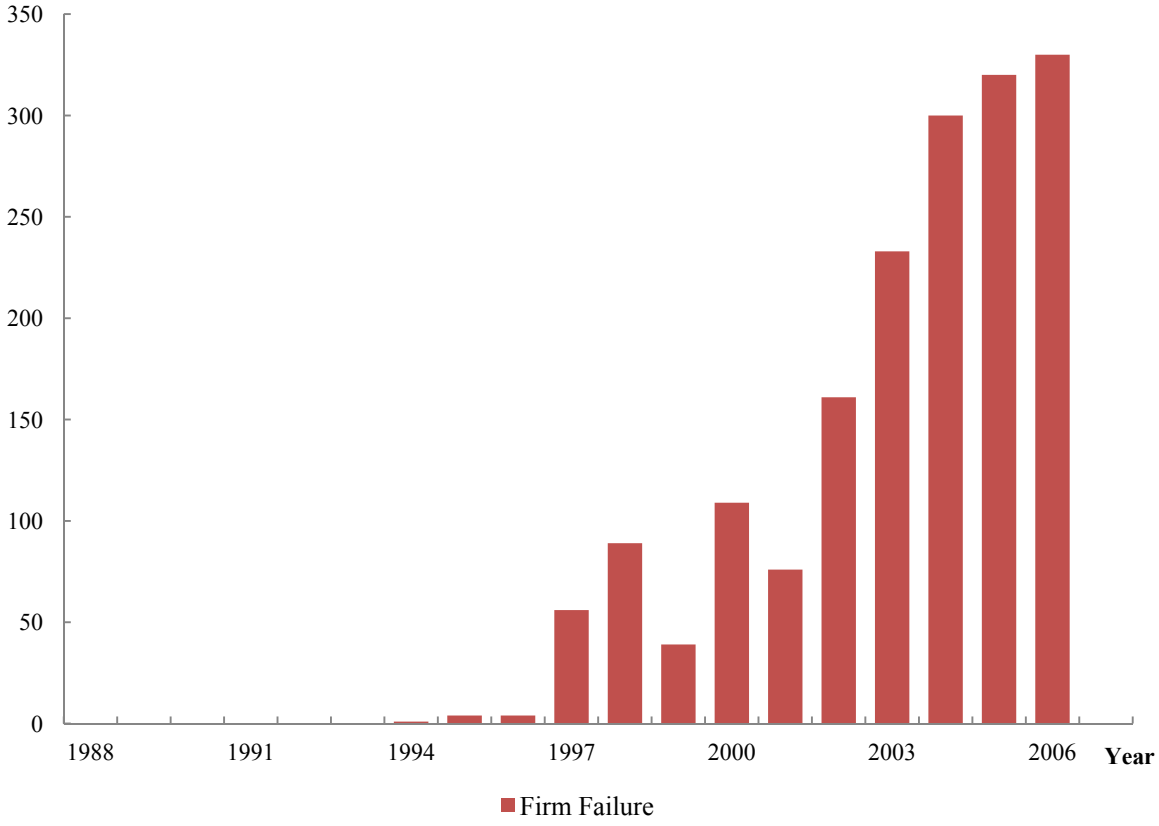


Figure 4. The mean of family ownership and intragroup-sharholdings in Korean business groups, 1987-2006 (Firm performance models)

Family ownership = The portion of family shares in a group
Intragroup-shareholdings = The portion of affiliated firms' share

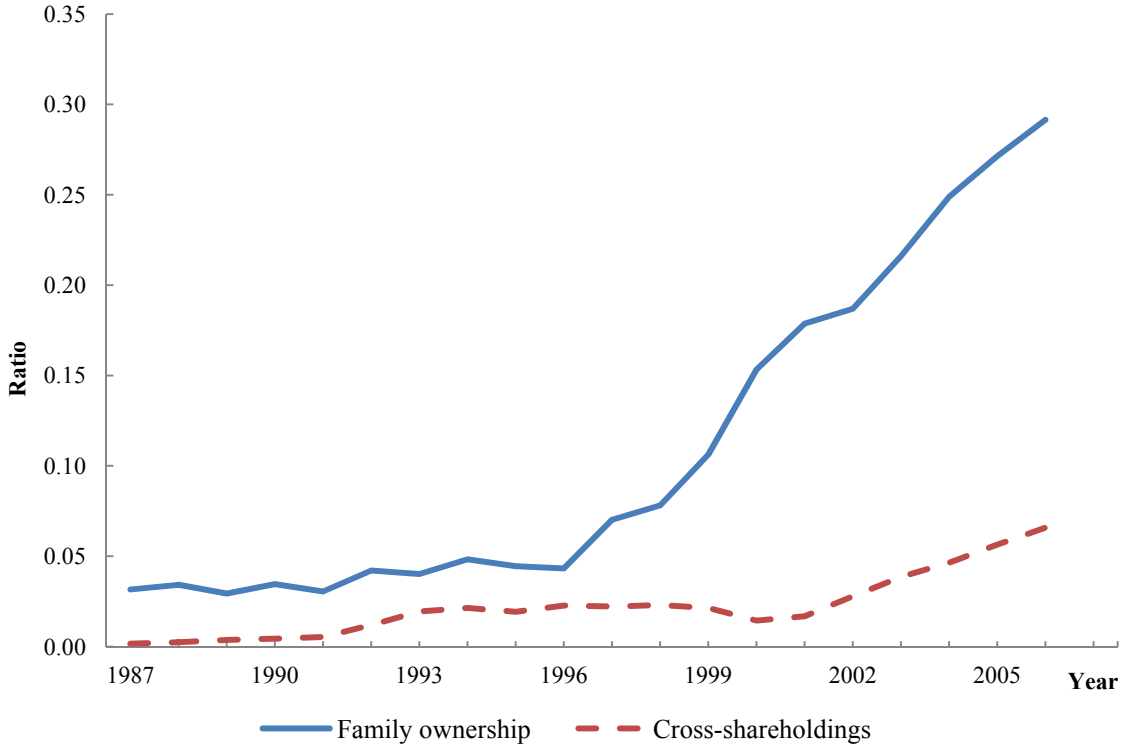


Figure 5. The mean of internal transactions in Korean business groups, 1987-2006 (Firm performance models)

Internal transaction = Internal sales and purchases / Group sales

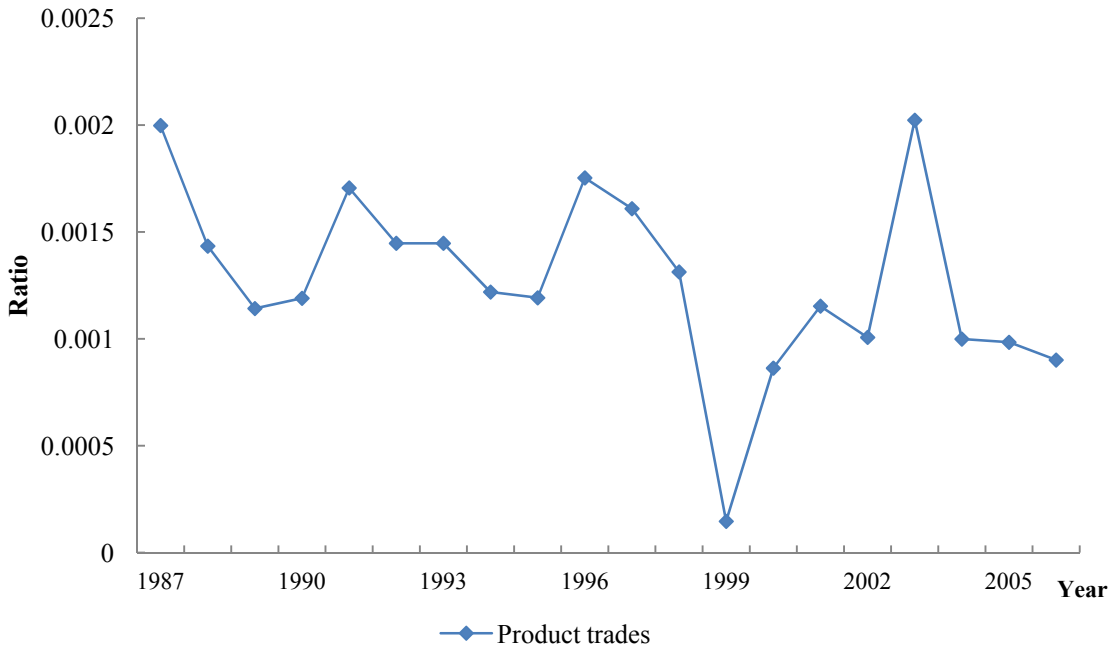
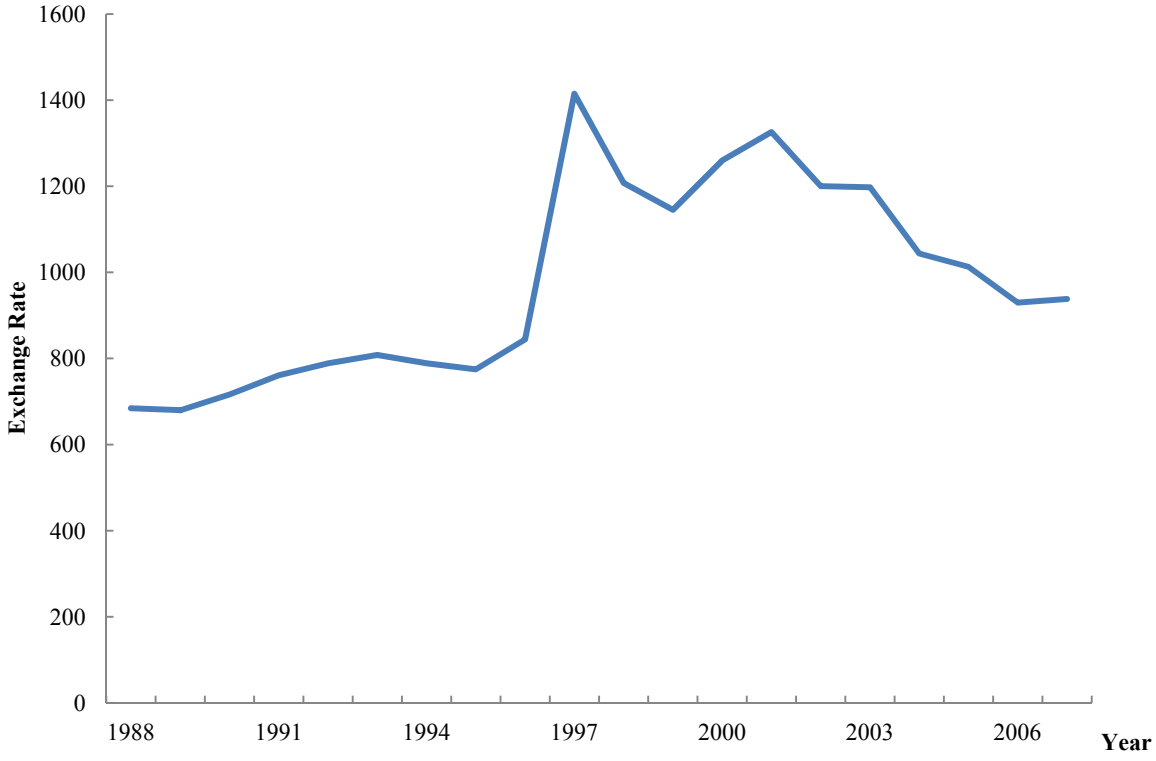


Figure 6. The Korean won/dollar exchange rate, 1988-2007



Source: Bank of Korea

Figure 7. The number of Korean business groups, 1988-2007

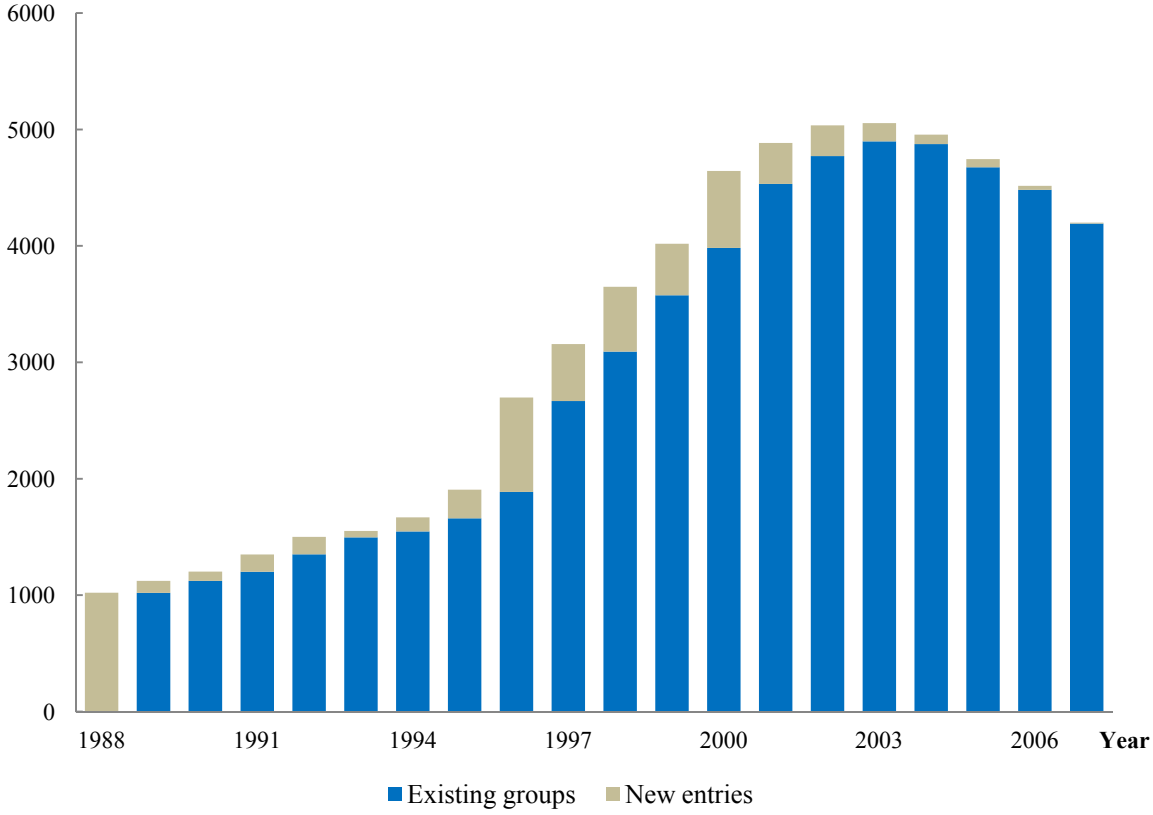


Figure 8. The distribution of group failure events, 1988-2007

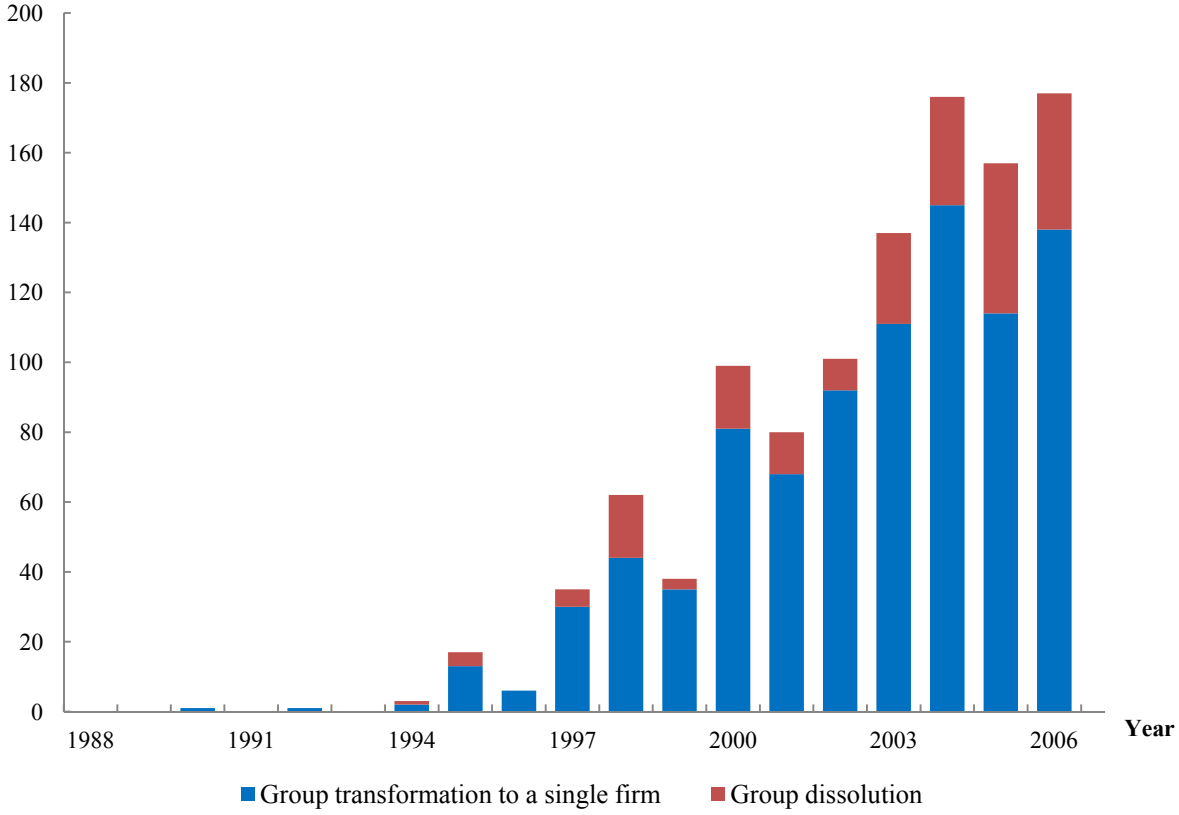


Figure 9. The mean of family ownership and intragroup-sharholdings in Korean business groups, 1987-2006 (Group performance models)

Family ownership = The portion of family shares in a group
Intragroup-shareholdings = The portion of affiliated firms' shares

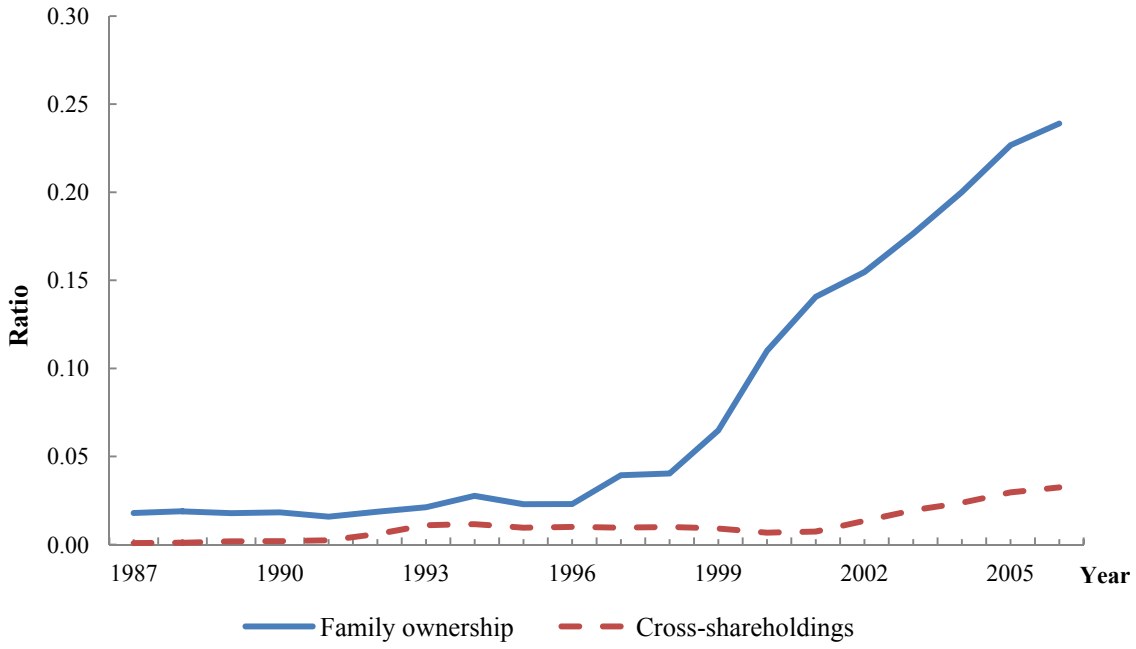


Figure 10. The mean of internal transactions in Korean business groups, 1987-2006 (Group performance models)

Internal transaction = Internal sales and purchases / Group sales

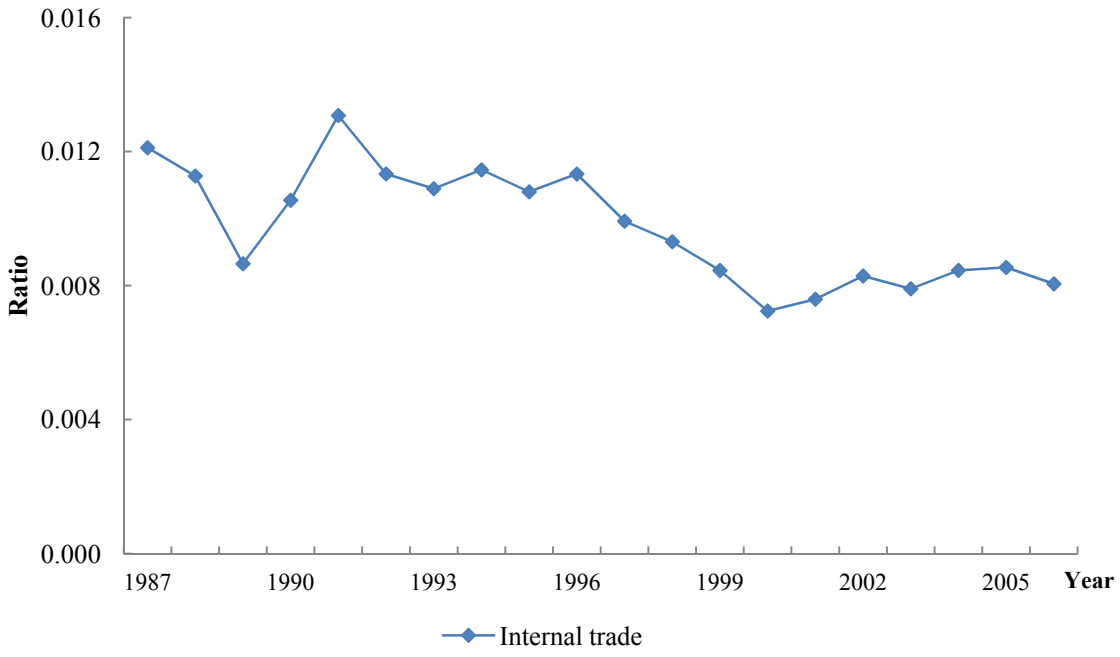


Figure 11. Multiplier of firm failure rate, the extent of coupling through family ownership
(Environmental scarcity: KOSPI)

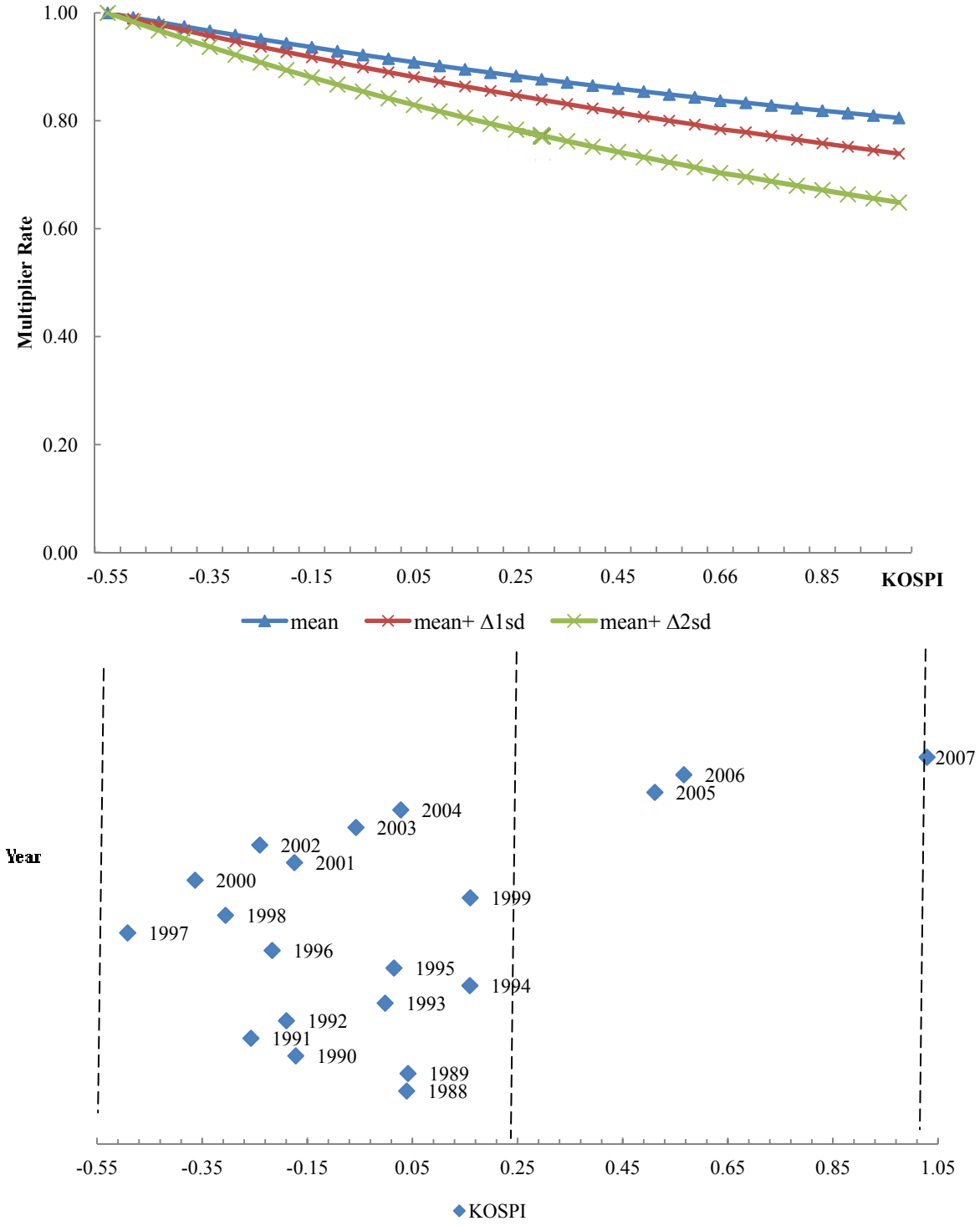


Figure 12. Multiplier of firm failure rate, the extent of coupling through intragroup-shareholding ownership

(Environmental scarcity: KOSPI)

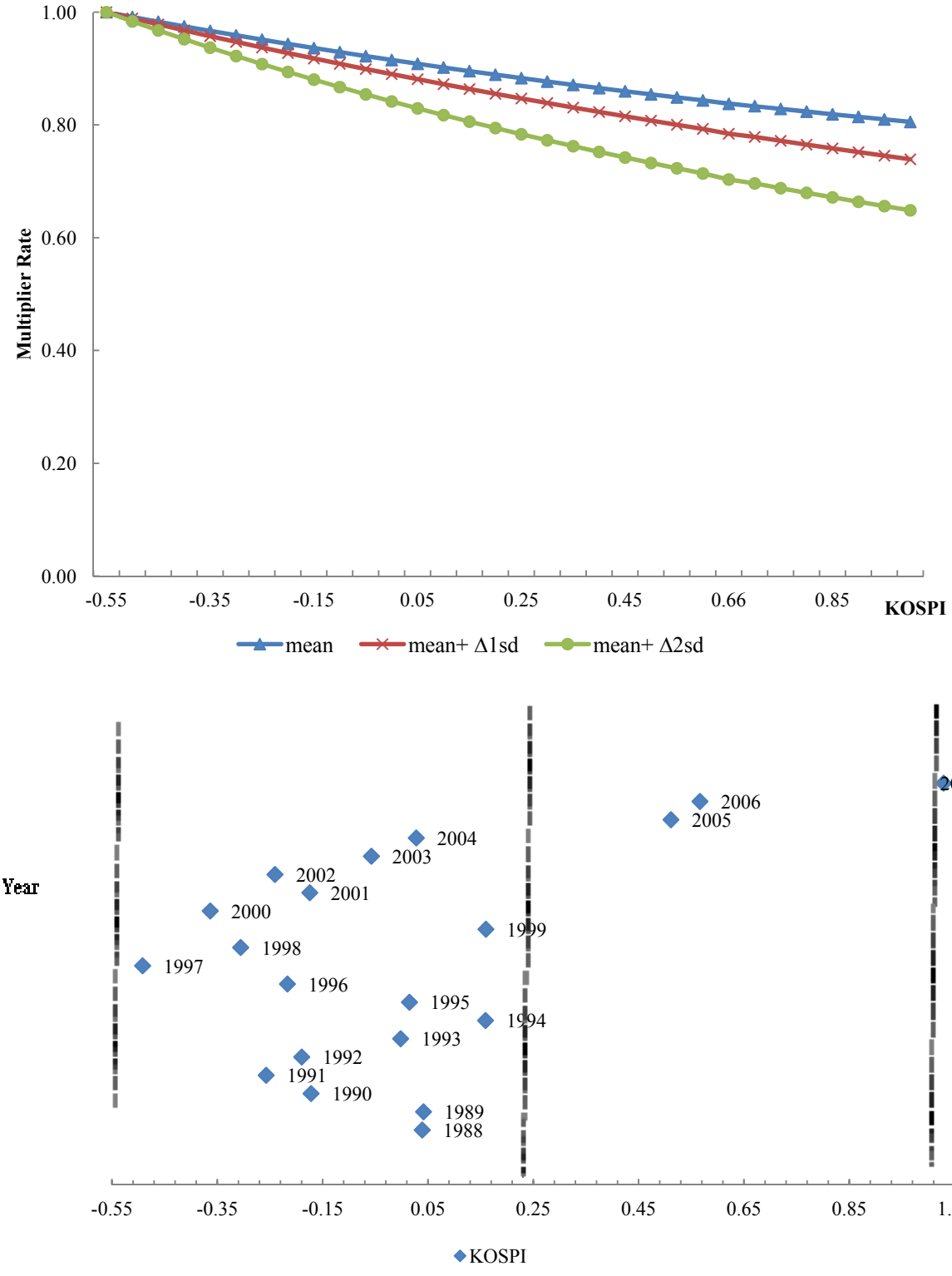
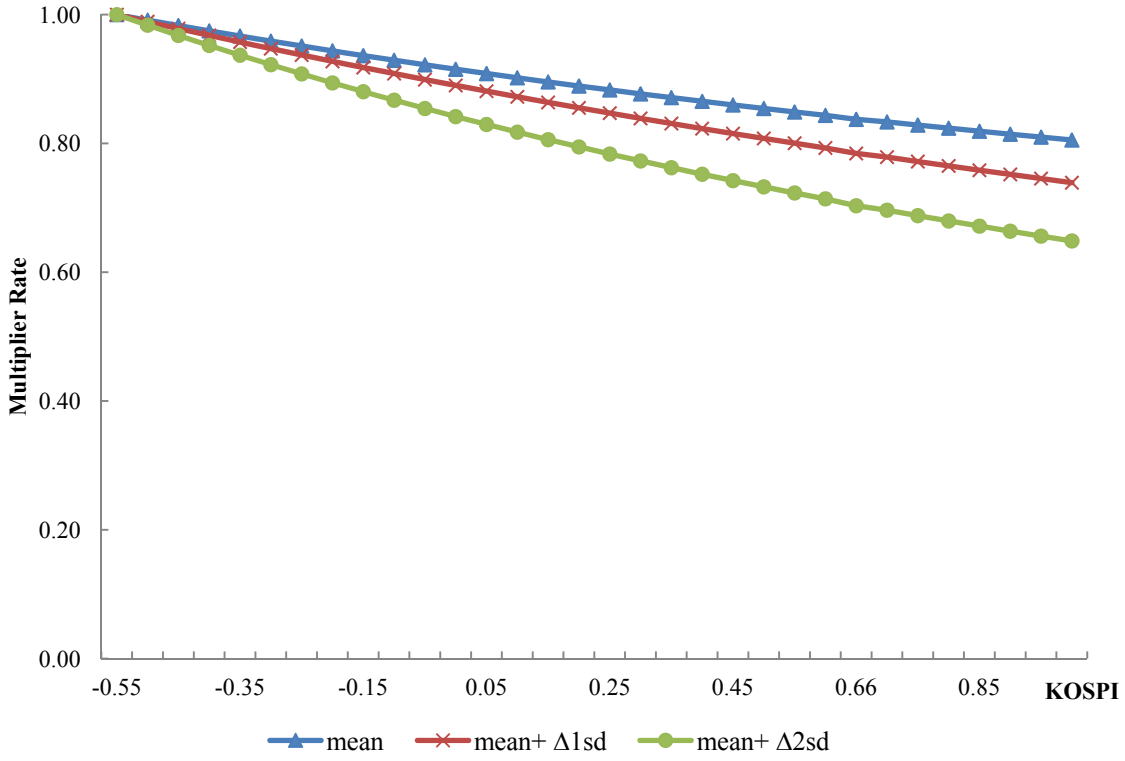


Figure 13. Multiplier of firm failure rate, the extent of coupling through internal trade

(Environmental scarcity : KOSPI)



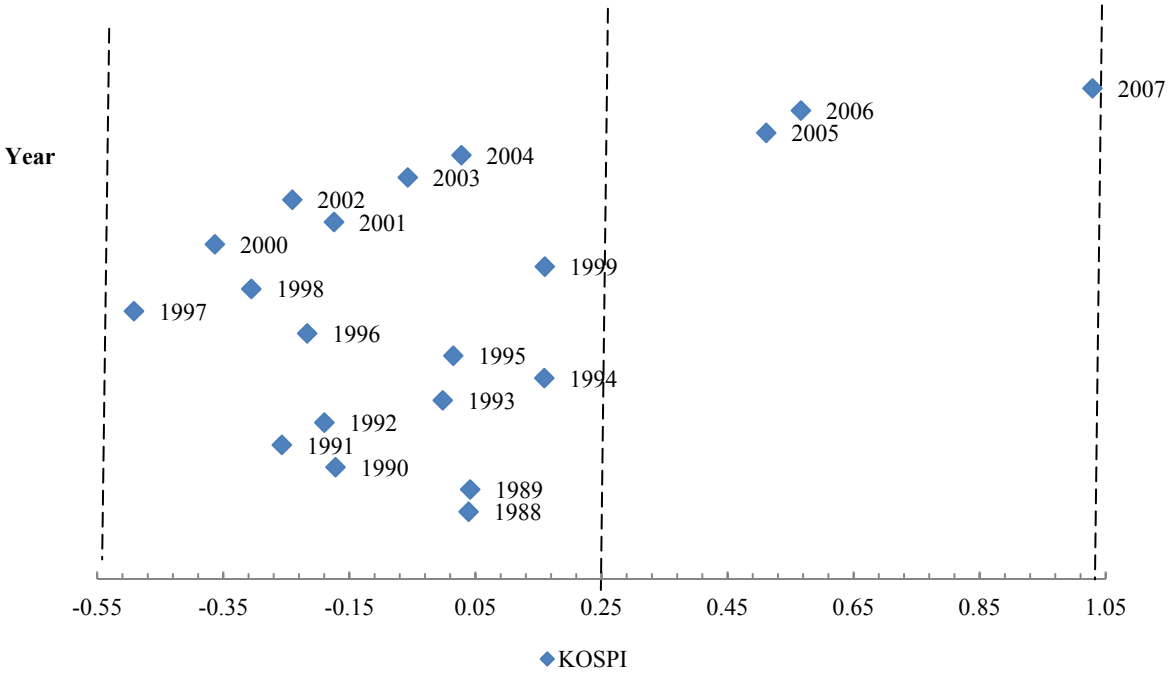


Figure 14. Multiplier of firm failure rate, the extent of coupling through family ownership

(Environmental scarcity: Won-dollar exchange rate)

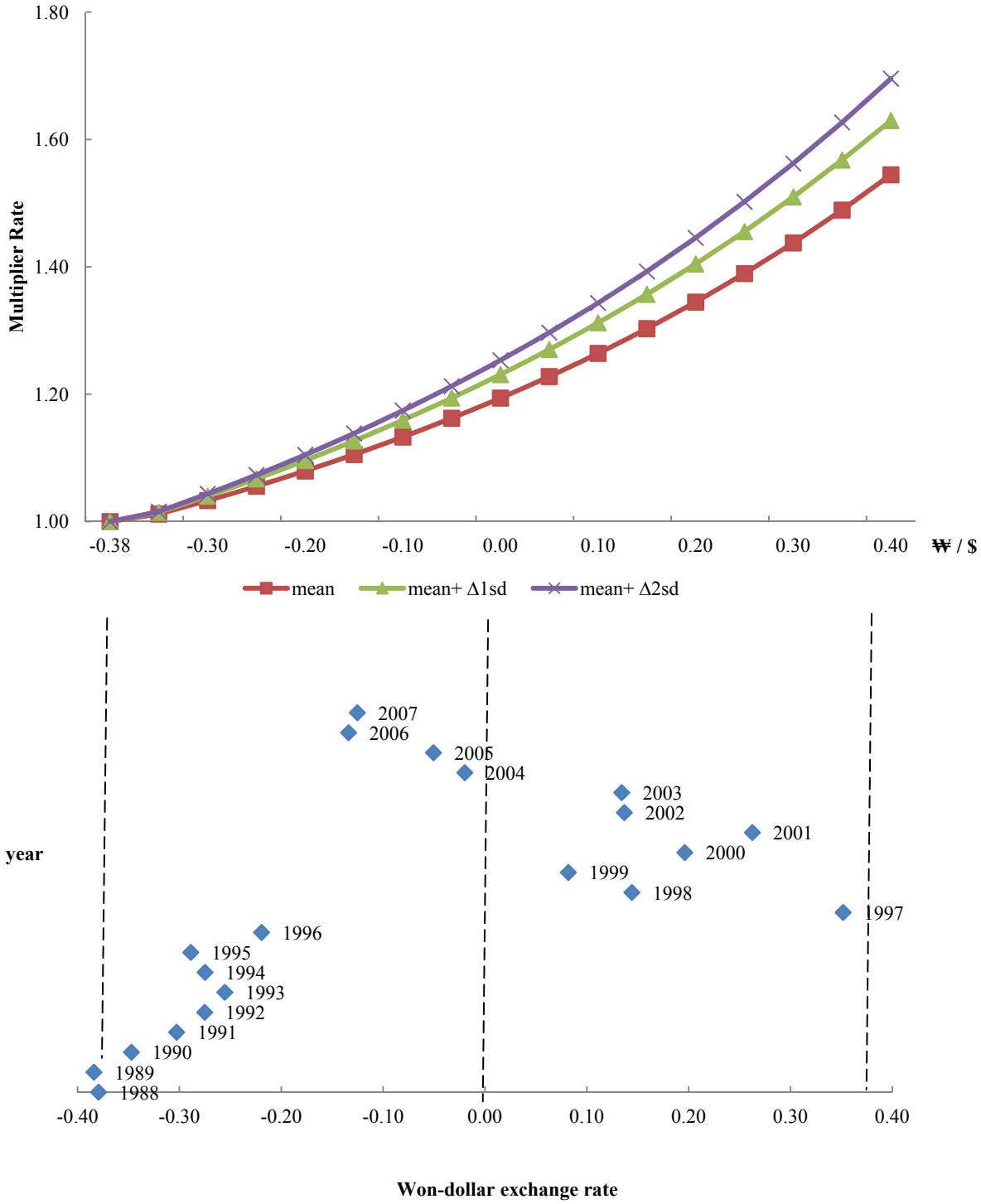


Figure 15. Multiplier of group failure rate, the extent of coupling through intragroup-shareholding ownership
(Environmental scarcity: Won-dollar exchange rate)

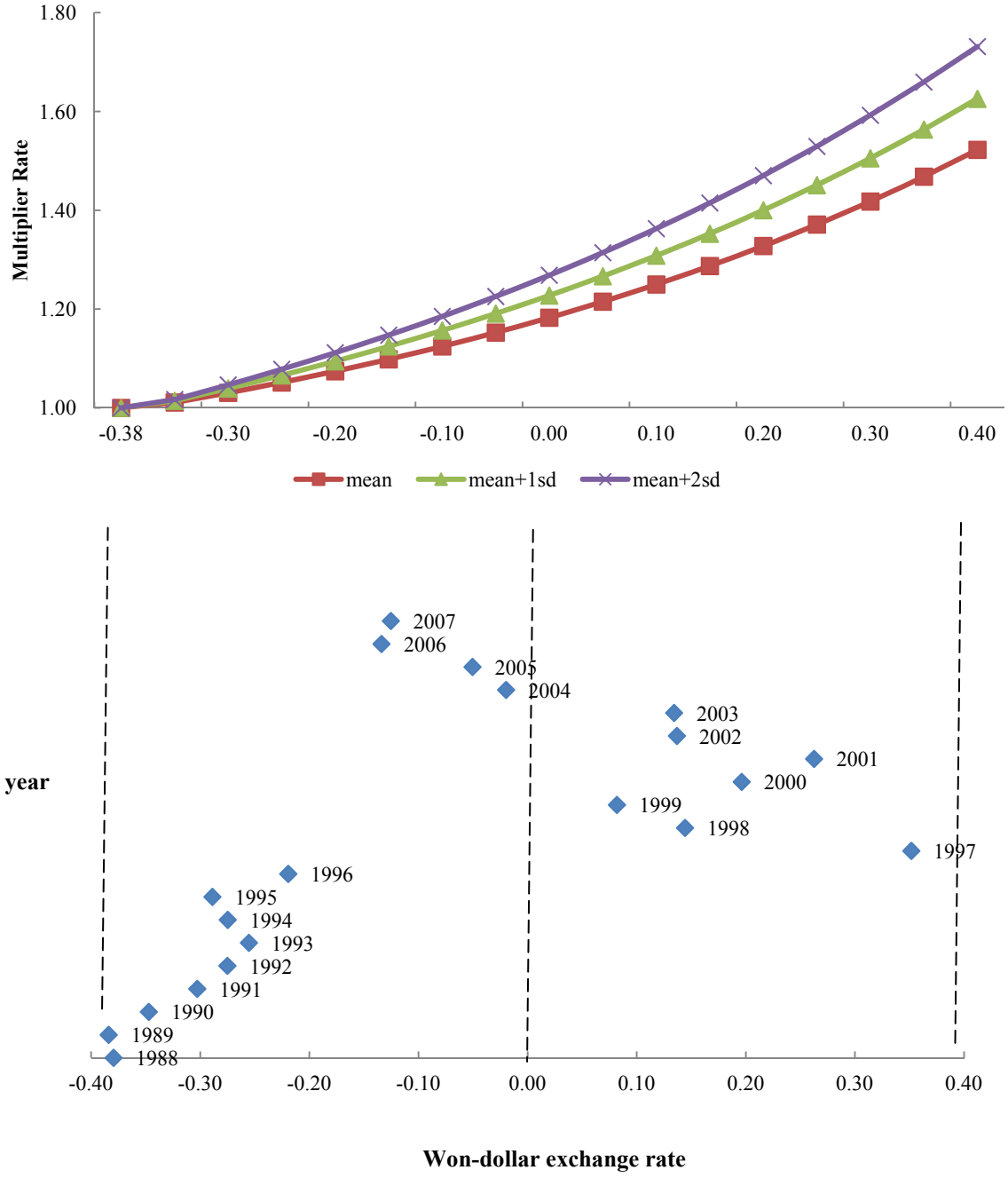


Figure 16. Multiplier of group failure rate, the extent of coupling through internal trade

(Environmental scarcity: Won-dollar exchange rate)

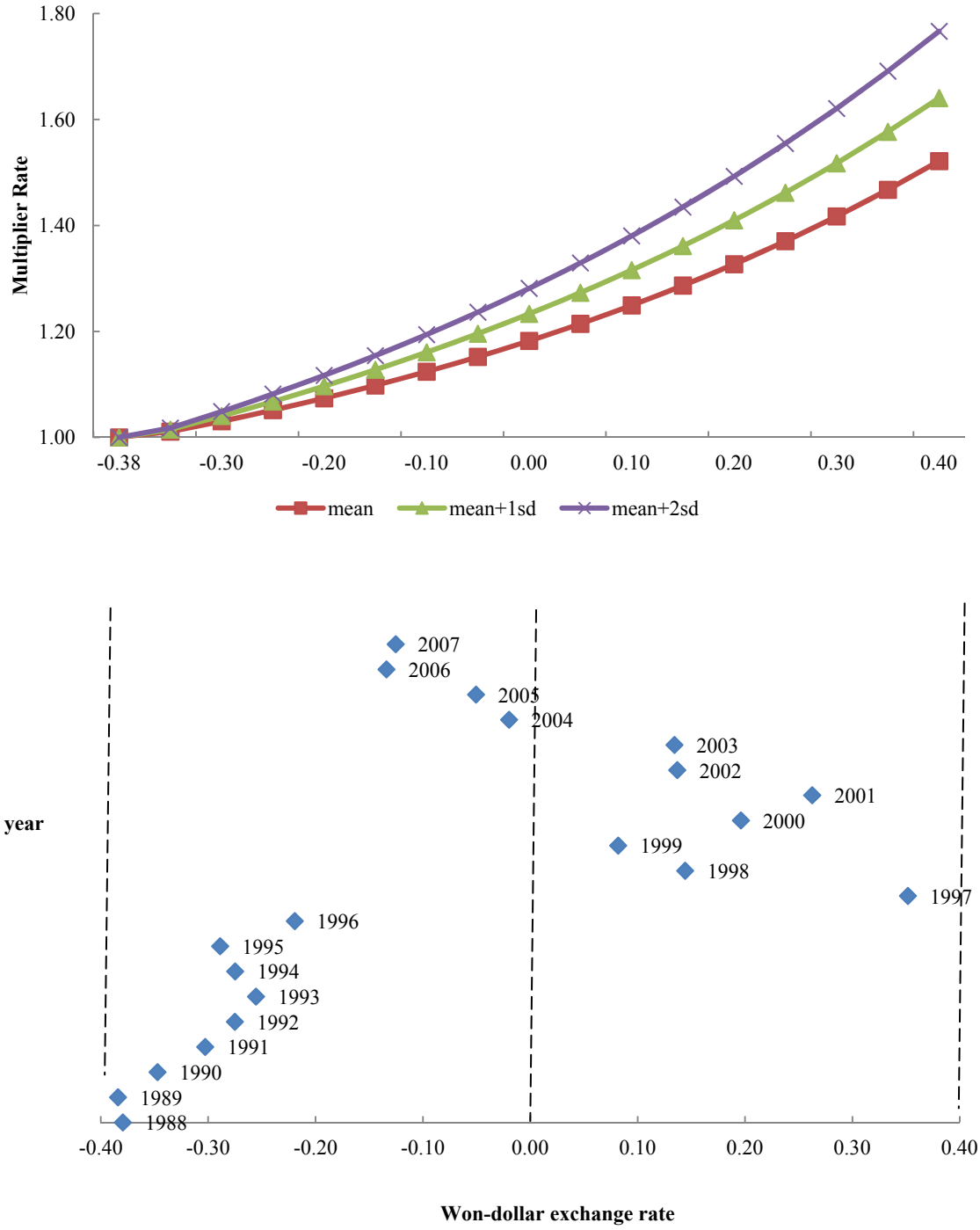


Table 1. The mixed outcomes of internal coupling structure on affiliated firms in business groups

Positive outcomes	Corporate governance Chang & Hong (2000); Chung & Luo (2008), Granovetter(2005), Gerlach (1992), Luo & Chung (2005), Keister (1998; 2001), Weidenbaum & Hughes (1996) Internal trades Chang & Choi (1988), Chang & Hong (2000), Chang et al. (2006), Gertner et al. 1994, Guillén (2000), Khanna & Palepu (1997; 2000), Khanna & Rivkin (2001), Kim et al. (2004); Mahmood & Mitchell (2004)
Negative outcomes	Corporate governance Bae & Jeong (2007), Bae et al. (2002; 2006), Baek et al. (2004), Baek et al. (2006), Bertrand et al. (2002), Claessens et al. (2000), Douma et al. (2006), Friedman et al. (2003), Ferris et al. (2003), Morck & Nakamura (1999)
Contingent outcomes	Firm characteristics Chang & Hong (2000), Chacar & Vissa (2005) Douma et al. (2006), Lincoln et al. (1996), Khanna & Yafeh (2005); Kim et al. (2004) Institutional contexts Chang et al. (2006), Hoskisson et al. (2004), Khanna & Palepu (1997), Khanna & Rivkin (2001), Keister (1998), Lee et al. (2008), Lins & Servaes (2002); Luo & Chung (2005), Weinstein & Yafeh (1998)

Table 2. The unbalanced outcomes of business group research

Level	Financial outcomes	Non-financial outcomes
Firm	**1.Market (stock) value** : Bae et al. (2002a, 2002b), Baek et al. (2004, 2006), Bae & Jeong (2007) **2.Profitability** 1) ROA: Berger & Ofek (1995), Chacar & Vissa (2005), Douma et al. (2006), Khanna & Palepu (2000), Khanna & Rivkin (2001), Lincoln et al. (1996), Kim et al. (2004), Luo & Chung (2005) 2) ROIC: Chang & Hong (2000), 3) EBIT: Bertrand et al. (2002) 4) Others: operating profit, nonoperating profit (Bertrand et al. 2002) **3.Tobin's Q** :Berger & Ofek (1995), Bertrand et al.(2002), Douma et al. (2006) **4.Sales growth** Kim et al. (2004) **5.Export ratio** :Hundley & Jacobson (1998)	**1.Innovation** 1) The count of the patents: Chang et al. (2006) 2) R&D intensity: Kim et al. (2008) **2..Foreign entry** : Guillén (2001)
Dyad	None	**1.Group boundary** : Lincoln et al. (1992), Khanna & Rivkin (2006)
Group	None	**1.Diversification, divestiture, restructuring** : Chung & Luo (2008) Hoskisson et al. (2005)(not tested) [Outcomes proposed but not tested yet] 1.The structure of business groups : Khanna & Yafeh (2007) 2.The ownership of business groups : Khanna & Yafeh (2007) 3.The formation of business

		groups : Khanna & Yafeh (2007), Maman (2002)
Macro economy	**1.Externality** Cash flows realized and payments: Almeida & Wolfzen (2006) **2.The importance of business groups in a country** The total net sales of business groups/GDP : Gullén(2000) **3. The skewness of stock returns in a country** The distribution of firm stock returns: Bae et al. (2006)	**1.Restructuring** : Hoskisson et al. (2004)

Table 3. Descriptive statistics and correlations of the variables in the firm performance models (period: 1988-2007, N=116,854)

Variable (rescaling)	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Firm failure	0.01	0.12								
(2) Firm age	17.53	8.84	0.13*							
(3) Firm ROA	4.17	1175.51	-0.00	-0.00						
(4) Firm asset	1.04	10.03	-0.00*	0.13*	-0.00					
(5) Firm export dependency	0.04	0.15	-0.01*	0.12*	-0.00	0.08*				
(6) Firm liquidity	5.55	159.53	0.00	-0.00	0.00	-0.00	-0.00*			
(7) Firms founded before 1988	0.36	0.48	-0.07*	0.55*	-0.00	0.09*	0.18*	-0.01*		
(8) The portion of a firm in coupling through family ownership	0.09	0.25	-0.00	0.22*	-0.00	0.02*	0.07*	-0.00	0.13*	
(9) The portion of a firm in coupling through intragroup-shareholdings	0.02	0.13	-0.00	0.10*	-0.00	0.02*	0.02*	-0.00	0.06*	0.09*
(10) The portion of a firm in coupling through intra trade	0.16	0.33	-0.02*	0.19*	-0.00	0.02*	0.16*	-0.01*	0.25*	0.28*
(11) Group failure	0.01	0.10	0.55*	-0.08*	-0.00	-0.00*	-0.00*	0.00	-0.04*	0.00
(12) Group ROA	0.02	0.24	-0.05*	0.00*	0.03*	-0.00	-0.00	0.00	-0.00*	-0.04*
(13) Number of affiliated firms (/100)	0.08	0.13	-0.00*	0.09*	-0.00	0.15*	0.06*	-0.00	0.08*	-0.00*
(14) Group liquidity (/100000)	0.00	0.00	-0.00	-0.00	0.00	-0.00	-0.0	0.48*	-0.00*	-0.00
(15) Group export dependency	0.06	0.16	-0.00*	0.08*	-0.00	0.06*	0.62*	-0.00	0.13*	0.03*
(16) Vertical relatedness	0.08	0.17	0.04*	-0.06*	-0.00	-0.01*	-0.00	0.00	-0.00	-0.01*
(17) Complementarity	0.52	0.29	-0.02*	-0.11*	0.00	-0.01*	0.03*	-0.01*	0.06*	-0.05*
(18) Industry density	4.19	8.60	0.06*	-0.07*	-0.00	-0.02*	-0.03*	0.00	-0.08*	-0.01*
(19) Industry export dependency	0.03	0.08	0.01*	-0.02*	-0.00	-0.00	0.07*	-0.00*	0.03*	0.00*
(20) Industry ROA	0.15	0.62	0.02*	-0.01*	0.00	-0.00	-0.00	0.00	-0.00*	0.00*
(21) GDP per capita (/10^7)	11.80	1.90	0.04*	0.20*	-0.00	0.00*	-0.10*	0.00*	-0.30*	0.17*
(22) KOSPI	0.93	0.42	-0.01*	-0.22*	0.00	-0.00*	0.01*	-0.00	0.10*	-0.15*
(23) Family ownership	0.17	0.25	-0.04*	-0.20*	0.00	-0.08*	-0.05*	0.00*	-0.07*	-0.30*
(24) Intragroup Shareholdings	0.03	0.08	-0.00	-0.19*	0.00	-0.12*	-0.06*	0.00	-0.10*	-0.11*
(25) Internal trade	0.00	0.00	-0.00	-0.20*	0.00	-0.07*	-0.11*	0.015*	-0.22*	-0.20*

* p<.05; two-tailed test

(Continued)

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(9)																
(10)	0.05*															
(11)	-0.01*	-0.00*														
(12)	-0.01*	-0.03*	-0.03*													
(13)	0.07*	-0.08*	-0.04*	-0.00*												
(14)	-0.00	-0.00*	-0.00	0.00*	-0.00*											
(15)	0.05*	0.08*	-0.02*	0.00	0.23*	-0.00*										
(16)	-0.01*	0.00	0.09*	-0.00*	-0.11*	0.00	-0.02*									
(17)	-0.04*	0.04*	-0.00	-0.01*	-0.12*	-0.00*	-0.00	0.44*								
(18)	-0.02*	-0.03*	0.05*	0.00	-0.06*	0.00	-0.04*	0.00*	0.00*							
(19)	-0.00	0.05*	0.00	-0.00*	-0.01*	-0.00	0.06*	-0.01*	0.05*	0.17*						
(20)	0.00	-0.00	0.01*	-0.00*	0.01*	-0.00	0.00*	-0.00*	-0.01*	0.02*	0.00					
(21)	0.07*	-0.05*	0.03*	0.01*	-0.02*	0.00	-0.07*	-0.06*	-0.31*	0.07*	-0.06*	0.01*				
(22)	-0.09*	-0.00*	-0.00	-0.00	-0.00*	0.00	-0.00	0.07*	0.34*	0.03*	0.02*	-0.03*	-0.65*			
(23)	-0.17*	-0.07*	0.02*	-0.07*	0.41*	-0.01*	0.17*	0.09*	-0.14*	0.02*	0.00*	-0.02*	-0.24*	0.17*		
(24)	-0.31*	0.02*	0.04*	-0.02*	0.55*	-0.00*	0.19*	0.10*	-0.16*	0.05*	0.01*	-0.01*	-0.14*	0.15*	0.57*	
(25)	-0.14*	-0.39*	0.04*	-0.06*	0.33*	0.01*	0.21*	0.07*	0.05*	0.07*	-0.04*	-0.02*	-0.02*	0.08*	0.52*	0.43*

Table 4. Estimates of piece-wise constant exponential models predicting the failure rate of firms in Korean business groups, 1988-2007 (Environmental scarcity: KOSPI)

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤22	-8.83	**	(0.48)	-6.95	**	(0.51)	-6.83	**	(0.51)
22<u≤ 35	-8.84	**	(0.53)	-7.01	**	(0.55)	-6.89	**	(0.55)
35<u≤ 47	-9.12	**	(0.59)	-7.36	**	(0.60)	-7.22	**	(0.60)
u> 47	-9.47	**	(0.78)	-7.75	**	(0.79)	-7.60	**	(0.79)
Control Variables									
Firm characteristics									
ROA	-0.00	*	(0.00)	-0.00	**	(0.00)	-0.00	**	(0.00)
Asset	-0.01		(0.01)	-0.02		(0.01)	-0.02		(0.01)
Export dependency	0.04		(0.21)	-0.02		(0.21)	-0.03		(0.21)
Liquidity	0.00		(0.00)	0.00		(0.00)	0.00		(0.00)
Firms founded before 1988	-1.19	**	(0.13)	-1.20	**	(0.13)	-1.22	**	(0.13)
Portion in group family ownership	0.09		(0.00)	-0.27	*	(0.00)	-0.24	*	(0.00)
Portion in group intragroup-shareholdings	0.16		(0.21)	-0.44	*	(0.22)	-0.45	*	(0.22)
Portion in group internal trade	-0.20	*	(0.09)	-0.57	**	(0.10)	-0.57	**	(0.10)
Business group characteristics									
Group failure	4.12	**	(0.05)	4.27	**	(0.05)	4.25	**	(0.05)
ROA	-0.03		(0.02)	0.00		(0.02)	0.00		(0.02)
Number of affiliated firms	1.44	**	(0.17)	-0.18		(0.23)	-0.30		(0.24)
Business group industry									
Vertical relatedness	0.17		(0.11)	0.29	*	(0.11)	0.32	**	(0.11)
Complementarity	-0.42	**	(0.10)	-0.62	**	(0.10)	-0.61	**	(0.10)
Industry characteristics									
Density	0.01	**	(0.00)	0.01	**	(0.00)	0.01	**	(0.00)
Export dependency	1.90	**	(0.30)	1.67	**	(0.32)	1.66	**	(0.32)
ROA	1.18	**	(0.00)	1.18	**	(0.00)	1.17	**	(0.00)
Macroeconomic effect									
GDP per capita	0.34	**	(0.04)	0.29	**	(0.04)	0.29	**	(0.04)
Environmental Scarcity									
KOSPI	-0.91	**	(0.12)	-0.98	**	(0.12)	-1.53	**	(0.18)
Independent variables									
Types of coupling									
Family ownership				-0.86	**	(0.08)	-0.90	**	(0.09)
Intragroup-shareholdings				-0.26	**	(0.08)	-0.32	**	(0.09)
Internal trade				-0.56	**	(0.06)	-0.63	**	(0.06)
Family ownership x KOSPI							0.46	*	(0.20)
Intragroup-shareholdings x KOSPI							0.19		(0.10)

Internal trade x KOSPI			0.46 ** (0.10)
Chi-square	19259.99**	18563.15**	18462.68**
Log Likelihood	-2639.74	-2451.46	-2434.54
N(observations / firms / failure events)		116,854/ 15,307/ 1,713	

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 5. Estimates of piece-wise constant exponential models predicting the failure rate of firms in Korean business groups, 1988-2007
(Environmental scarcity: Won-dollar exchange rate)

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤22	-7.40	**	(0.40)	-5.50	**	(0.43)	-5.61	**	(0.43)
22<u≤ 35	-7.40	**	(0.46)	-5.56	**	(0.48)	-5.67	**	(0.49)
35<u≤ 47	-7.68	**	(0.52)	-5.90	**	(0.54)	-6.00	**	(0.54)
u> 47	-8.04	**	(0.73)	-6.30	**	(0.74)	-6.39	**	(0.74)
Control Variables									
Firm characteristics									
ROA	0.00	*	(0.00)	0.00	**	(0.00)	0.00	**	(0.00)
Asset	-0.02		(0.01)	-0.02		(0.01)	-0.02		(0.01)
Export dependency	0.05		(0.21)	-0.02		(0.21)	-0.04		(0.21)
Liquidity	0.00		(0.00)	0.00		(0.00)	0.00		(0.00)
Firms founded before 1988	-1.19	**	(0.13)	-1.20	**	(0.13)	-1.22	**	(0.13)
Portion in group family ownership	0.09		(0.10)	-0.26	*	(0.1)	-0.23	*	(0.10)
Portion in group intragroup-shareholdings	0.12		(0.21)	-0.47	*	(0.22)	-0.47	*	(0.22)
Portion in group internal trade	-0.21	*	(0.09)	-0.56	**	(0.1)	-0.56	**	(0.10)
Business group characteristics									
Group failure	4.17	**	(0.05)	4.31	**	(0.05)	4.30	**	(0.05)
ROA	-0.03		(0.02)	0.00		(0.02)	0.00		(0.02)
Number of affiliated firms	1.43	**	(0.18)	-0.17		(0.23)	-0.24		(0.24)
Business group industry									
Vertical relatedness	0.20	+	(0.11)	0.32	**	(0.11)	0.35	**	(0.11)
Complementarity	-0.41	**	(0.10)	-0.61	**	(0.1)	-0.62	**	(0.11)
Industry characteristics									
Density	0.01	**	(0.00)	0.01	**	(0)	0.01	**	(0.00)
Export dependency	1.80	**	(0.30)	1.57	**	(0.33)	1.57	**	(0.33)
ROA	1.31	**	(0.10)	1.30	**	(0.1)	1.25	**	(0.10)
Macroeconomic effect									
GDP per capita	0.19	**	(0.02)	0.14	**	(0.03)	0.14	**	(0.03)
Environmental Scarcity									
Exchange rate	1.26	**	(0.27)	1.42	**	(0.28)	2.39	**	(0.49)
Independent variables									
Types of coupling									
Family ownership				-0.90	**	(0.08)	-0.79	**	(0.11)
Intragroup-shareholdings				-0.23	**	(0.08)	-0.26	*	(0.1)
Internal trade				-0.54	**	(0.06)	-0.39	**	(0.08)
Family ownership x Exchange rate							-0.99	+	(0.61)
Intragroup-shareholdings x Exchange rate							0.08		(0.53)

Internal trade x Exchange rate			-1.33 ** (0.46)
Chi-square	19336.53**	18655.91**	18581.35**
Log Likelihood	-2657.35	-2469.37	-2459.20
N(observations / firms / failure events)		116,854/ 15,307/ 1,713	

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 6. Estimates of a variance function model of firm profitability

Variable	Model 1			Model 2			Model 3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Mean									
Firm characteristics									
Asset	0.00		(0.00)	0.00		(0.00)	0.00		(0.00)
Export dependency	0.00		(0.00)	0.01	**	(0.00)	0.00		(0.00)
Liquidity	0.00	**	(0.00)	0.00		(0.00)	0.00	**	(0.00)
Business group characteristics									
Number of affiliated firms	-0.03	**	(0.00)	0.02	**	(0.00)	0.02	**	(0.00)
ROA	1659.87	**	(25.4)	1590.87	**	(25.3)	1934.75	**	(27.3)
Business group industry									
Vertical relatedness	-0.01	+	(0.00)	-0.01	**	(0.00)	-0.01	**	(0.00)
Complementarity	0.00		(0.00)	0.00		(0.00)	0.00		(0.00)
Industry characteristics									
Density	0.00	**	(0.00)	0.00		(0.00)	0.00		(0.00)
Export dependency	-0.02	**	(0.00)	-0.01	*	(0.00)	-0.01	**	(0.00)
ROA	0.00	*	(0.00)	0.00	*	(0.00)	0.00	*	(0.00)
Macroeconomic effect									
GDP per capita	0.00	**	(0.00)	0.00	*	(0.00)	0.00	**	(0.00)
Types of coupling									
Family ownership				0.03	**	(0.00)	0.03	**	(0.00)
Intragroup-shareholdings				0.00	*	(0.00)	0.00		(0.00)
Internal trade				0.02	**	(0.00)	0.02	**	(0.00)
Constant	0.03	**	(0.00)	-0.01	**	(0.00)	-0.02	**	(0.00)
Variance									
Firm characteristics									
Asset	0.00		(0.00)	0.00		(0.00)	0.00		(0.00)
Export dependency	-0.36	**	(0.03)	-0.36	**	(0.03)	-0.18	**	(0.03)
Liquidity	0.00	*	(0.00)	0.00	**	(0.00)	0.00		(0.00)
Age	-0.01	**	(0.00)	-0.01	**	(0.00)	-0.01	**	(0.00)
Firms founded before 1988	-0.37	**	(0.01)	-0.36	**	(0.01)	-0.47	**	(0.01)
Business group characteristics									
Number of affiliated firms	0.64	**	(0.03)	0.67	**	(0.03)	-0.71	**	(0.03)
ROA	43.50	**	(3.52)	42.22	**	(3.52)	43.21	**	(3.52)
Liquidity	-30.45	**	(6.20)	3.41		(6.20)	-26.83	**	(6.20)
Export dependency	0.30	**	(0.03)	0.30	**	(0.03)	-0.08	*	(0.03)
Business group industry									
Vertical relatedness	0.15	**	(0.02)	0.15	**	(0.02)	0.09	**	(0.02)
Complementarity	0.14	**	(0.01)	0.14	**	(0.01)	0.19	**	(0.01)
Industry characteristics									
Density	0.00	**	(0.00)	0.00	**	(0.00)	0.00	**	(0.00)
Export dependency	0.02		(0.05)	0.03		(0.05)	-0.17	**	(0.05)

ROA	0.03	**	(0.00)	0.03	**	(0.00)	0.02	*	(0.00)
Macroeconomic effect									
GDP per capita	0.00	**	(0.00)	0.00	**	(0.00)	0.00	**	(0.00)
Independent variables									
Types of coupling									
Family ownership							-0.73	**	(0.01)
Intragroup-shareholdings							-0.19	**	(0.01)
Internal trade							-0.51	**	(0.01)
Constant	-4.35	**	(0.02)	-4.35	**	(0.02)	-2.93	**	(0.02)
Chi-square (d.f)	9485.121**(26)			10000**(29)			19000**(32)		
Chi-square (d.f) improvement over Model 2							9000 ** (3)		

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 7. Descriptive statistics and correlations of the variables in the group performance models (period: 1988-2007, N =62,878)

Variable (rescaling)	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Group failure	0.0173	0.1305								
(2) Number of affiliated firms (/100)	0.0404	0.0536	-0.04*							
(3) Return on assets	0.0000	0.0016	0.00	-0.00						
(4) Liquidity (/100000)	0.0001	0.0053	0.00	-0.00	0.00					
(5) Export dependency(x10)	0.0528	0.1617	-0.01*	0.11*	-0.00	-0.00				
(6) Groups founded before 1988	0.4801	0.4996	-0.01	0.17*	-0.00	-0.00	0.17*			
(7) Vertical relatedness	0.1041	0.2139	0.13*	-0.07*	-0.00	-0.00	0.00	0.01*		
(8) Complementarity	0.5694	0.3028	0.00*	-0.05*	0.00	-0.00*	0.03*	0.06*	0.45*	
(9) GDP per capita (/10^7)	1.1650	0.3782	0.04*	-0.08*	-0.00	0.00	-0.10*	-0.22*	-0.06*	-0.31*
(10) Exchange rate	0.0000	0.2020	0.03*	-0.09*	0.00	0.00	-0.11*	-0.20*	0.03*	0.11*
(11) KOSPI	0.0000	0.3924	0.00*	-0.02*	-0.00	-0.00	-0.02*	-0.08*	-0.06*	-0.30*
(12) Family ownership	0.1089	0.2283	0.02*	0.10*	-0.00	-0.00	0.02*	0.12*	0.00	-0.09*
(13) Intragroup-shareholdings	0.0136	0.0569	0.01	0.20*	-0.00	0.00	0.06*	0.12*	0.03*	-0.04*
(14) Internal trade	0.0091	0.0444	0.02*	0.04*	-0.00	-0.00	0.04*	0.07*	0.02*	0.01*

* p<.05; two-tailed test

(Continued)

	(9)	(10)	(11)	(12)	(13)
(9)					
(10)	0.10*				
(11)	0.67*	-0.43*			
(12)	0.29*	0.01*	0.24*		
(13)	0.14*	-0.02*	0.13*	0.17*	
(14)	-0.01*	-0.01*	-0.00*	0.06*	0.05*

Table 8. Estimates of piece-wise constant exponential models predicting the failure rate of Korean business groups, 1988-2007 (Environmental Scarcity: KOSPI)

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤40	-5.82	**	(0.23)	-5.60	**	(0.24)	-5.72	**	(0.24)
40<u≤ 50	-5.13	**	(0.31)	-5.04	**	(0.31)	-5.13	**	(0.31)
50<u≤ 70	-5.04	**	(0.37)	-4.89	**	(0.38)	-4.87	**	(0.38)
70<u≤ 85	-5.78	**	(1.03)	-5.45	**	(1.03)	-5.49	**	(1.03)
u> 85	-5.42	**	(1.03)	-5.16	**	(1.03)	-5.17	**	(1.03)
Control Variables									
Business group characteristics									
Number of affiliated firms	-44.50	**	(4.37)	-48.31	**	(4.46)	-48.13	**	(4.46)
ROA	-811.38	**	(174.46)	-821.37	**	(177.82)	-818.71	**	(178.18)
Liquidity	-1918.87	**	(727.95)	-1787.41	**	(670.86)	-1905.34	**	(679.48)
Export dependency	0.08		(0.23)	0.05		(0.23)	0.08		(0.23)
Groups founded before 1988	0.14	*	(0.06)	0.06		(0.06)	0.05		(0.06)
Business group industry relatedness									
Vertical relatedness	2.03	**	(0.11)	1.95	**	(0.11)	1.90	**	(0.11)
Complementarity	-1.38	**	(0.13)	-1.31	**	(0.13)	-1.26	**	(0.13)
Macroeconomic effect									
GDP per capita	2.07	**	(0.14)	1.90	**	(0.15)	1.99	**	(0.15)
Environmental Scarcity									
KOSPI	-0.65	**	(0.11)	-0.75	**	(0.12)	-0.44	**	(0.12)
Independent variables									
Coupling ties									
Family ownership				0.97	**	(0.12)	1.22	**	(0.12)
Intragroup-shareholdings				0.90	*	(0.44)	1.35	**	(0.43)
Internal trade				0.99	**	(0.34)	0.58		(0.45)
Family ownership x KOSPI							-1.74	**	(0.28)
Intragroup-shareholdings x KOSPI							-2.17	*	(1.03)
Internal trade x KOSPI							-3.92	*	(1.34)
Chi-square	19422.39**			19222.96**			19027.50**		
Log Likelihood	-2618.22			-2583.67			-2554.09		
N(observations/ groups/ failure events)	62,669/ 5850/ 1,018								

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 9. Estimates of piece-wise constant exponential models predicting the failure rate of Korean business groups, 1988-2007

(Environmental Scarcity: Won-dollar exchange rate)

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤40	-5.38	**	(0.19)	-5.08	**	(0.19)	-5.15	**	(0.19)
40<u≤ 50	-4.77	**	(0.28)	-4.59	**	(0.28)	-4.66	**	(0.28)
50<u≤ 70	-4.68	**	(0.35)	-4.44	**	(0.35)	-4.40	**	(0.35)
70<u≤ 85	-5.41	**	(1.01)	-5.00	**	(1.02)	-5.04	**	(1.02)
u> 85	-5.05	**	(1.02)	-4.69	**	(1.02)	-4.72	**	(1.02)
Control Variables									
Business group characteristics									
Number of affiliated firms	-43.87	**	(4.36)	-47.59	**	(4.45)	-47.89	**	(4.47)
Return on assets	-770.40	**	(173.67)	-781.90	**	(176.89)	-784.31	**	(176.92)
Liquidity	-2266.06	**	(738.95)	-2147.41	**	(726.03)	-2392.33	**	(741.48)
Export dependency	0.16		(0.23)	0.12		(0.23)	0.11		(0.23)
Groups founded before 1988	0.25	*	(0.07)	0.16	*	(0.06)	0.15	*	(0.06)
Business group industry relatedness									
Vertical relatedness	2.12	**	(0.11)	2.04	**	(0.14)	2.04	**	(0.11)
Complementarity	-1.44	**	(0.13)	-1.43	**	(0.13)	-1.42	**	(0.13)
Macroeconomic effect									
GDP per capita	1.66	**	(0.10)	1.44	**	(0.10)	1.52	**	(0.10)
Environmental Scarcity									
Exchange rate	1.75	**	(0.17)	1.79	**	(0.18)	1.52	**	(0.19)
Independent variables									
Coupling ties									
Family ownership				0.89	**	(0.12)	0.85	**	(0.12)
Intragroup-shareholdings				0.86	*	(0.44)	0.86	+	(0.45)
Internal trade				1.10	**	(0.34)	0.49		(0.48)
Family ownership x Exchange rate							1.61	*	(0.77)
Intragroup-shareholdings x Exchange rate							5.15	*	(2.65)
Internal trade x Exchange rate							7.05	**	(2.07)
Chi-square	19149.95**			18976.04**			18914.28**		
Log Likelihood	-2584.09			-2553.09			-2541.58		
N(observations/ groups/ failure events)	62,669/ 5850/ 1,018								

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 10. Estimates of piece-wise constant exponential models predicting the group dissolution rate of Korean business groups, 1988-2007

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤30	-8.09	**	(0.52)	-7.87	**	(0.53)	-8.01	**	(0.55)
30<u≤ 50	-7.66	**	(0.61)	-7.60	**	(0.62)	-7.69	**	(0.63)
50<u≤ 88	-7.29	**	(0.81)	-7.27	**	(0.83)	-7.21	**	(0.83)
u> 88	-5.49	**	(1.16)	-5.30	**	(1.16)	-5.37	**	(1.16)
Control Variables									
Business group characteristics									
Number of affiliated firms	-20.55	**	(5.9)	-24.04	*	(6.11)	-24.36	**	(6.15)
ROA	-776.56	*	(361.29)	-820.13	*	(370.38)	-818.20	*	(368.61)
Liquidity	-3125.90		(2150.75)	-2781.42		(1976.95)	-2935.66		(2015.29)
Export dependency	-0.05		(0.55)	-0.10		(0.55)	-0.10		(0.55)
Groups founded before 1988	-0.01		(0.16)	-0.10		(0.16)	-0.12		(0.16)
Business group industry relatedness									
Vertical relatedness	1.13	**	(0.27)	1.00	**	(0.27)	0.91	**	(0.27)
Complementarity	-1.12	**	(0.27)	-1.10	**	(0.27)	-1.04	**	(0.27)
Macroeconomic effect									
GDP per capita	2.29	**	(0.35)	2.11	**	(0.36)	2.20	**	(0.37)
Environmental Scarcity									
KOSPI	-0.60	*	(0.27)	-0.69	*	(0.27)	-0.37		(0.29)
Independent variables									
Coupling ties									
Family ownership				0.88	**	(0.13)	1.22	**	(0.26)
Intragroup-shareholdings				2.40	**	(0.53)	3.09	**	(0.73)
Internal trade				1.44	*	(0.55)	1.29		(0.81)
Family ownership x KOSPI							-1.53	**	(0.56)
Intragroup-shareholdings x KOSPI							-4.17	*	(1.76)
Internal trade x KOSPI							-1.99		(2.24)
Chi-square	7576.58**			7479.69**			7385.04**		
Log Likelihood	-896.47			-885.36			-876.46		
N(observations/ groups / failure events)	62,699/ 1,018/ 209								

+p<0.10, * p<0.05, **p<0.01; two-tailed tests

Table 11. Estimates of piece-wise constant exponential models predicting the rates of transformation to a single group of Korean business groups, 1988-2007

Variable	Model1			Model2			Model3		
	Coeff.		(SE)	Coeff.		(SE)	Coeff.		(SE)
Time splits (Group age):									
0<u≤26	-5.76	**	(0.27)	-5.55	**	(0.27)	-5.66	**	(0.27)
26<u≤ 33	-5.21	**	(0.36)	-5.11	**	(0.36)	-5.20	**	(0.36)
33<u≤ 52	-5.03	**	(0.43)	-4.85	**	(0.43)	-4.85	**	(0.43)
u> 52	-5.57	**	(1.04)	-5.24	**	(1.04)	-5.28	**	(1.04)
Control Variables									
Business group characteristics									
Number of affiliated firms	-57.67	**	(5.83)	-61.57	**	(5.92)	-61.35	**	(5.91)
ROA	-797.71	**	(198.14)	-806.75	**	(201.46)	-803.03	**	(202.14)
Liquidity	-1468.90	*	(690.75)	-1393.93	*	(634.11)	-1515.41	*	(642.81)
Export dependency	0.12		(0.25)	0.10		(0.26)	0.13		(0.25)
Groups founded before 1988	0.20	**	(0.07)	0.12		(0.07)	0.11		(0.07)
Business group industry relatedness									
Vertical relatedness	2.19	**	(0.12)	2.13	**	(0.12)	2.08	**	(0.12)
Complementarity	-1.35	**	(0.15)	-1.35	**	(0.15)	-1.30	**	(0.15)
Macroeconomic effect									
GDP per capita	2.04	**	(0.16)	1.88	**	(0.16)	1.96	**	(0.17)
Environmental Scarcity									
KOSPI	-0.67	**	(0.12)	-0.77	**	(0.13)	-0.47	**	(0.14)
Independent variables									
Coupling ties									
Family ownership				1.01	**	(0.13)	1.23	**	(0.13)
Intragroup-shareholdings				0.41		(0.53)	0.76		(0.53)
Internal trade				0.87	*	(0.38)	0.32		(0.55)
Family ownership x KOSPI							-1.72	**	(0.31)
Intragroup-shareholdings x KOSPI							-1.27		(1.23)
Internal trade x KOSPI							-3.40	*	(1.67)
Chi-square	16835.27**			16670.06**			16521.39**		
Log Likelihood	-2231.61			-2204.87			-2183.12		
N(observations / groups / failure events)	62,699/ 1,018/ 822								

+p<0.10, * p<0.05, **p<0.01; two-tailed tests