The Korean market and business groups

Three essays on the pricing, valuation and policies of Korean listed firms

Thesis

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“미래를 결정짓고 싶다면, 과거를 공부하라”

“Study the past if you would define the future”

Confucius

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Abstract

This dissertation presents three essays on the Korean market and business groups. In Korea, large business groups called chaebols played and continue to play a prominent role in the economy. While the existing literature is primarily focused on the period of the 1997 Asian financial crisis, this dissertation analyzes the subsequent period. The beginning of the twenty-first century saw the rise of Korea as a global player and the emergence of Korean firms as leaders in several key industries. This dissertation explores research opportunities opened up by this recent evolution in three empirical studies.

The first essay documents the "Korea discount", which refers to the undervaluation of the Korean stock market. Despite practitioner interest, scholars did not address this topic. This article fills this literature gap and provides the first empirical evidence of this phenomenon. The Korea discount persists despite reforms aiming at reaching international standards. The study shows that the phenomenon affects both chaebol and non-chaebol firms. This observation suggests that chaebols are not the direct cause of the Korea discount contradicting a common belief.

The second study exploits the revenue shock triggered by the COVID-19 pandemic to examining the value of business group affiliation during an economic downturn. The analysis reveals a switch in the value of affiliation as the crisis unfolded. The discount observed at the beginning of the crisis turned into a premium when the stock market started its recovery. Financial and governance risks appear as important drivers of variations in the value of affiliation. In addition to extend the growing COVID-19 literature, this study complements the literature on chaebol and crisis with a new empirical framework.

The third essay examines the effect of affiliation on firm performance and firm policies. Overall, affiliation with a chaebol is associated with a higher firm value and a lower firm profitability. The results show that the intensity of the performance effect of affiliation depends on group characteristics such as size, diversification, and leverage. The analysis of corporate policies confirms the high level of control centralization of chaebols. Indeed, the results show that a number of chaebols conduct group-level strategies and apply homogeneous policies to their affiliates. This study contributes to the chaebol literature by documenting the association between affiliation and firm outcomes. The analysis makes also empirical and methodological contributions for business group literature by highlighting the relevance to account the heterogeneity between business groups in analysis of the affiliation effect.

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List of abbreviations

ADR	American Depository Receipt
BP	Book-to-price
COVID-19	Coronavirus disease 2019
CSR	Corporate social responsibility
ESG	Environmental, social, and corporate governance
EP	Earnings-to-price
EPB	Economic Planning Board
EPS	Earnings per share
FKI	Federation of Korean Industries
GAAP	Generally Accepted Accounting Principles
GAFAM	Google, Amazon, Facebook, Apple, and Microsoft
GDP	Gross domestic product
GNI	Gross national income
I\B\E\S	Institutional Brokers' Estimate System
ICB	Industry Classification benchmark
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
KRX	Korea Exchange
KFTC	Korea Fair Trade Commission
KSD	Korea Securities Depository
KSE	Korean stock exchange
KRW	Korean won
MRFTA	Monopoly Regulation and Fair Trade Act
OECD	Organization for Economic Co-operation and Development
PB	Price-to-book
PE	Price-earnings
PPE	Property, plant, and equipment
PS	Price-to-sales
R&D	Research and development
ROA	Return on assets

SME	Small and medium enterprise
SP	Sales-to-price
US	United States
USD	United States dollar
WB	World Bank
WEF	World Economic Forum

Introduction

The twenty-first century saw the emergence of South Korea (Korea hereafter) as a globalized country. The 2002 World Cup and the diffusion of entertainment products improved the image of Korea after the severe 1997 financial crisis (Schwak, 2016). Korean brands and products have grown in popularity and recognition among Western consumers. While Korean carmakers compete with well-established Japanese and European manufacturers, Korean brands are among the leaders in consumer electronic sector. This country also plays a prominent role in the global supply chain, and US-China trade tensions have reinforced the role of Korea as a privileged partner for Western countries. In 2022, the choice of the US President Joe Biden to start his first presidential visit to Asia in Korea illustrates the expanding international role of the country (Wootson et al., 2022).

The Korean market is characterized by the presence of large business groups commonly called chaebols, which play a key role in the economy and society. Most chaebols emerged in the aftermath of the Korean War (1950-1953). During the 1960s and in the following decades, they were privileged partners of the government to implement development policy. As the Korean economy was developing, chaebols expanded their activities and accumulated a substantial economic power. Neither the opening up of the economy nor the democratization process harmed the power of these business groups and their founding families. However, their alleged role in the spread of the 1997 Asian financial crisis to Korea raised public criticisms and controversies. Under pressure from society and foreign creditors, the government strengthened the regulation of large business groups. However, chaebols maintained their role of spearheading the Korean economy and contributing to its current dynamism. [1]

Business groups are present in different parts of the world such as Asia, Latin America, and Europe. We can broadly define a business group as a set of firms linked together by social and economic ties that act in a coordinated way. However, business groups do not form a monolithic block and tend to differ from each other. For instance, the organization and ownership vary across countries. The centralized and family control prevalent in Korea contrasts with the bank centered network of firms characterizing Japanese business groups. In other countries such as China, we observe an important presence of state-controlled groups (Cuervo-Cazurra, 2006). The empirical

[1] Interested readers can read Eichengreen et al. (2015).

studies presented in this dissertation also show that within a country, business groups differ in their characteristics and strategies. Across countries, business groups also experienced different fates. Hence, business groups maintain their role as leaders in some countries like Korea, whereas they disappear in others due to changes in the legal or economic environment (Jones and Colpan, 2010). Even though the literature often focuses on emerging markets (and Japan), the presence of business groups is not limited to those countries. In the US, the recent emergence of large groups active in the IT sector, known under the acronym GAFAM, [2] revived the question of the monopoly and market power exercised by conglomerates. GAFAM resemble to conglomerates and business groups to some extent. Indeed, they started as single firms that quickly developed their activities in various industries and conducted aggressive acquisition strategies. Their power raises concerns among the society and politicians (The Economist, 2021).

Business groups attract the interest of researchers from various academic fields. Indeed, business groups contradict the hypothesis of independent and widely held firms that is prevalent in finance theories. Hence, the presence of a controlling shareholder contrasts with the assumed dispersed ownership. Moreover, the coordination among affiliates aiming to serve group-level strategy contradicts the alleged firm independence. The discrepancy between the theoretical and actual framework is likely to have relevant implications in terms of firm decisions, corporate governance, and investor behavior. Hence, the literature documents both the bright and dark sides of those business structures and scholars often hesitate between "paragons or parasites" to define business groups (Khanna and Yafeh, 2007). Such ambiguity is also observed among Korean society and academics regarding the place of chaebols in the Korean economy and history.

This dissertation aims to provide new evidence regarding the Korean market and chaebols as the existing literature mostly focuses on the 1997 Asian financial crisis, changes experienced by Korea during the last decade open a gap in the literature. This dissertation is composed of an introductory chapter followed by three essays. The first chapter introduces the reader to the topic of business groups and the specificities of the Korean framework. The motivation, organization, and main contributions of the dissertation are also discussed in the first chapter. The next three chapters consist of empirical studies complementing different strands of the literature. The first essay contributes to international finance literature and examines the value of Korean stocks relative to their foreign peers. The empirical analysis supports the existence of the "Korea discount"

[2] GAFAM is an acronym for Google, Amazon, Facebook (Meta now), Apple, and Microsoft.

reported by practitioners. The second empirical study extends the business group literature in examining how investors perceive the affiliation with a business group during an economic downturn. The stock price analysis exploits the shock triggered by the COVID-19 pandemic and documents a switch in the affiliation value as the crisis unfolded. The valuation discount observed at the beginning of the crisis turned into a premium during market recovery. The third essay explores the impact of chaebol membership on firm performance and decisions. The results show that the intensity of the performance effect of affiliation varies depending on group characteristics. In terms of financial and investment policies, the analysis reveals that chaebols conduct group-level strategies. A concluding chapter summarizes the results of the thesis and highlights the main contributions.

Introductory chapter

Business groups and the Korean market

1. Business groups

Finance literature often assumes that a majority of listed firms are independent and widely held. However, scholars document the concentration of ownership and the presence of large business groups in many countries contrasting with this alleged framework. Indeed, business groups are prevalent in a large number of countries in Asia and Latin America, but also in Europe. Even in the US, business groups played a substantial economic role in the 1930s before disappearing due to policy changes (Kandel et al., 2019).

1.1 Definition and characteristics

Khanna (2000) observes that providing a formal and universal definition of business groups is not a trivial task. The substantial heterogeneity of business groups and the diversity of theoretical perspectives explain the variety of definitions used in the literature. Hence, definitions differ from one country to another depending on the historical considerations and characteristics of business groups in each country. Table 1 illustrates the heterogeneity of business groups in terms of origin, ownership and structure in 15 countries. The definition might also depend on the field of research. Social scientists tend to observe business groups as social constructions, whereas economists and management scholars focus on equity and trade relations.

In his seminal paper, Leff (1978) discusses the existence of business groups in emerging countries and defines business groups as sets of firms "which transact in different markets but which do so under common entrepreneurial and financial control." The author also insists on the presence of a controlling family providing capital and management resources. Later, other authors propose broader definitions that are not limited to emerging markets. Hence, Khanna and Rivkin (2001) define a business group as "a set of firms which, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated action." Khanna and Yafeh (2007) emphasize the persistence of the ties linking affiliates and

diversification of business group activities. Despite the wide diversity in their organization, structure, and characteristics, we can identify a number of features shared by most business groups around the world.

Table 1 Business groups around the world

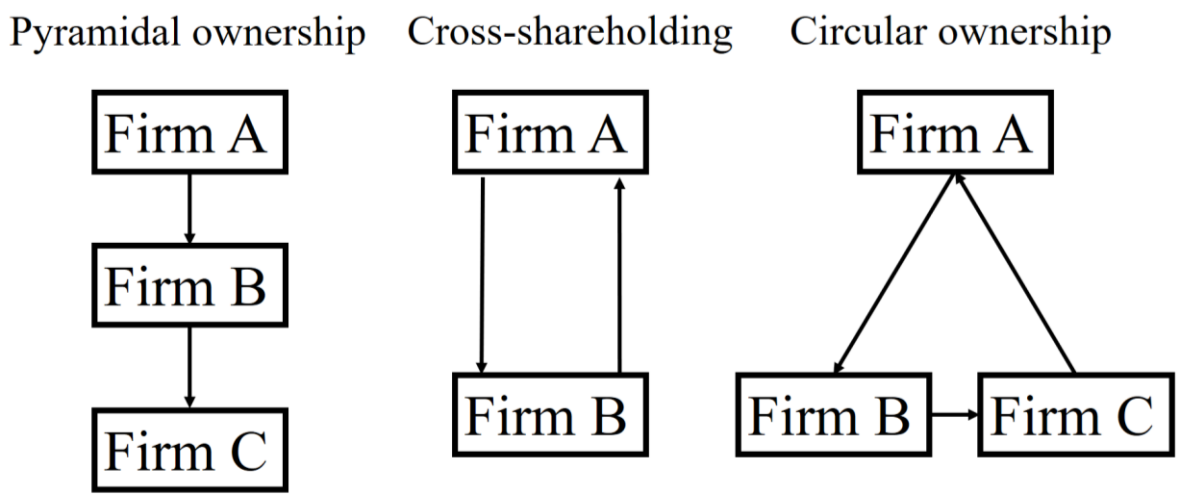
Country	Name	Origin	Number of groups	Firms belonging to family groups	Market cap. held by family groups
Argentina	*grupos economicos*	1950s	9 (6)	19.48%	11.03%
Brazil	*grupos economicos*	1940s	35 (22)	20.91%	15.31%
Chile	*grupos economicos*	1940s	31 (21)	46.19%	44.52%
China	*qiye jituan*	1980s	NA	NA	NA
India	*business houses*	1850s	72 (59)	29.31%	22.63%
Israel	*ownership groups*	1950s	22 (20)	40.09%	23.22%
Japan (post-war)	*keiretsu*	1960s	166 (42)	3.15%	3.76%
Japan (pre-war)	*zaibatsu*	1880s	NA	NA	NA
Mexico	*grupos economicos*	1940s	13 (12)	26.24%	49.47%
Russia		1990s	NA	NA	NA
Singapore		1970s	27 (19)	10.69%	41.11%
South Africa		1890s	22 (9)	9.73%	8.65%
South Korea	*chaebol*	1950s	95 (85)	20.50%	56.64%
Taiwan	*guanxiqiye*	1950s	44 (41)	16.55%	41.33%
Thailand	*klum thurakit*	1960s	34 (30)	21.72%	47.06%
Turkey	*family holdings*	1930s	37 (34)	50.00%	46.43%

Names and origin come from various chapters of Colpan et al. (2010). Periods of origin have only an indicative value as they vary from a group to another. Number of groups, firms belonging to family groups, and market capitalization held by family groups are reported from Masulis et al. (2011) and based on data for the year 2002. Number of groups is the number of business groups (family business groups) identified by the authors. Firms belonging to family groups is the percentage of listed firms that belong to a family business group. Market cap. held by family groups is the percentage of the total market capitalization held by family business groups in a country.

Unlike multidivisional firms composed of integrated divisions, business groups are composed of legally independent firms called affiliates. The ties that bind these firms together constitute a key element of the business group definition and are crucial in the identification of group boundaries as business groups are often not legal entities per se. Khanna and Rivkin (2006) observe that within a group these ties are often multiple and overlapping. We can distinguish social ties from economic ties. The former raises the interest of social scientists who address business

groups as social constructions based on social relations. The presence of social and often informal ties differentiates business groups from multinational or holding firms (Yiu et al., 2007). Among social ties, family ties play a prominent role in many countries and business groups. Family members can directly hold shares in affiliated firms or can be appointed to key positions in affiliated firms such as the board of directors or management positions. The strength and persistence of family relations are associated with goal alignment, stability, and reliability. In addition, Bennedsen et al. (2022) note that business families often develop strong networks with other families or government. Outside of family relations, interlocking directorate, which refers to the appointment of the same director on the board of several firms, and workforce exchanges contribute to binding group affiliates. Finally, friendship, education, religion, and ethnicity can be sources of social ties that are more difficult for researchers to identify (Khanna and Rivkin, 2006).

Figure 1 Different ownership schemes



The figure presents three types of ownership structures. The left-hand figure presents pyramidal ownership in which firm A holds stocks in firm B that holds a stake in firm C. The middle figure presents cross-shareholding in which firms A and B holds reciprocal shareholdings. The right-hand figure presents circular ownership in which firm A holds a stake in firm B that holds a stake in firm C that holds a stake in firm A.

Scholars from economic and management sciences focus more on the equity-based ties. Business groups often exhibit complex ownership structures. Figure 1 illustrates three types of ownership structures commonly used in business groups namely pyramidal ownership, cross-shareholding, and circular ownership. Masulis et al. (2011) observe the prevalence of pyramidal ownership structures in many business groups around the world. In a pyramidal structure, the

ultimate owner controls a firm through a chain of control where firm A holds stocks in firm B that holds a stake in firm C, and so on. Almeida and Wolfenzon (2006) highlight the benefits of pyramidal structures in terms of control, financing, and firm creation. Cross-ownership is another type of ownership structure that consists of reciprocal shareholdings between two affiliates. In a simple cross-ownership structure, firm A holds a stake in firm B that holds a stake in firm A. Circular ownership schemes are more complex and involve at least three firms. For instance, firm A holds a stake in firm B that holds a stake in firm C that holds a stake in firm A (Levy and Szafarz, 2017).

Finally, firms belonging to the same business groups can be linked by various types of intragroup transactions. For instance, affiliates can exchange intermediate and final goods to lower transaction costs and secure supply. Some affiliates can also provide services to other group firms such as distribution, marketing, or research and development (R&D).

Business groups are characterized by complex governance structures. Colpan and Hikino (2010) distinguish two types of business groups: hierarchy-type and network-type business groups. These types of business groups differ in their level of control centralization. Hierarchy-type business groups are characterized by a "core entity" (as designated by Yiu et al. (2007)) that plays the role of group headquarter. The core entity owns and controls group members through different economic and social means. The core entity can be a family, a company, or the state. Family controlled groups are prevalent in many countries. Chang (2003) cites the examples of the Wallenberg family in Sweden, Krupp in Germany, and Angelini in Chile. In other countries such as China, state-owned groups are common. Korean chaebols are an example of hierarchy-type business groups with a controlling family at the helm. Unlike hierarchy-type business groups, network-type business groups do not have a dominant control or holding unit. This type of business groups form loose coalitions of firms linked by equity ties, bank relationships, and director interlocks. The coordination between member firms relies on the principle of alliance. Post-war Japanese business groups called keiretsu are examples of network-type groups (Colpan and Hikino, 2010, pp. 17-22). Despite differences in terms of organization, both network-type and hierarchy-type business groups are characterized by the coordination and cooperation between group members in reaching long-term goals.

The diversification of activities is an important component of group strategy and is often cited as a characteristic of business groups. However, the level of group diversification might vary

substantially across groups and evolve along the business group life cycle depending on the opportunities, economic environment or controlling shareholder preferences. Business groups can diversify their activities by either setting up new companies or acquiring existing ones. According to scholars, both external and internal factors explain the diversification of business groups (Colpan and Hikino, 2010, p. 38). Hence, the economic and institutional environment are important drivers of diversification. In emerging countries where capital and product markets are underdeveloped, vertical integration and diversification allow business groups to lower transaction costs, secure supply sources, and access scarce resources (Khanna and Yafeh, 2007). Government policies might also play a role in the diversification strategy of business groups by providing incentives such as business licenses or favorable funding (Yiu et al., 2007). In addition to external factors, internal factors explain the diversification of business groups. Indeed, business groups benefit from generic knowledge and financial capacities that ease entry into unrelated markets compared with independent firms (Guillen, 2000). Finally, the preferences and goals of controlling shareholders also contribute to shaping the diversification strategy of the group. For instance, Cuervo-Cazurra (2006) suggests that the education of heirs, marriages, or sentimental links with some industries are likely to influence diversification decision in family business groups, whereas state-controlled groups develop their activities in industries with social benefit or national importance.

1.2 Theoretical background

Scholars from different academic fields address the topic of business groups using a wide variety of theoretical lenses. In the finance literature, institutional, resource-based, and agency theories are the most frequently used theoretical perspectives to explain the effect of business group membership on firm performance, shareholder wealth, and firm policies.

1.2.1 Institutional theories

Institutional theories claim that the legal, social, and economic environment affect firm behavior and performance. Following these theories, a substantial part of business group literature focuses on emerging markets and explains the "raison d'être" of business groups by the market underdevelopment and institution voids (Carney et al. (2011); Holmes Jr et al. (2018)). Leff (1978) motives the emergence and prevalence of business groups in emerging countries by their capacity to internalize market failures and substitute for the lack of external markets for input, labor, or

capital. This hypothesis is further developed by Khanna and Palepu (1997) who argue that business groups fill institutional voids. The authors cite the example of Indian business groups that developed in-house manager training programs to mitigate the lack of educated workforce. Diversification allows business groups to secure supply sources and lower transaction costs. Masulis et al. (2011) observe the prevalence of business groups in countries with a lack of capital availability suggesting that business groups can substitute to underdeveloped capital markets. The policy environment also plays a role in the evolution of business groups. In some countries, governments foster the emergence and expansion of business groups by providing some benefits to develop specific industries or reach some development goals. For instance, Yiu et al. (2005) note that the Chinese government used business groups to reform the domestic economy. By contrast, some countries like the US undertook legal reforms that led to the dismantling of business groups (Hamdani et al., 2021). Overall, the institutional theories posit that the institutional framework shapes business groups and explains their emergence, development, and evolution.

1.2.2 Resource-based theories

Resource-based theories assert that a firm performance and competitive position relies on its resources. Under this theoretical lens, business groups are studied as pools of intangible and tangible resources. Group identity and reputation are intangible resources associated with business group membership. For instance, a business group name can be used as a brand name. Hence, Chang and Hong (2000) observe that affiliates of a same business groups benefit from spillover in terms of marketing expenses. The business group reputation can also benefit affiliates in building credibility and trust among consumers and suppliers (Khanna and Palepu, 2000b).

As diversified entities, business groups have the ability to create internal factor markets by pooling and reallocating resources among affiliates based on business opportunities, financial situation, or group strategy. Internal factor markets allow business groups to lower transaction costs and secure access to key resources. Khanna and Yafeh (2007) argue that internal factor markets constitute a competitive advantage of business groups in less developed countries. In such conditions, internal markets can substitute underdeveloped and deficient external markets. Internal markets allow for more efficient resource allocation than external markets due to the lower information asymmetry. However, at some point, diversification (Stein, 1997) and rent-seeking behaviors (Scharfstein and Stein, 2000) might harm the efficiency of internal markets. The

literature documents three main types of internal factor markets: internal labor markets, intragroup trades, and internal capital markets (Holmes Jr et al., 2018).

Khanna and Palepu (1997) highlight the benefits of internal labor markets in countries with underdeveloped educational systems. Internal training programs ensure access to a qualified workforce. Internal labor markets also allow for greater flexibility in the allocation of human resources depending on the needs of the affiliated firms. Granovetter (2010, p. 442) explains that exchanges of workforce between affiliated firms are also associated with the transfer and diffusion of the knowledge within a group. In addition, they tend to strengthen group identity and reduce agency conflicts. Affiliates of diversified business groups often maintain trading relations and exchanges of inputs. Hence, some affiliates are specifically dedicated to supplying other affiliates. Intragroup trades are crucial when there is a lack of external supply sources or in the presence of low contract enforcement and quality issues. In addition, intragroup trades reduce transaction, inventory, and transportation costs (Chang and Hong, 2000).

Among the different types of internal markets, internal capital markets attract the most attention from finance scholars. According to Stein (2003, p. 140), internal capital markets create value through the "more-money effect" and "smarter-money effect." The more-money effect refers to the capacity of business groups to raise a larger amount of funds than standalone firms. Indeed, internal capital markets can play the role of collateral and ease access to external financing. Hence, a financially constrained affiliate can access external financing by using either unused debt capacity or the assets of another affiliate (Larrain et al., 2019). The "too big to fail" belief and political connections also ease access to external financing for business group affiliates (Minetti and Yun, 2015). Finally, group diversification contributes to the more-money effect through the co-insurance effect. Indeed, the diversification of cashflow sources between different industries and affiliates reduces the overall risk (Lewellen, 1971). The smarter-money effect refers to flexibility in capital allocation. The efficiency of internal capital markets depends on agency conflicts and the asymmetry of information. In comparison with external agents (e. g. a bank), the group headquarter (e. g. "core entity") is supposed to be better informed and have access to private information. Therefore, it is able to select and fund the more promising projects. However, rent-seeking behaviors and diversification might reduce the efficiency of internal capital markets (Stein (1997); Scharfstein and Stein (2000)).

To some extent, institutional and resource-based theories are interrelated and support that business groups are beneficial especially in less developed environment. Indeed, resource-based theories describe how business groups can answer the lack of resources, institutional voids, and market failures.

1.2.3 Agency theories

Agency theories examine the relations and conflicts between shareholders and managers within a firm. Corporate governance literature is mostly based on the assumption of widely held and independent firms. The separation between ownership and control might cause conflicts of interests between shareholders and managers as described by Jensen and Meckling (1976). However, the corporate governance structure of business groups differs substantially from this hypothesis. Indeed, both ownership and control of affiliates are in the hands of the group controlling shareholder. The ownership concentration solves the risk of principal-agent conflicts. Nevertheless, conflicts between the controlling and non-controlling shareholders, called principal-principal conflicts, might arise from such ownership structure (Young et al., 2008). Principal-principal conflicts often result in minority shareholder expropriations such as tunneling, decisions in the interest of the controlling shareholder, and appointments of relatives at key positions (La Porta et al., 2000). Common among business groups, the use of control magnifying mechanisms such as pyramidal structures, cross-shareholding or circular ownership exacerbate the risk of principal-principal conflicts by distorting control and ownership rights (Claessens et al., 2000). In addition, potential conflicts between group-level and affiliate-level interests increase the risk of principal-principal conflicts in business groups (Granovetter, 2010, p. 440). Indeed, the group controlling shareholder is likely to favor the interests of the group as a whole rather than the interests of individual affiliated firms and their non-controlling shareholders.

The literature documents different means used by controlling shareholders to extract private benefits at the expense of non-controlling shareholders. First, controlling shareholders can tunnel resources from a controlled firm in which their cashflow rights are low to another firm in which their stake is higher. Johnson et al. (2000b) cite unfair transfer pricing, loan guarantees, excessive executive compensation, and the expropriation of corporate opportunities as frequent channels through which controlling shareholders tunnel firm resources and expropriate minority shareholders. In business groups, unfair pricing occurs when intragroup transactions are mispriced

in order to benefit the controlling shareholders (Black et al., 2015). Cross debt guarantees between affiliates might be considered as a form of minority shareholder expropriation. This practice involves using assets of one affiliate as collateral for the debt of another affiliate. Cross debt guarantees are beneficial at a group level but can be harmful for the non-controlling shareholders of the firm providing the guarantee (Chang and Hong, 2000). Minority shareholder interests might also be harmed by strategic decisions, if they are taken in the interest of the controlling shareholder or the group. For instance, controlling shareholders might use the resources of an affiliated firm to invest in unprofitable projects that generate private benefits (Lemmon and Lins, 2003). Another example of minority shareholder expropriation is cross-subsidizations, when the resources of a profitable affiliate are used to support an unprofitable one (Lincoln et al., 1996). Finally, appointing relatives to key positions may be considered as a form of expropriation since these decisions are usually based on kinship or loyalty rather than competency (Witt, 2014, p. 222). In addition, such practices tend to annihilate internal corporate governance mechanisms (Young et al., 2008).

Each theory associates business group membership with some benefits and costs. Both institutional and resource-based theories tend to depict business group affiliation as a source of competitive advantage relative to standalone firms. However, under some circumstances agency costs might substantially reduce them.

1.3 Business groups in the finance literature

Business groups are the subject of a vast literature in finance characterized by the heterogeneity in the methodologies, theoretical perspectives, and designs used by researchers. Cuervo-Cazurra (2006) notes that the lack of consensus in the literature is a hurdle to the comparability of studies and the development of knowledge on business groups.

We can distinguish single-country and multi-country analyses. Khanna (2000) observes that single-country analyses provide more reliable results than multi-country analyses. Indeed, the differences in business group definitions, business group structures, institutional frameworks, and cultures alter the results of multi-country analyses. This type of analyses often exploit between country heterogeneity to test hypotheses related to institutional theories. For instance, Khanna and Rivkin (2001) examine the performance of business groups in 14 emerging markets in the 1990s and Masulis et al. (2011) conduct an extensive analysis covering 45 countries for the year 2002. Both studies highlights substantial differences between countries. Hence, Khanna and Rivkin

(2001) attribute differences in the performance effect of affiliation to the differences in institutional contexts. Masulis et al. (2011) suggest that institutional frameworks is at the origin of the formation and organization of business groups. Longitudinal single-country analyses are also used to test the institutional theories during periods of reforms and changes in the institutional framework. For instance, Carney et al. (2009) and Zattoni et al. (2009) explain the evolution of business group performance by the economic development and changes in the institutions in China and India respectively. Their analyses suggest that improvements in the institutional framework reduce the impact of business group membership on affiliates.

Performance is a central question in the finance literature, and a number of authors investigate whether business group membership affects firm value and firm profitability. Holmes Jr et al. (2018) note that the evaluation of the performance effect of affiliation is not trivial and faces a number of challenges associated with the identification of group boundaries, the roles of affiliates in the group, and the choice of the performance measure. Overall, results regarding the affiliation effect on firm profitability and firm value are mixed. The meta-analysis conducted by Carney et al. (2011) illustrates the lack of consensus and the heterogeneity in results regarding the effect of affiliation on firm performance. The authors base their analysis on 141 studies covering 28 countries. Overall, the results suggest that affiliation is associated with a negative effect on the different measures of firm performance. However, the authors observe that the effect is small and varies substantially from one study to another. The cross-country study by Khanna and Rivkin (2001) provides an additional evidence of the heterogeneity of the performance effect of affiliation across countries. Their results show a positive and significant effect of business group affiliation on firm profitability in six countries and a negative and significant effect in three others. In the five remaining countries, business group affiliation is not associated with a significant impact on performance. The performance effect of affiliation might also fluctuate over time. Using a Chinese sample, Carney et al. (2009) show that the effect of affiliation on firm profitability declines between 1999 and 2004 due to the development of market institutions.

Corporate governance is another important field of research in business group literature. The complexity of business group structures raises concerns regarding corporate governance and attracts many finance scholars. Almeida and Wolfenzon (2006) theorize the use of pyramidal structures in family business groups. Their model predicts that controlling shareholders prefer using direct ownership for highly profitable firms, whereas pyramidal ownership is preferred for

firms providing high private benefits. In a cross-country analysis, Masulis et al. (2011) find that pyramidal structures are more common in countries where access to external capital is more constrained. They also observe a negative association between the length of pyramids and the country-level availability of capital. A number of scholars investigate the consequences for minority shareholders. Most studies focus on the expropriations and mechanisms used to conduct such practices. Faccio et al. (2001) document minority shareholder expropriations among business groups in Asia and Europe. Bertrand et al. (2002) propose an empirical methodology to measure tunneling activities based on the spillover of earning shocks. Their empirical analysis provides evidence of minority shareholder expropriations within Indian business groups. Several articles use Korean data to document different means of minority shareholder expropriations such as mergers (Bae et al., 2002), private equity issuance (Baek et al., 2006), and intragroup trades (Black et al., 2015). [3]

The existence of internal capital markets within business groups is another important topic in finance literature. As internal capital markets are not observable per se, scholars document their effects or the mechanisms used to transfer financial resources across affiliates. Based on a sample covering the period from 1965 to 1988, Lincoln et al. (1996) document the profit smoothing behavior conducted by Japanese keiretsu. The authors suggest that the resource allocation across affiliates aims at improving the long-term viability of the group rather than maximizing profitability. This redistribution allows maintaining solvency of affiliates at the expense of investments. Consequently, the authors observe a lower failure rates among business group affiliates than standalone firms. Gopalan et al. (2007) obtain similar results using a sample of Indian business groups covering the period from 1989 to 2001. They find that business groups use intragroup loans to transfer capital between affiliates for the benefit of the weakest affiliates. Intragroup loans provide lower costs financing and avoid the risk of affiliate default. As observed by Lincoln et al. (1996), this policy aims to maintain the group viability. More recently, Buchuk et al. (2020) and Santioni et al. (2020) observe that intragroup loans and cash transfers within business groups help affiliated firms to face the Global financial crisis in Chile and Italy. Larrain et al. (2019) study the role of internal capital markets in the access to external financing in 12 European countries during the period from 2009 to 2013. They find that firms leaving business groups tend to decrease their leverage due to higher credit constraints. The authors suggest that the higher debt

[3] The literature on Korean chaebols is discussed in Section 2.4.

capacity of group affiliates is due to collateral. Byun et al. (2013) and Gormley et al. (2015) observe that business groups affiliation eases access to debt financing in Korea. Some studies dedicated to internal capital markets examine the effect of internal capital markets on investment decisions. Hoshi et al. (1991) study cashflow sensitivity of investments among Japanese firms between 1965 and 1986. Their results show that cashflow sensitivity of investment is lower for firms affiliated with a business group than for standalone firms. This result provides evidence that internal capital markets reduce financial constraints of affiliated firms. Similar results are observed in India (Lensink et al., 2003) and Korea (Shin and Park, 1999). Using a sample of Chilean data for the 1990 to 2009 period, Buchuk et al. (2014) find that intragroup loans benefit to affiliates with higher investment opportunities, profitability, and controlling shareholder ownership.

The empirical research on business groups is subject to a number of empirical limitations and challenges. As discussed earlier in this section, the first limitation is due to the lack of consensus on a universal definition of business groups (Khanna and Palepu, 2000). Consequently, the definition differs from one study to another limiting the comparability of the results. A second challenge for scholars is the identification of business group boundaries in the absence of legal status (Granovetter, 2010, p. 430). Therefore, the identification of affiliated firms relies on the criteria set by the authors and the data availability. Khanna and Rivkin (2006) highlight the importance of the different types of ties in the control of business group affiliates but observe that some types of ties might be unobservable to outside observers. Another constraint in the identification of affiliated firms is the presence of unlisted affiliates for which no data are available (Khanna, 2000). The measurement and interpretation of the effect of affiliation on performance or financial policies is another challenging and difficult task for researchers. Indeed, the conclusion might differ depending on the level of analysis. Hence, the group-level results can conflict with the affiliate-level results. For instance, Lincoln et al. (1996) observe that Japanese business groups conduct profit smoothing strategy favoring the viability of the business group as a whole at the expense of the highest performing affiliated firms. Therefore, such strategy appears costly from an affiliate-level perspective but beneficial from a group-level perspective. The firm-level effect might also vary within a group depending on the role of the affiliate in the group (Kim et al., 2004b). Finally, endogeneity is a major empirical concern in the business group literature that raises the risk of reverse causality (Holmes et al., 2018). For instance, one might expect that being affiliated with a business group has an impact on the performance of the firm. However, it is also possible

that the group controlling shareholder picks firms depending on their performance. Scholars develop different empirical approaches to address the endogeneity issue and establish causal inference. Unfortunately, some methods are not applicable to the specificities of business group research. For instance, firm fixed effect models are difficult to implement given the time invariance of affiliation status. Indeed, Khanna and Rivkin (2001) observe that the composition of business groups tends to be stable over time given the rivalry between groups and social ties. However, the historical composition of business groups mitigates the issue of group formation endogeneity, according to Khanna and Yafeh (2007). Khanna (2000) also notes the difficulties of finding reliable instruments for group affiliation. Therefore, a popular approach consists of using exogenous shocks such as crises (e. g. Bae et al. (2012)) or legal changes (e. g. Black and Kim (2012)).

2. The Korean framework

2.1 Korean history and chaebols

Chaebols and the economic development of Korea are closely linked. During the early stages of Korean industrialization, chaebols played the role of government partners in development strategies. While Korea was developing, chaebols expanded their activities and increased their economic power. Despite numerous political changes, and several financial crises, chaebols succeeded in adapting to the domestic and international environment to maintain their competitiveness and power.

Between 1910 and 1945, Japan colonized the Korean peninsula. During the 1910s, Japan used Korea as a source of agricultural supply. Industrialization of Korea started in the 1920s with the establishment of small factories. The development of heavy industry began later with the investments of Japanese zaibatsu (Jones and SaKong, 1985, pp. 23-24). [4] The end of World War II marked the decolonization and the division of the Korean peninsula between the North under the communist influence and the South supported by the US. The Republic of Korea (or South Korea) was officially founded in 1948 with Rhee Syng-man as president. Two years later, the Korean War began and ended in 1953 with an armistice between South Korea and North Korea (officially the Democratic People's Republic of Korea) (Eichengreen et al., 2015, p. 17).

[4] Zaibatsu is the name commonly used for pre-war Japanese business groups.

After the Korean War, North Korea was in a better economic position than South Korea. Indeed, most mines and heavy infrastructures developed by the Japanese were located in the north of the peninsula, while the southern part suffered from the most severe war destructions (Song, 2003, p. 49). President Rhee Syng-man returned to power after the war in 1953. During his presidency, South Korea relied essentially on foreign aid and adopted an import substitution development policy (Song, 2003, p. 52). Most family businesses at the root of chaebols emerged in this context. In exchange for their support to the Rhee government, these entrepreneurs benefited from various privileges. Hence, Jones and SaKong (1985, pp. 271-272) cite the examples of non-competitive allocation of licenses and contracts, disposal of former Japanese facilities at bargain price, and access to cheap financing. These privileges are at the root of the power accumulated by chaebols.

The actual economic and industrial development started in the early 1960s after General Park Chung-hee came to power through a military coup. Government undertook important measures to foster the industrialization and economic development of the country. In 1961, Park government established the Economic Planning Board (EPB) and adopted the first Five-Year Economic Development Plan. The government nationalized commercial banks to control the access to capital and the sources of financing (Eichengreen et al., 2015, pp. 146-147). Whereas the Korean economy was mostly based on agriculture and mining, the government selected some strategic sectors and provided support to a number of entrepreneurs to implement government policy (Kim, 2010, p. 159). The selected firms obtained tax deductions, preferential loans, foreign capital, and tariff exemptions. The government support was conditioned upon the performance and respect of policy priorities (Eichengreen et al., 2015, p. 148). The first Five-Year Plan focused on import substitution, but suffered from a lack of government experience and preparation to reach its goals (Jones and SaKong, 1985, p. 49). The purpose of the successive Five-Year Plans evolved along the development process of the Korean economy and infrastructures. The government promoted first labor-intensive industries benefiting from low labor costs before encouraging the development of capital-intensive industries (BOK, 2016, p. 8). Hence, the adoption of the Heavy and Chemical Industry Drive policy in the 1970s marked a milestone in the industrialization of the Korean economy in laying the foundations of a modern industry. The promotion of heavy and chemical industries came hand in hand with substantial investments in facilities, research, and education (Eichengreen et al., 2015, p. 152).

The industrialization policy based on government-led economic growth but executed by private firms under the supervision of the government allowed for rapid economic development of Korea. Between 1961 and 1980, the gross national income (GNI) per capita increased from USD 82 to USD 1597 and the unemployment rate declined from 12.2 to 5.2 percent (Song, 2003, pp. 84-85). However, this policy also had some adverse effects. State protection and support encouraged aggressive investments financed by debt, thereby exacerbating the financial vulnerability of chaebols. As a result, the government had to intervene several times in order to avoid the collapse of major chaebols (Eichengreen et al., 2015, p. 156).

After the assassination of General Park in 1979, Choi Kyu-hah was elected as president. One year later, Chun Doo-hwan overthrew the elected president and took power through a military coup. Even though Chun had no ties with chaebols, the economic importance of chaebols prevented the government from withdrawing its support and protection (Eichengreen et al., 2015, pp. 155-156). However, the necessity to move to a free and fair market economy led the government to enact the Monopoly Regulation and Fair Trade Act (MRFTA) in 1980 and establish the Korea Fair Trade Commission (KFTC) one year later. The KFTC was initially established as part of the EPB. In 1994, the KFTC became an independent administrative entity. In its current form, the KFTC is composed of a committee and a secretariat. The secretariat is in charge of monitoring and promoting competition policies including the identification of large business groups. The committee is composed of nine commissioners in charge of deliberating on competition issues. The KFTC is headed by a chairperson who is appointed by the Korean president. Since 2019, Joh Sung-wook, a professor of finance, sits as KFTC chairwoman (KFTC, 2022a, 2022b).

The MRFTA aimed to promote the "balanced development of the national economy" and to stimulate "creative business activities" (Song, 2003, p. 143). However, the fair trade law did not impact business groups until the amendment of December 1986 (Kim, 2013a). [5] Since 1987, the KFTC plays a key role in the regulation of chaebols by designating the largest business groups. [6] The improvement of the legal framework was complemented by the privatization of commercial banks in the early 1980s. Despite an apparent shift to a free market economy, the government maintained a substantial control over the economy. Indeed, the law allowed exceptions to maintain the competitiveness of Korean firms against foreign competitors and the appointment of bank

[5] The implementation of the MRFTA and the Korean corporate governance framework are presented in Section 2.2.2.

[6] The process of business group designation is discussed in details in Section 2.3.

presidents required government approval. The government also intervened directly in the economy and organized mergers to avoid major bankruptcies (Eichengreen et al., 2015, pp. 159-161).

The second half of the 1980s was marked by demonstrations for democracy. Presidential elections took place in 1987 and former general Roh Tae-woo was elected as president (Eichengreen et al., 2015, p. 28). As chaebol owners became important donors for politicians, the democratization reinforced the power of chaebols (OECD, 2018, p. 92). In 1993, Kim Young-sam succeeded Roh as president. The agenda of the new president was aimed at economic liberalization and globalization to access the OECD membership. Under Young-sam administration, several changes in regulation and government practices were undertaken in order to meet the OECD standards (Eichengreen et al., 2015, p. 34).

In 1997, one year after having integrated the OECD, the Asian financial crisis severely hit Korea. Chaebols are cited as one cause of the spread of the crisis to Korea. The crisis led to the bankruptcy or the dismantlement of the most vulnerable chaebols. Korea benefited from international aid, including an IMF rescue package conditioned with substantial reforms (BOK, 2016, p. 15). A series of reforms targeted chaebols in order to improve their financial resilience through the reduction of debt leverage and the prohibition of debt guarantees among affiliated firms (Kim, 2010, p. 165). The government also organized restructuring plans aimed at consolidating key industries through the mergers of the main players. The situation also pushed a number of chaebols to reduce their diversification by divesting in non-performing affiliates (Kim, 2010, p. 165). These measures allowed chaebols to increase their productivity during the early 2000s. The structural reforms undertaken in the aftermath of the 1997 Asian financial crisis improved the resilience of the corporate and financial sectors, limiting the impact of the 2008 Global financial crisis on the Korean economy. The government stimulus and the won depreciation and also contributed to a quick recovery (OECD, 2010, p. 11).

The power of chaebols, market fairness, and corporate governance remained important topics in the political agendas of successive governments. However, the actual improvements in governance framework and practices varied between governments. President Lee Myung-bak conducted reforms to improve the corporate governance framework in the early 2010s, whereas only little improvements were observed under the President Park Geu-hye administration, despite her campaign promises (ACGA and CLSA, 2014, 2016). In 2016, a political scandal involving

chaebol leaders led to the impeachment of President Park. [7] Elected to fill the vacancy left by President Park impeachment, President Moon Jae-in made the reform of chaebols and the dismantlement of collusion between business and politics a priority of his presidency. Despite some improvements, observers noted that chaebols maintained their power (Davies, 2022). Unlike previous presidential campaigns, the topic of chaebol reforms was dominated by concerns over inflation and housing prices during the March 2022 election, which was won by conservative and business-friendly candidate Yoon Suk-yeol (Kim, 2022).

2.2 The Korean institutional framework

2.2.1 The Korean stock market

The Korean stock exchange (KSE) was established in 1956 and joined the World Federation of Exchanges (formerly known as International Federation of Stock Exchange) in 1979. The KSE was privatized in 1988. Since 1992, the Korean stock market is open to direct stock investments by foreign investors, and the ceiling on foreign investment was fully removed in 1998 after the Asian financial crisis. In 2005, the different divisions of the Korean stock markets were consolidated as the Korea Exchange (KRX). (KRX, 2017, pp. 26-27).

The Korean stock market is organized into three market divisions: the KOSPI, the KOSDAQ, and the KONEX. The KOSPI is the historical and main market division. Flagship companies such as Samsung Electronics, Hyundai Motor, and LG Corporation are listed on this market division. At the end of July 2022, 820 firms are listed on the KOSPI market for a market capitalization of 1931.9 trillion KRW. The KOSDAQ and KONEX market divisions target the firms that do not meet the requirements for listing on the KOSPI market. The KOSDAQ market is established in 1996 to provide access financial market to SMEs in growing industries such as IT and biotechnology. At the end of July 2022, 1571 firms are listed on the KOSDAQ market for a market capitalization of 363.3 trillion KRW. With 125 listed firms, the KONEX is the smallest market division. [8] It was established in 2013 as an "entry-level" market (KRX, 2017, pp. 56-57).

[7] Starting in 2016, this political scandal involves President Park and her friend and adviser Choi Soon-sil. In March 2017, the President was impeached and lost her immunity. Later, she was charged for collusion with her friend, state power abuse and leak of state secret. Choi was found guilty to have used her connection with the President to obtain donation in favor of non-profit organizations under her control (BBC, 2018).
[8] The number of firms and market capitalization are retrieved from KRX website (KRX, 2022).

The status of the Korean stock market is ambiguous. Indeed, the country has experienced rapid economic growth and development. In less than 50 years, Korea turned from one of the poorest countries to a G20 member and became one of the most connected and innovative countries in the world. During the first decades of the twenty-first century, Korean products gained international recognition, and a number of firms became world leaders in industries such as semiconductor industry. Despite those substantial changes, in 2022, South Korea is still classified as an emerging market by the MSCI. The index provider justifies this classification due to concerns regarding information, market infrastructure, and market entry (MSCI, 2021). By contrast, the FTSE upgraded Korea as a developed market in September 2009 (FTSE, 2008).

2.2.2 The legal framework, corporate governance, and chaebol regulation

The Korean legal system is inspired by the German Commercial Code that provides a lower degree of shareholder protection than the common law system (Porta et al., 1998). Despite recent reforms and improvements, low corporate governance quality and minority shareholder protection are often cited as weaknesses of the Korean market (ACGA and CLSA, 2020, p. 304).

Different historical factors explain the low corporate governance quality of the Korean market and chaebols. The industrialization policy based on selected firms supported by government insulated chaebols from traditional governance mechanisms, resulting in a “too big to fail” legacy (Hwang and Seo, 2000). Chaebols benefited from government support that allowed them to expand their activities without concern for efficiency. The state control of capitals also annihilated the monitoring role of banks and high entry barriers reduced product market mechanisms. The strict regulation of merger and acquisitions (M&A) aiming to mitigate chaebol expansion and the limitation of foreign ownership had the adverse effect of protecting chaebols against hostile takeover threats (Hwang and Seo, 2000). Finally, the different interventions of the authorities to avoid bankruptcy of chaebols enhanced the “too big to fail” belief and moral hazard (Eichengreen et al., 2015, p. 155).

The establishment of the KFTC and the promulgation of the MRFTA in 1980 marked the starting point of chaebol regulation (Eichengreen et al., 2015, p. 158). The first series of effective measures aiming to mitigate economic power concentration was introduced in 1986. To avoid excessive expansion of business groups and the distortion between control and cashflow rights, the law banned the establishment of holding companies and cross-shareholding schemes. The

prohibition of holding companies aimed at preventing the development of pyramidal structures (KFTC, 2016, p. 192). The ban of cross-shareholding schemes, which refer to reciprocal shareholding between affiliates, led to the development of circular shareholding that involved at least three affiliates (OECD, 2018, p. 95). Finally, the voting rights of financial and insurance affiliates were restricted to avoid controlling families using financial affiliates to expand their control over other group affiliates (Kim, 2013a).

The 1997 Asian financial crisis marked another milestone in corporate governance regulation in Korea. First, the IMF conditioned its rescue package to substantial reforms. Second, the role played by chaebols in the crisis led the government to strengthen the regulation. Hence, a number of reforms were undertaken in the aftermath of the crisis in order to improve corporate governance, financial resilience and transparency. A special focus was placed on the role of boards of directors. Large listed firms were required to appoint 50% of outside directors and to have committees for audit and nomination of outside directors (Kim et al., 2022). Several reforms aimed to improve minority shareholder rights. The introduction of cumulative voting [9] aimed to help small shareholders to elect directors and the minimum ownership to sue insiders (derivative suits) was also lowered. The lift of restrictions on foreign investment also aimed at promoting external monitoring (OECD, 2018, p. 103). Some reforms specifically targeted chaebols. Hence, new debt guarantees between affiliates were forbidden to avoid chains of bankruptcies. This measure also aimed to ensure fairer access to the debt market for non-chaebol firms (KFTC, 2016, p. 181). [10] To improve the transparency of ownership structure, the prohibition of holding companies introduced in 1986 was lifted in 1999 (Kim, 2013a). Finally, the first Code of Best Practice for Corporate Governance was published in 1999 and revised in 2003 and 2016. [11]

The early 2010s saw a new series of legal changes aiming at improving the corporate governance framework and reaching world standards. These reforms reinforced the role of boards of directors in strengthening the criteria for the selection of outside directors (Kim et al., 2022). Reporting reliability increased with the adoption of IFRS accounting standards (ACGA and CLSA,

[9] Cumulative voting allows shareholders that hold less than three percent of voting rights to give all their votes to one candidate during appointment of directors. The cumulative voting is defined in the article 382-2 of the Korean Commercial Act. For further explanations on cumulative voting see: https://www.investor.gov/introduction-investing/investing-basics/glossary/cumulative-voting.

[10] Debt guarantee among affiliates is first restricted in 1992 before being forbidden in 1998 (KFTC, 2016, p. 181).

[11] Codes of best practice are available on the ECGI website:
https://ecgi.global/content/codes?field_country_value=KR&sort_by=field_date_posted_value&sort_order=DESC

2012, p. 134). Transparency was improved by the disclosure of director and manager compensations. The protection of minority shareholders against tunneling through related party transactions within chaebols was reinforced. Hence, large related party transactions require approval from the board of directors and cannot benefit the controlling families (Kim et al., 2022). To mitigate the development of circular shareholding, the prohibition of new or additional circular shareholding was introduced in 2014 (KFTC, 2016, p. 174).

Overall, market observers note that the changes in corporate governance framework were mainly driven by the government rather than the corporate sector (ACGA and CLSA, 2012, p. 130) and the speed of reforms varies depending on the administrations (ACGA and CLSA, 2014, p. 142). They also observe that through the Federation of Korean Industry (FKI), chaebols often lobby against corporate governance reforms, arguing that they risk weakening the Korean economy (ACGA and CLSA, 2014, p. 143).

2.3 Korean chaebols

The term "chaebol" (재벌 in the Korean alphabet) means "a group of blood-related persons who have accumulated massive wealth" (Kim, 2013a). Korean chaebols correspond to hierarchical business groups described in Section 1. Chaebols can be defined as large groups of legally independent firms linked together by multiple social and economic ties that operate under the influence of a controlling shareholder commonly called "chairman".

2.3.1 The legal definition

The Korean market offers an ideal framework for scholars to conduct research on business groups. As discussed in Section 1, a hurdle in the business group literature is the definition and identification of business groups. In Korea, researchers do not have to face such challenge as the KFTC designates for regulatory purpose the largest business groups and discloses the list of affiliated firms. This unique framework explains the abundance of studies using the Korean market in the business group literature.

Chaebols and their boundaries are defined in the MRFTA and its enforcement decree. To define the scope of business groups, the KFTC identifies a "same person" referring to the group controlling shareholder (or "core entity" according to Yiu et al. (2007) definition). The "same person" can be either a natural or legal person. The KFTC considers both shareholding and *de facto*

control to define the scope of a business group. Hence, a firm is considered as a group affiliate if the same person ownership exceeds 30 percent. The KFTC considers both direct or indirect shareholding through related parties such as relatives or other affiliated firms. A firm is also designated as a group affiliate if the same person exercises *de facto* control over the firm through director appointment, influence on strategic decisions, personal ties and so on. Based on this definition, the KFTC publishes the list of the largest business groups. Initially, the KFTC focused on only the 30 largest business groups. However, since 2002, the selection is based on a threshold in terms of the total value of assets. Initially set at 2 trillion KRW, this threshold increased to 5 trillion KRW in 2009.

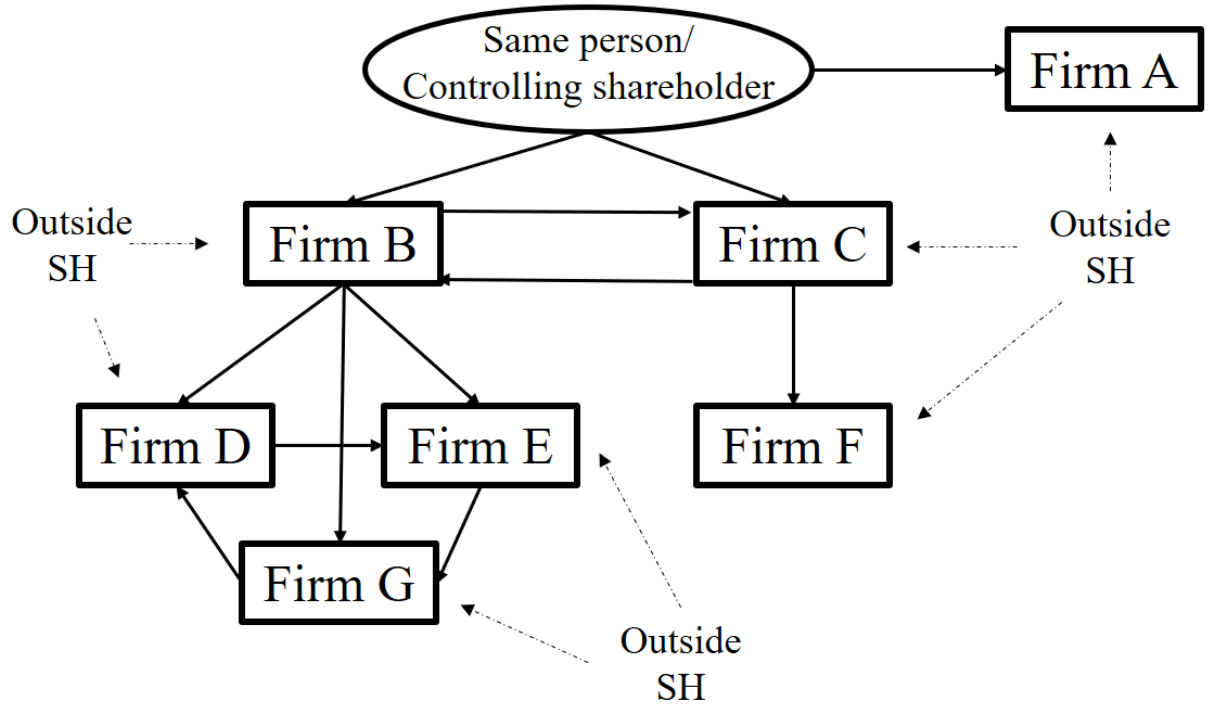
Ownership maps established by the KFTC for Samsung and LG groups are shown in Appendix 1 and Appendix 2 respectively. In 2021, Samsung group was ranked as the largest chaebol, while LG group was ranked fourth. The commission designated Lee Jae-yong as the same person for Samsung group and Koo Kwang-mo as the same person for LG group. The figures show the difference in ownership structure between the two chaebols. Samsung group maintains a complex ownership structure, while LG group shifted to a holding structure after the 1997 Asian financial crisis. This structural changes was associated with a reduction in the unrelated diversification of the group (Kim et al., 2004a).

The legal definition and official business group designation offer an ideal framework for conducting research on business groups. Indeed, the KFTC classification provides a homogeneous classification to researchers. The homogeneity in the definition contributes to the reliability and comparability of studies. In addition, the identification of the group boundaries takes into account both quantitative and qualitative criteria. As discussed in Section 1, non-equity ties play a significant role in business group control but are often difficult to identify for outside observers (Khanna and Rivkin, 2006). Despite numerous advantages, this empirical framework has some limitations. First, the data availability is limited to the largest business groups (Hwang and Kim, 2016). Second, the total asset threshold set by the KFTC to define large business groups is arbitrary. Due to this limitation, the KFTC classification can be used to investigate only large business groups. Indeed, firms that are not classified as affiliated firms by the KFTC might belong to smaller groups.

2.3.2 Characteristics of chaebols

Based on the MRFTA, a chaebol can be defined as a large group of firms under the direct or indirect control of a controlling shareholder. Hence, Korean chaebols corresponds to hierarchy-type business groups as described in Section 1. Indeed, chaebols are characterized by a highly centralized control and group-level decision making process (Shin and Park, 1999). The controlling shareholder who holds effective power over the whole business group is commonly called "chairman" (same person in MRFTA). In the 1970s, a number of chaebols established group headquarters called the "chairman office" to improve coordination and organizational efficiency. Despite the legal independence of their affiliates, chaebols can be considered to some extent as single entities in which affiliated firms operate as divisions given the high level of centralization (Hwang and Seo, 2000). With the exception of a few chaebols such as POSCO and KT, family control characterizes most Korean business groups. The major chaebols are still under the control of their founding families (OECD, 2018, p. 14). For instance, the third generation of the Lee family still controls the group Samsung.

Figure 2 Example of chaebol ownership structure



The figure presents a fictitious chaebol involving different types of ownership structures discussed in Almeida et al. (2011) and KFTC (2016). Outside SH refers to non-controlling shareholders holding stakes in affiliated firms.

Controlling families use different devices to control affiliated firms, facilitate group expansion and the intergenerational transmission (OECD, 2018, p. 96). During the emergence and development of chaebols, the controlling families used intensively cross-shareholding to dissociate ownership from control. In the 1980s, the prohibition of cross-shareholding led to the development of circular ownership schemes that were banned in 2014 (KFTC, 2016, p. 174). Figure 2 illustrates a fictitious chaebol and summarizes different ownership schemes. In the figure, firms B and C are involved in a cross-shareholding scheme and firms D, E, and G are involved in a circular-ownership scheme. As affiliated firms are not fully owned, outside shareholders can hold shares in affiliated firms.

Almeida et al. (2011) examine the ownership structure of chaebols. Their articles introduces measures of firm centrality and position of the firm within pyramidal structure. The firm centrality refers to the role of a given affiliate in preserving the control over the other group affiliates. Based on data for the period from 1998 to 2004, the authors observe substantial variations in affiliate ownership and distinguish three main types of affiliates. First, the controlling shareholder directly holds a number of affiliates with high net present value (firm A in Figure 2). These firms do not have stakes in other affiliates. Second, the group controlling shareholder has stakes in a few "central firms" (firms B and C in Figure 2). Central firms are usually the older and larger affiliates of the group. These firms play a key role as they are used to control several affiliates through pyramidal structures. In addition, the authors observe that central firms are usually used to conduct the acquisition of new affiliates. Finally, most affiliates are controlled through pyramids (firms D to G in Figure 2). The authors observe that pyramids rarely exceed three layers. Pyramid controlled firms are usually smaller, younger, and less profitable than directly controlled affiliates. The authors observe that the firm profitability determines the position of the affiliate in the pyramid. Hence, poor performing affiliates are placed deeper in the pyramid. Park et al. (2020) complement the findings of Almeida et al. (2011) by analyzing the relation between firm centrality and governance decisions. Their results show that central firms are more likely to go public. On the other hand, non-central firms that are directly held by controlling shareholder usually stay private. The authors also find a negative association between the centrality and the likelihood of divestment. More specifically, they observe that affiliates located at the bottom of pyramid with low equity stakes in other affiliates are more prone to be divested as they play a minor role in the group structure.

In addition to equity-based ties, owner families often appoint family members or loyal supporters to executive positions to reinforce their control over affiliated firms (Witt, 2014, p. 222). Hence, Choi et al. (2007) observe that a large portion of outside directors of chaebol firms are actually executives of other affiliates. Finally, Lee and Gaur (2013) insist that socio-cultural mechanisms play an important role in collectivist cultures such as Korea. Informal ties and shared values contribute to alleviating conflicts of interest within groups and reducing the costs associated with broad diversification.

On the one hand, family ownership and control are associated with some benefits, such as goal alignment and, long-term and robust ties. On the other hand, the agency theory predicts that concentrated and family ownership tends to exacerbate principal-principal conflicts (Young et al., 2008). Controlling shareholders can be tempted to use their power to obtain private benefits for themselves or their group at the expense of minority shareholders (Baek et al., 2004). In addition, conflicts between group-level and firm-level interests increase the risk of minority shareholder expropriations in business groups. Since the controlling family is usually involved in the management of both the group and its affiliates, group-level interests are likely to be prioritized. For instance, cross-subsidization can be value-creating for the group as a whole, but value-destroying for the supporting firm and its shareholders (Bae et al., 2008). Succession is a challenge specific to family businesses. The high inheritance tax applicable in Korea makes transitions between generations more complex (Bennedsen et al., 2022). Hence, Shin (2020) observes that inheritance tax avoidance motives intragroup mergers that might be costly for minority shareholders. Family feuds during succession periods might also affect chaebols and their affiliates. Gam et al. (2020) cite the example of Shinsegae, CJ, and Hansol that are spinoffs of Samsung group. Finally, the misbehavior of some chaebol owner families raises hostility among the Korean society. For instance, Bennedsen et al. (2022) observe that several chaebol families are involved in tax fraud or bribery cases.

As partners of the government in the implementation of industrialization policy, chaebol controlling families maintain close ties with the government. These political connections contributed to the expansion of chaebols. Indeed, chaebols benefited from several forms of government support under the General Park regime. Governments succeeding General Park attempted to withdraw their support to chaebols and dismantle these ties to promote a free market. However, the importance of chaebols for the Korean economy and its competitiveness made this

task difficult (Eichengreen et al., 2015, p. 156). The FKI that represents chaebols interests often opposed reforms, arguing that they risk harming the competitiveness of Korean firms (ACGA and CLSA, 2014, p. 143). The political ties and dependency of the Korean economy on chaebols resulted in a "too big to fail" legacy and an implicit government guarantees (Hwang and Seo, 2000). After the democratization, chaebols maintained close relationships with politicians through the financing of political campaigns (Eichengreen et al., 2015, pp. 162-163). Appointing former politicians and government officials at the boards of affiliates also reinforced the political connections of controlling families (Choi et al., 2007). Judicial authorities are often criticized for their clemency toward chaebol owners and managers (Choi et al., 2016). Indeed, a number of chaebol owners benefited from political pardons (ACGA and CLSA, 2016, p. 160). In 2016, the influence of chaebol controlling families on political power was brought to light by the scandal that led to the impeachment of President Park and the imprisonment of Samsung's vice-chairman (Kim, 2017).

Business groups are often described as diversified business entities. The level of diversification differs from one chaebol to another and tends to evolve over time. Consistent with the institutional theories, market failures and institutional voids fostered the diversification of chaebols in the early stages of Korean industrialization. Chaebols then expanded their activities through acquisitions and the creation of new firms (Chang and Choi, 1988). Korean government policy also contributed to the formation of large and diversified business groups by restricting government support to a limited number of firms (Campbell II and Keys, 2002). Edwards (1955) points out potential anti-competition behaviors associated with diversification. In Korea, the expansion of chaebols in various industries harmed the development of SMEs (Kim, 2013a). In 1991, the government started to promote specialization among large business groups. However, only the 1997 Asian financial crisis and the restructuring plans pushed some chaebols to refocus on their core business to improve their financial performance and resilience (OECD, 2018, p. 93). While some chaebols remained highly diversified, a number of chaebols split into more focused groups. For instance, Hyundai group was a highly diversified business group active in various industries including automotive, financial services, chemical, and heavy industries. The financial difficulties of one of its flagship affiliate triggered the group split off followed by the establishment of Hyundai Motor Group, which is focused on the automotive industry (Kim et al., 2004a).

2.4 Chaebols in the finance literature

Korean chaebols are the subject of a vast literature. The dominance of these large business groups and their role in the economic development of the country characterize the Korean framework. The legal framework and data availability are other factors explaining the popularity of Korea in business group literature. Indeed, most studies on Korean business groups rely on the KFTC classification to identify business groups and their affiliates. The use of this official classification provides numerous advantages in terms of comparability and identification. However, it limits the analysis to the largest business groups.

The effect of chaebol affiliation on firm profitability and firm value was one of the first questions addressed by scholars. Overall, the results indicate that the performance effect varies over time. The study by Chang and Choi (1988) is among the first article about chaebols to be published in an international journal. The authors examine the effect of chaebol affiliation on the operating performance of affiliated firms. Their results show a positive association between affiliation and profitability over the period from 1975 to 1984. Later, other studies complement this article by covering different periods. Choi and Cowing (1999) find a negative and significant effect of affiliation with a chaebol on the profitability of manufacturing firms during the second half of the 1980s. They observe that the performance effect turned non-significant during the early 1990s. This result contrasts with Kim (2006), who find a negative effect of chaebol affiliation on total factor productivity during the 1990s. Another part of the literature dedicated to the performance effect of chaebol affiliation focuses on firm valuation. Lee et al. (2010) examine the evolution of the affiliation effect on Tobin's q of chaebol firms over a period from 1984 to 2005. Their study reveals a change in the value of affiliation. Hence, the authors observe a valuation premium during the 1980s and the 2000s and a discount during the 1990s. These variations in the value of affiliation are consistent with Lee et al. (2008) who observe a valuation premium during the period from 1984 to 1993 and a discount until 1996. Ferris et al. (2003) find a similar discount prior to the 1997 Asian financial crisis. According to these authors, overinvestments, profit smoothing, cross-subsidizations, and the development of institutions explain the changes in affiliation value.

Several authors investigate the variation of the performance effect across groups and affiliates. Exploiting a change in the designation criteria in 2016, Lee (2022) observes that affiliation with a chaebol fulfilling the KFTC size criteria is associated with a higher Tobin's q than affiliation with a smaller business group. The author explains this result by stronger corporate

governance monitoring and lower financial friction associated with KFTC designated chaebols. Chang and Hong (2000) use a sample of affiliated firms covering the period from 1985 to 1996 to investigate the effect of group-level resources and intragroup transactions on firm profitability. Affiliated firms benefit from group-level intangible resources such as R&D and advertising activities. The group financial position also affects affiliate performance with a positive effect of liquidity and a negative effect of debt. The authors also observe that intragroup transactions have a heterogeneous effect across affiliates. Hence, their results show that providing debt guarantee or purchasing inputs from other affiliates negatively affects firm profitability. By contrast, the reception of debt guarantees and sales to other affiliates is associated with a higher profitability. Almeida et al. (2011) find that the profitability of the firm explains its position in the chaebol and not the reverse. Hence, low profitable affiliates are more likely to be placed deeper in the chain of control, whereas firms with high net present value tend to be directly held by the controlling shareholder. The authors also find that firms that are used to control other affiliates or acquire new affiliates (central firms) exhibit a lower Tobin's q than other affiliated firms.

Shin and Park (1999) are among the first scholars to investigate the effect of internal capital markets within chaebols. During the period preceding the 1997 Asian financial crisis, they find that affiliation with a chaebol and the access to internal capital markets reduce financial constraints of firms. Indeed, the authors do not find significant investment-cashflow sensitivity for chaebol affiliates contrasting with the results for unaffiliated firms. They observe that growth opportunities and cashflow generated by other affiliates are the main drivers of the investments of chaebol affiliates. Lee et al. (2009) obtain similar results for the 1990s period, but observe that external capital markets substitute to internal ones during the 2000s. Almeida et al. (2015) highlight the benefits of internal capital markets and their role in reducing the negative effects of an economic downturn. In the period following the 1997 Asian financial crisis, the authors observe that chaebols transfer capital from low-growth to high-growth affiliates. These transfers allow the most promising affiliates to maintain an optimal level of investment. Chaebol affiliation also affects the cost of debt. Byun et al. (2013) show that firms affiliated with a chaebol benefit from lower borrowing costs on the public bond market during the period from 2001 to 2007. The authors explain their results by the co-insurance effect associated with business group affiliation. They also observe a stronger effect among affiliates with higher cashflow uncertainty and low pledgeable income.

A number of studies show that the ties between affiliates of the same chaebol are reflected in the stock prices. Kim et al. (2015) find stronger stock returns correlation between firms belonging to the same chaebol than the firms operating in the same industry. The authors note that the between affiliates correlation strengthen after the 1997 Asian financial crisis. Moreover, several studies document spillover effects within groups. For instance, Bae et al. (2008) find that when an affiliate announces a decreasing (increasing) year-to-year earnings, the same chaebol affiliates experience negative (positive) abnormal returns. The authors also observe that the cashflow rights of the controlling shareholder, the size, the past stock performance, and the debt guarantee of the announcing affiliate tend to strengthen the spillover effect. Kwon et al. (2016) and Joe and Oh (2018) find a spillover effect at credit rating announcements. When an affiliate experiences a credit rating downgrade, Kwon et al. (2016) observe that the other chaebol affiliates earn significant and negative abnormal returns. The authors note that affiliates with high credit ratings exhibit lower price drops. Joe and Oh (2018) find similar results and add that an increase in credit rating is associated with a positive spillover effect. They also observe a stronger spillover effect when the group leading firm announces rating changes. These results provide additional evidence for the existence of internal capital markets. The downgrade of an affiliate credit rating increases its dependency on the group support and reduces its contribution to the group internal capital market. Kwon et al. (2019) find a within group spillover effect of stock price crash. They observe that the crash risk of an affiliate is positively associated with the stock price crash of the other affiliates. Intragroup transactions tend to increase the spillover effect.

A substantial part of the chaebol literature focuses on the period surrounding the 1997 Asian financial crisis. The crisis provides an interesting setting to conduct empirical studies given the severity of the shock and the subsequent changes in the institutional framework. This crisis led to the collapse of several important chaebols and raised concerns about their financial resilience and performance. Kim and Lee (2003), Baek et al. (2004), and Bae et al. (2012) highlight the role of corporate governance in the crisis. Their results show that firms with weak corporate governance experienced a larger stock price decline than other firms. Some studies examine the effect of the crisis on the debt market. Despite the “no bail out” policy of the Korean government, Gormley et al. (2015) show that chaebol firms benefit from their affiliation and the “too big to fail” belief to access bond financing. Indeed, the authors observe that chaebol affiliates issued larger amounts of loans at a lower rate during the year 1998. Consistent with this study, Minetti and Yun (2015) find

that chaebol firms benefit from a better access to loan financing associated with their affiliation during the period from 1992 to 2004. However, the authors observe that such benefits tends to decline in the post-crisis period. The 1997 Asian financial crisis also led to substantial legal reforms aiming at improving the corporate governance quality. In 1999, the Korean government introduced a reform mandating large firms to appoint at least 50% of outside directors. Choi et al. (2007) observe a positive effect of outside directors on firm value. Using event study and difference-in-difference methodologies, Black and Kim (2012) find that firms affected by this reform experience positive returns at the announcement and an increase in value. Black et al. (2015) use this reform to examine the effect on tunneling through related party transactions. First, the authors observe a positive market reaction at the law announcement for firms exposed to a high risk of expropriations. This result suggests that investors expected an effective improvement in governance practice. Second, the authors find that the reform did not affect the volume of related party transactions but rather the pricing of these transactions.

Scholars also address the question of corporate governance outside of the Asian financial crisis period. Black et al. (2006) observe a positive relationship between corporate governance and firm value. Their study is based on a survey of Korean listed firms for the year 2001. The authors find a stronger relation between governance quality and value for chaebol firms. A number of scholars provide empirical evidence of tunneling and minority shareholder expropriations among chaebols. Bae et al. (2002) examine acquisitions conducted by chaebols between 1981 and 1997. They find that acquisitions benefit group controlling shareholders at the expense of affiliate minority shareholders. Indeed, the authors observe that acquisitions have a value-enhancing effect at the group level, but a value-destroying effect at the affiliate level. The results of the above-mentioned study by Black et al. (2015) suggest that the mispricing of related party transactions is used to transfer resources within business groups. Based on a sample covering the period from 1998 to 2014, Choi et al. (2020) highlight the role of central firms [12] in tunneling activities through unfair intragroup transactions. The authors observe that central firms are involved in more fraudulent intragroup trades than other chaebol affiliates. This result suggests that group controlling shareholders use central firms to extract benefits from other affiliated firms. The authors also show that the number of corporate frauds involving central firms decreased after a legal reform reducing

[12] Following Almeida et al. (2011), "central firms" refer to firms used by the group controlling shareholder to control other affiliated firms.

the power of central firms over other affiliates. Baek et al. (2006) find evidence of tunneling activities through the pricing of private security issuances. Based on data for the period from 1989 to 2000, the authors observe that the offering price is set to benefit the group controlling shareholders. A number of scholars also describe succession periods as prone to governance issues. Hwang and Kim (2016) show that the controlling families use related-party transactions to maintain their control over affiliated firms during succession periods. The results of Gam et al. (2020) suggest that sibling rivalries during successions alter firm performance. Finally, Shin (2020) observes that some group controlling shareholders use intragroup mergers to transfer control to heirs and avoid inheritance tax.

3. Motivation and organization of the thesis

3.1 Motivations

A substantial part of the finance literature is based on the Anglo-Saxon framework characterized by the common law system, efficient capital markets, and independent and widely held firms. However, several studies highlight substantial differences between this alleged framework and the reality in most countries. La Porta et al. (1999) show that concentrated ownership and the presence of controlling shareholders are prevalent in many countries contrasting with the assumption of widely held firms. The findings of Claessens et al. (2000) and Faccio and Lang (2002) support this observation and provide more detailed results for Asian and European countries respectively. Aminadav and Papaioannou (2020) observe, in an analysis covering 127 countries, the presence of non-controlling blockholders in numerous widely held firms. Masulis et al. (2011) note that a substantial part of firms belong to business groups in both developed and emerging markets, contradicting the alleged independence of firms. Recently, the topic of business groups and accumulation of power was revived by the emergence of large and powerful groups such as Google, Amazon, Meta (formerly Facebook), Apple, and Microsoft in the US (The Economist, 2021).

Korea is one of the most studied countries in the literature dedicated to business groups. The data availability and the role of business groups in the rapid industrialization of the country explain this interest. The economic development of Korea went hand-in-hand with the expansion and empowerment of large business groups. The longevity of the Korean chaebols challenges the

common belief that business groups are specifically adapted to underdeveloped economies. Indeed, chaebols showed the ability to adjust their structure and strategies to legal and economic changes. Since the 1980s, Korean business groups have to face a strict regulation and monitoring by the authorities. With the openness of the Korean market to foreign investors and products, chaebols had to enhance their competitiveness to face international competition. The 1997 Asian financial crisis marked a milestone in the history of chaebols. For the first time, the government did not bail out chaebols and let the most vulnerable collapse. The severity of this crisis and its consequences for the domestic economy also raised the public criticism towards chaebols and their owner families. The aftermath of the crisis saw the implementation of several reforms aiming to improve the governance and resilience of chaebols. This sudden shock combined with substantial changes in the legal framework raised the scholar interest in the Korean market and led to an abundant literature. Since this crisis, the Korean economy and corporate sector have experienced substantial changes. The 2000s saw the emergence of the "Korean wave" (or *hallyu* in Korean) referring to the popularity of Korean cultural products such as music (K-pop) and TV programs (K-drama) around the world. The Korean wave was associated with a growing soft power and a nation branding strategy that aimed to improve the image of Korea around the world (Kim, 2013b). In the meantime, a number of Korean companies emerged as world players in industries such as consumer electronics and automotive. Trade tensions between the US and China placed Korea as a privileged partner of Western countries to develop and secure supply chains (Wootson et al., 2022). Hence, a number Korean companies announced substantial investments in the US to build factories for production of electric vehicle batteries (Kang, 2022) and electronic components (Song, 2021). These recent changes offer new research opportunities and open a gap in the literature that remains mostly focused on the period of the 1997 Asian financial crisis.

3.2 Organization and contributions

This dissertation consists of three empirical studies contributing to several strands of the literature. The first study [13] investigates a phenomenon called the "Korea discount." When the Korean market opened to foreign investors after the 1997 Asian financial crisis, market observers reported the undervaluation of Korean stocks in comparison to their foreign peers. This

[13] The article "The Korea discount and chaebols" is published in the Pacific-Basin Finance Journal and co-written with Dušan Isakov.

phenomenon is often discussed among practitioners, but scholars paid little attention to it. This article fills this literature gap and provides the first empirical investigation of the Korea discount. Based on a comprehensive international sample, covering 28 countries over the period of 2002 to 2016, the empirical analysis confirms the existence of the Korea discount. This result is robust to the use of different benchmarks, as well as control for various country-level characteristics including macroeconomic factors, corporate governance, and country risk. The analysis shows that the intensity of the discount tends to decrease over time. The study also examines the role of chaebols in this phenomenon and shows that both chaebol and non-chaebol firms are discounted relative to foreign firms. This observation suggests that chaebol firms are not the direct cause of the undervaluation of the Korean market unlike a common belief. In addition to providing the first rigorous investigation of the Korea discount, this paper contributes to better understanding of the phenomenon. To tackle the Korea discount, authorities need to adopt market-wide policy and reforms.

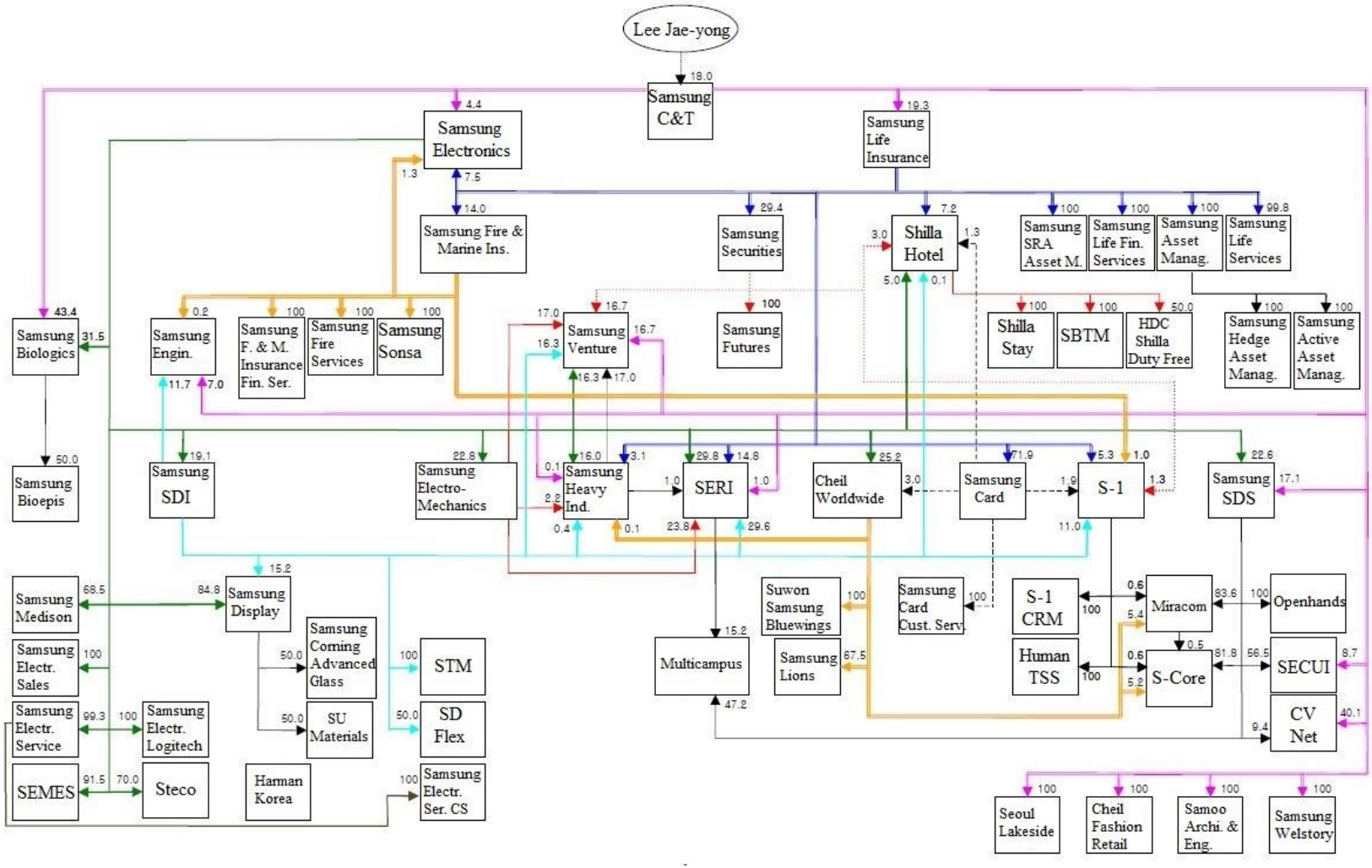
The second study contributes to the growing COVID-19 literature and extends the literature on chaebols and crisis starting with the 1997 Asian financial crisis. The empirical analysis exploits the uniqueness of the shock triggered by the COVID-19 pandemic to examine how investors perceive chaebol membership during a period of high uncertainty and economic downturn. The 1997 Asian financial crisis and the COVID-19 crisis differ substantially. Whereas the Asian financial crisis resulted from macroeconomic factors, the COVID-19 crisis originated from a health crisis. The rapid spread of the pandemic across Asia and the rest of the world forced the government to take unprecedented measures, deeply affecting firm functioning and revenue. The conditions of the Korean economy and corporate sector during these crises also differed. Indeed, the reforms undertaken during the last decades allowed the Korean institutions and firms to be more prepared and resilient to a strong economic downturn than they had been in the mid-1990s. The empirical approach distinguishes this study from the majority of prior works, which use accounting-based measures to estimate the value of affiliation. The stock price analysis used in this study allows documenting the changes in value as the crisis unfolded. During the first months of the pandemic, investors discounted affiliation with a business groups. This discount is explained by investors' concerns regarding governance and financial risks. However, the analysis reveals a switch in affiliation value during the market recovery. The affiliation discount turned into a premium, suggesting that state and central bank interventions dissipated investors' concerns. In addition, this

paper shows that investors perceive group internal capital markets as a substitute for internal liquidity and an additional source of funding in case of revenue shock. This study contributes to the business group literature by documenting the evolution of affiliation value as a crisis unfolds and the economic environment changes. The results of this stock price analysis complements prior works relying on accounting-based measures of firm value. The switch in the affiliation value highlights the volatility and time-sensitivity of the value effect estimation. Finally, this study also contributes to the literature on group internal capital markets by linking business group affiliation and the value of financial flexibility.

The third essay uses a novel identification strategy to examine the impact of chaebol affiliation on firm outcomes. This approach allows accounting for the heterogeneity in business group characteristics. On average, affiliation with a chaebol is associated with a higher firm value and a lower firm profitability relative to unaffiliated firms. However, the analysis reveals that the intensity of the performance effect of affiliation varies depending on chaebol characteristics such as size, diversification, and leverage. The homogeneity in the performance effect contrasts with the effect on corporate policies. The analysis of corporate policies indicates that a number of chaebols conduct group-level strategies that differ across chaebols. This study contributes to the chaebol literature. First, it extends prior works on the performance effect of chaebol affiliation by documenting a subsequent period. Second, the analysis of corporate policies provides an empirical evidence of the high level of control centralization among chaebols as some groups tend to apply homogeneous financial and investment policies to their affiliates. This essay also provides some recommendations for researchers. As group characteristics are reflected in firm outcomes, business groups should not be considered as homogeneous entities. Consequently, researchers should avoid using a single dummy variable to estimate the effect of affiliation. Indeed, such models fail to accurately estimate the affiliation effect in the presence of heterogeneous business groups. Estimating the performance effect of affiliation requires accounting for group characteristics, while group influence must be considered in analyses of affiliate policies.

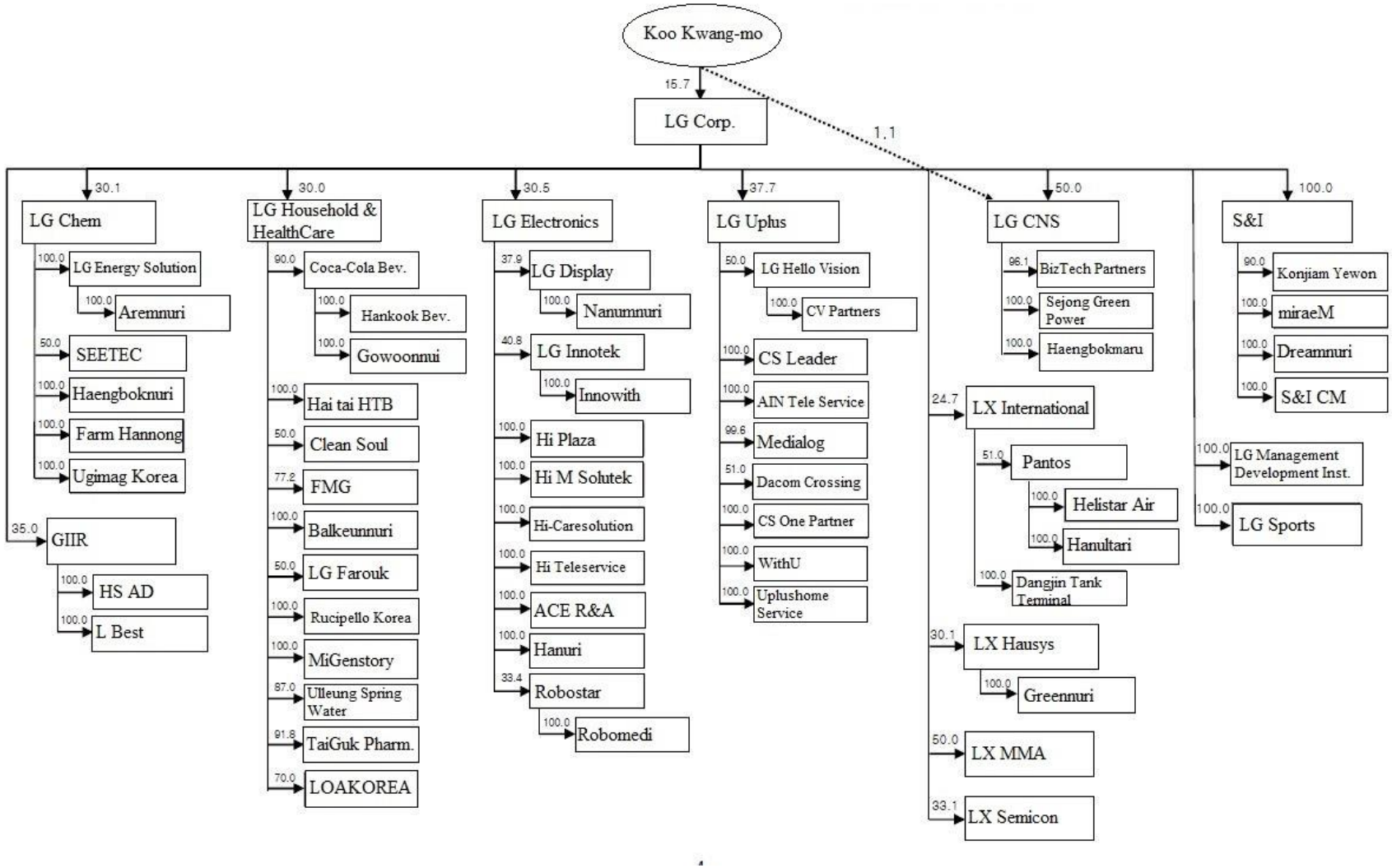
Appendices

Appendix 1 Ownership map of Samsung (2021)



Source: KFTC translated by the author.

Appendix 2 Ownership map of LG (2021)



Source: KFTC translated by the author.

Chapter 1

The Korea discount and chaebols♣

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Abstract

Finance practitioners frequently claim that stocks of Korean firms are undervalued and trade at a discount relative to foreign firms. This phenomenon is commonly called "the Korea discount". It is based on anecdotal evidence comparing either the price-earnings ratios of different market indexes or those of different individual stocks. This paper provides empirical evidence on the existence of such a discount using a large sample of stocks from 28 countries over the period 2002-2016. We find that Korean stocks have significantly lower price-earnings ratios than their global peers. We also investigate the role of large business groups called chaebols, which are often considered to be the main cause of the discount because of their poor corporate governance. Our findings show that it is not the case.

♣ We thank an anonymous referee and the seminar participants at the Paris Financial Management Conference and the Accounting and Finance doctoral seminar of the University of Fribourg for their helpful comments and suggestions. We are responsible for all remaining errors.

1. Introduction

Finance practitioners frequently claim that stocks of Korean firms are undervalued and trade at a discount relatively to comparable foreign firms. They call this phenomenon "the Korea discount". This term first appeared in Korea in the aftermath of the 1997 Asian financial crisis but quickly became global when Korea opened its stock market to foreign investors at the turn of the century as this increased the general interest for this market. [14] The Korea discount refers to a lower price-earnings (PE) ratio of Korean stocks relative to their global peers (OECD, 2018, p. 75). The evidence on the existence of this discount is usually obtained either by comparing the level of the PE ratio of a Korean market index (e. g. Noble (2010)) with the PE ratio of an international index or the PE ratio of some Korean firms (e. g. The Wall Street Journal Asia (2007)) with the PE ratio of foreign peers. However, these comparisons offer only anecdotal evidence and a systematic analysis is necessary to be able to conclude that Korean stocks really trade at a discount. Surprisingly, despite the interest of practitioners and its recurrence in the financial press, this question has not been addressed in the academic literature so far. Our paper fills this gap and provides a detailed empirical research on a large sample of international stocks over the period 2002-2016. We report the presence of a significant discount over this period. Korean stocks have PE ratios that are, on average, lower by 30% than their foreign peers.

Our analysis uses firm-level data and includes firms from 28 countries for the period 2002-2016. The total sample contains 25,863 unique firms and 162,495 firm-year observations. We measure the presence of the Korea discount using three different approaches. Two of them aggregate stocks into portfolios and provide results supporting anecdotal evidence reported by market observers. A third approach is based on individual stocks. The latter offers a finer view on the presence of the discount as the grouping of stocks into portfolios can eventually hide some differences in valuation ratios. It also offers the possibility to control for firm specific parameters. The results of all three approaches converge in terms of both forward and trailing earnings valuation ratios and document the presence of a significant discount for Korean stocks. In addition to providing a statistical support to practitioner observations, our approach also allows us to document the evolution of the discount over time as well as with respect to different reference countries. We notably find that there is a decline of the Korea discount over time. Our

[14] The 1997 Asian crisis and international bail-out of Korea forced the country to reform corporates and financial markets. Since 1998, most of restriction on foreign equity investment have been removed (Eichengreen et al., 2015, p. 100).

results also suggest that the Korea discount is a pervasive phenomenon that affects most Korean industries relative to their foreign counterparts, no matter if these foreign firms are from emerging or developed markets

The financial press and analysts of the Korean market offer different potential explanations for the presence of the discount. These include tensions with North Korea, social and political risks, or poor corporate governance. However, numerous observers attribute the main cause of the discount to the presence of chaebols (The Economist (2012); OECD (2018) , p. 75). A second objective of this paper is to investigate the role played by these large business groups in the Korean discount. Chaebols are often criticized for their poor governance and the misbehavior of their controlling families (The Economist (2012); Choi et al. (2018)). The governance and risk of expropriation might cause the discount observed at a market level if investors discount firms affiliated to a chaebol for these reasons. If this explanation is valid, we should only observe a discount for firms affiliated to a chaebol. Our results do not support this hypothesis since both chaebol and non-chaebol firms exhibit a significant discount. Moreover, we find that firms affiliated to a chaebol have a lower discount than other Korean firms. This could be due to the gain in international reputation and visibility of some chaebol firms which may have led investors to consider affiliated firms differently from less known Korean firms. This result is also consistent with an alternative explanation, less discussed in the context of the Korea discount, which is related to the substantial economic power that chaebols have accumulated over time. Indeed, policymakers and international organizations point out the negative effect of the dominance of chaebols on competition and competitiveness of other firms typically small and medium-sized enterprises (SMEs) and startups (OECD, 2018, p. 74). The lower valuations of non-affiliated firms could therefore simply reflect the fact that these firms are harmed by the presence of chaebols.

The paper contributes to the literature in the following ways. First, we identify and document extensively the presence of the Korea discount at the market, industry and individual firm levels. This is an important issue for Korean financial markets that has not been addressed previously in the academic literature. Second, we analyze the role played by chaebols in the discount and find that they are not directly responsible for the lower valuation of Korean stocks. Their role seems to be different from what most observers expect.

The rest of this paper is organized as follows: Section 2 describes the data and the different variables used in the analysis while Section 3 provides empirical results documenting the presence of the Korea discount using different approaches. It also investigates the robustness of the results to a possible omitted variable bias and to the use of alternative valuation ratios.

Section 4 investigates the role played by chaebols in the valuation of Korean firms. Section 5 summarizes the major findings and concludes the paper.

2. Data

This study uses firm-level data to provide a detailed analysis of the Korea discount. We obtain data from three sources: Thomson Reuters Datastream (Datastream), Worldscope, and Institutional Brokers' Estimate System (I\B\E\S). As Karolyi and Kim (2017), we use a number of filters on Datastream to build our sample. [15] Our final sample includes publicly listed firms from 28 markets [16] covering all continents and both emerging and developed markets. For different tests, countries are also grouped in three geographical areas: Asia-Pacific, emerging markets, and developed markets (based on MSCI classification). Note that Korea is excluded from sub-samples to avoid overlapping issues. We use these three groups of countries to estimate the Korea discount to check the robustness of the discount with respect to different countries of reference. For instance, the discount might only exist with respect to one group of countries which would imply that the discount is not only a Korean phenomenon, but a more general problem. Our sample covers the time period from 2002 to 2016. Our goal is also to analyze the evolution of the discount over time and to document any change. We specifically isolate the global financial crisis to document if there was a difference during this specific episode. We therefore divide the sample into three sub-periods, namely the pre-crisis (2002-2006), crisis (2007-2009), and post-crisis (2010-2016) periods. After deletion of observations with missing data, the final sample contains 25,863 unique firms for 162,495 firm-year observations.

Table 2 shows the number of firms from each country included in our sample as well as their evolution over time. We observe that the coverage of firms from developed markets remains fairly stable over time while the number of firms from emerging market and Asia-Pacific has increased. The data on both historical and forecasted earnings are obtained from the I\B\E\S database covering a large number of countries and firms. This data is also widely used by practitioners.

[15] The following filters are used in DFO navigator: category (Equities), market, currency (local currency), type (Equity), security (Major), and quote (Primary). For some countries, firms that are not listed on a domestic exchange are excluded. Dead and active securities are kept in order to avoid survivor bias.

[16] The sample includes Australia, Austria, Belgium, Brazil, Canada, Chile, France, Germany, Hong-Kong, India, Indonesia, Israel, Italy, Japan, Korea, Malaysia, Netherland, New Zealand, Philippines, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, United Kingdom, and US. We do not include China due to the valuation issue regarding different classes of shares.

Table 2 Sample description

	2002	2004	2006	2008	2010	2012	2014	2016
Australia	304	359	438	460	491	521	592	561
Austria	31	28	38	46	38	36	38	37
Belgium	81	79	88	92	82	78	79	80
Brazil	14	11	45	101	108	126	129	108
Canada	364	524	679	663	705	759	727	642
Chile	19	16	19	16	37	35	30	35
France	334	311	383	400	369	371	361	401
Germany	734	558	710	865	794	767	729	699
Hong-Kong	207	272	300	349	399	409	486	427
India	83	145	372	419	616	685	696	664
Indonesia	69	71	77	84	92	127	137	132
Israel	18	24	19	28	31	33	35	38
Italy	143	148	181	181	182	175	168	181
Japan	1447	1156	1300	1156	1087	1021	1232	1290
Korea	294	162	225	178	171	324	521	619
Malaysia	201	228	285	335	273	245	269	253
Netherland	114	94	100	93	87	80	79	82
New-Zealand	48	56	63	64	57	58	78	80
Philippines	43	26	40	46	46	59	72	69
Singapore	144	197	212	202	166	167	181	170
South Africa	137	100	126	134	145	133	125	126
Spain	101	98	100	108	107	100	90	90
Sweden	147	130	156	173	224	254	208	257
Switzerland	152	139	159	166	162	153	146	151
Taiwan	201	183	259	205	304	347	492	491
Thailand	125	202	211	148	143	154	191	207
UK	793	837	989	1003	960	954	954	914
US	2894	3086	3197	3098	3052	3107	3363	3298
Asia-Pacific	2872	2895	3557	3468	3674	3793	4426	4344
Emerging markets	910	1006	1453	1516	1764	1911	2141	2085
Developed markets	8038	8072	9093	9119	8993	9043	9546	9398
Full sample	9242	9240	10771	10813	10928	11278	12208	12102

The table provides the number of firm-year observations per country and geographical areas for even-numbered years. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issues. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. The full sample consists in 162,495 firm-year observations (25,863 unique firms).

As the Korea discount is generally defined in terms of PE ratio (see Appendix 3), we essentially consider the PE ratio in our analysis. Moreover, this ratio is very important for analysts as they essentially support their stock recommendation (Brown et al., 2015) with this measure. [17] Finally, investors primarily use this ratio to assess the possible under/over-valuation of a stock. Even though the anecdotal evidence on the Korean discount is mostly based on

[17] According to a survey conducted by Brown et al. (2015), analysts use mostly the price-earnings and price-earnings-growth ratios. 61.33% of the respondents claim to use these ratios very often. This result is consistent with the finding of the survey of Block (1999).

forward valuation (see Appendix 3), we analyze both 12 months trailing and 12 months forward earnings valuation ratios. The former refers to realized earnings, whereas the latter is based on the expected earnings (Welch, 2009, p. 47). The trailing ratio corresponds to a realized or historical perspective, whereas forward valuation has a prospective dimension. From an investor point-of-view, the trailing ratio may be interpreted as how the market values the current/realized performance, whereas the forward valuation reflects more market expectations. The results might therefore be different for the two measures. For each firm, we collect the 12 months trailing earnings per share (item EPS1TR12) and forward earnings per share (item EPS1FD12) measured at year-end. Both are expressed in local currency. We also collect the year-end price (item IBP) expressed in local currency, and number of outstanding shares (item IBNOSH). From Worldscope, we collect the market capitalization in local currency (item 08001) and the market capitalization expressed in US dollars (item 07210). We use the Industry Classification benchmark (ICB) provided by FTSE Russell as industry classification. For each firm, we collect industry (item ICBIC), and sector (item ICBSC) level data.

The tests in Section 4 require information relative to the affiliation to chaebols for Korean firms. To determine whether Korean firms are affiliated or not to a chaebol, we use the Korean Fair Trade Commission (KFTC) classification. This is a common practice in the literature (see for instance Black et al. (2015); Hwang and Kim (2016); Kim et al. (2019)). We consider as a chaebol firms, firms that are affiliated to one of the 30 largest business groups as classified by the KFTC. Authors working in this area motivate the choice of analyzing separately affiliation to one of the 30 largest chaebols by their economic power, higher diversification, and difference in capital and ownership structure (Bae et al., 2002). With this definition, on average, 27.1% of the Korean firms included in our sample are considered as being affiliated to a chaebol. They represent 67.6% of the total market value of the Korean market.

3. Estimation of the Korea discount

This section presents estimates of the Korea discount. We first provide statistical evidence of the existence of this phenomenon. Second, we analyze the evolution of the Korea discount over time. We also investigate if Korea discount is a market-wide or industry-specific phenomenon. Our analysis is performed with three different approaches. The two first approaches are based on the valuation of portfolios. First, we use market-wide portfolios (market portfolio approach hereafter) to replicate the comparison of country indexes as it is

usually done in financial press to illustrate the Korea discount. However, the main drawback of the market portfolio approach is the lack of time-series observations, which does not allow to analyze statistically the differences between two portfolios. To address this issue and conduct a more rigorous analysis, we build portfolios containing stocks of the same country and industry and compute their PE ratio (industry portfolio approach hereafter). The industry portfolio approach allows the analysis of differences in the level of the Korea discount across industries and its evolution over time. The third empirical approach is based on the PE of individual firms (individual stock approach hereafter). This approach allows controlling for firm-level characteristics. It also offers a finer view on the presence of the discount as the grouping of stocks into portfolios can eventually hide some differences in valuation ratios.

3.1. Market portfolio approach

We first replicate the results obtained with market indexes by analysts and journalists to illustrate the Korea discount phenomenon. To do so, we use a methodology inspired by the MSCI methodology (MSCI, 2019) to compute market-level portfolio valuation. The market-level PE ratio is computed as the ratio between the year-end sum of market capitalizations in USD divided by the sum of total earnings (forward or trailing) in USD. [18] This measure of market-level value can be interpreted as an aggregated and value weighted measure.

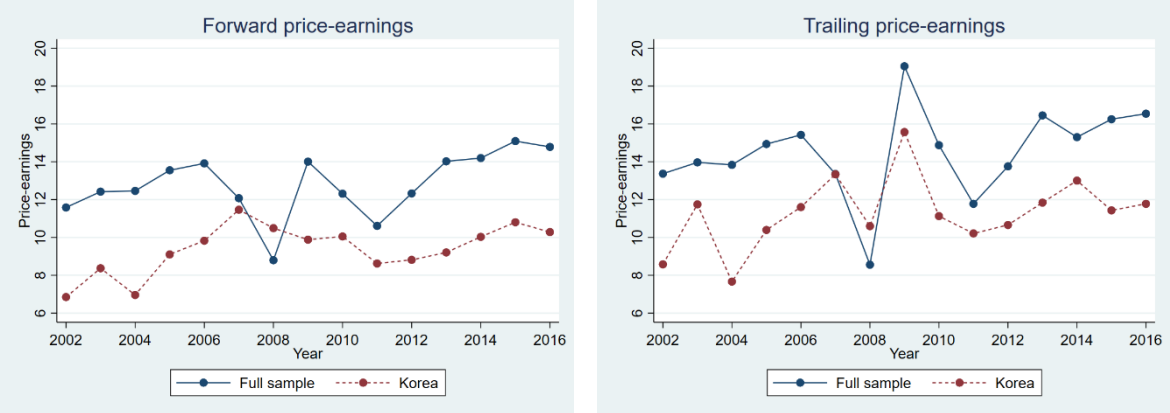
Figure 3 presents evolution of forward (left hand figure) and trailing (right hand figure) PE ratio of Korea (dotted red line) and the full sample (blue line). Consistent with practitioners' anecdotal evidence, we observe the lower valuation level of the Korean market relative to the full sample both in terms of trailing and forward PE ratios. The only exception is the worst year of financial crisis (2008) when the valuation of the Korean market exceeded the valuation of other markets. The quick recovery of Korean economy can explain this phenomenon. Over the full period, we observe an upward trend for the valuation of the Korean market and a decline in valuation difference.

[18] Formally, the PE ratio of an index composed of N stocks is computed as (MSCI, 2019, p. 47):

$$PE = \frac{\sum_{i=1}^{N} P_i * Share_i * \frac{1}{FX_i}}{\sum_{i=1}^{N} EPS_i * Share_i * \frac{1}{FX_i}}$$

in which, P_i is the year-end share price of firm i, EPS_i is the earning-per-share (forward or trailing) of firm i, $Share_i$ is the number of shares outstanding by firm i, and FX is the exchange rate between the currency of firm i and USD. All PEs are measured in USD except for Korea.

Figure 3 Evolution of price-earnings ratios over time



The figure presents the evolution of forward (left hand figure) and trailing (right hand figure) price-earnings ratios for the full sample (blue line) and Korea (red dotted line) portfolios. The measure of market valuation follows the MSCI methodology (MSCI, 2019) and is computed as

$$PE = \frac{\sum_{i=1}^{N} P_i * Share_i * \frac{1}{FX_i}}{\sum_{i=1}^{N} EPS_i * Share_i * \frac{1}{FX_i}}$$

in which, P_i is the year-end share price of firm i, EPS_i is the earning-per-share (forward or trailing) of firm i, $Share_i$ is the number of shares outstanding by firm i, and FX_i is the exchange rate between the currency of firm i and USD. The Korea portfolio is weighted using relative market capitalization in KRW. Full sample portfolio is weighted using market capitalization in USD. The full sample includes 162,495 firm-year observations (25,863 unique firms).

Table 3 presents mean valuation ratios for the full sample length (2002-2016) and for three different sub-periods. The average valuations obtained for the different periods confirm the observations based on Figure 3. For all sub-periods, Korean market exhibits a lower valuation than the full sample as well as other geographical areas. This observation is valid for both forward and trailing ratios, even though we find slightly smaller differences when valuation is compared in terms of trailing ratio. We also find that the difference in valuation depends on the geographical area used as benchmark. For instance, the difference in valuation between Korean market and emerging markets is lower than the difference with developed market. The industry portfolio and individual stocks analysis in the following subsections confirm these observations.

Consistent with anecdotal evidence from practitioners and the financial press, this first analysis based on the market portfolio approach reveals a lower valuation ratio of Korean market relative to other markets. Except during the global financial crisis, the difference in valuation is observed during the full period under review (2002-2016) and relative to different benchmarks. Our analysis also confirms that the Korea discount is not due to index construction or valuation methodology used by index providers. If the market portfolio approach has the advantage of being close to practitioners' practices, a major drawback is the impossibility to test

statistically the existence of the Korea discount because of the modest number of observation points available.

Table 3 Price-earnings ratios of market portfolios

	2002-16	2002-06	2007-09	2010-16
Panel A: Forward price-earnings				
Full sample	12.81	12.79	11.63	13.34
Korea	9.38	8.22	10.61	9.69
Developed markets	12.82	12.80	11.62	13.34
Emerging markets	11.97	10.74	11.90	12.88
Asia-Pacific	13.21	15.19	11.97	12.32
Panel B: Trailing price-earnings				
Full sample	14.50	14.31	13.65	14.99
Korea	11.30	10.00	13.17	11.44
Developed markets	14.50	14.32	13.65	14.99
Emerging markets	13.96	12.50	13.97	14.99
Asia-Pacific	16.16	18.64	14.39	15.15

The table presents mean forward (Panel A) and trailing (Panel B) price-earnings ratios for the full sample length and three sub-periods. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. The full sample consists in 162,495 firm-year observations (25,863 unique firms).

3.2 Industry portfolio approach

To address the issue of the lack of observations present in the market portfolio analysis but nevertheless keeping an aggregate data approach, we develop an industry by country-level analysis. This industry portfolio approach allows using pooled regression to estimate the Korea discount. In addition, through cross-section and time series estimations, this approach allows a finer analysis of the phenomenon by documenting its evolution over time and presence across industries. A difference between market and industry portfolio approaches is the weighting of each industry. In the market portfolio approach, each industry is value-weighted at the country-level, whereas industries are equally weighted in the case of industry portfolio approach. Another difference between the market and industry portfolio approaches is the effect of exchange rates. Indeed, in the case of market portfolios, valuation is expressed in USD, whereas industry by country portfolios valuation ratios are computed in local currency.

Instead of sorting firms by geographical area as in the market portfolio approach, we sort firms by industry and then by country. The valuation of the industry by country annual portfolios is computed using the same methodology as for market portfolios. However, a drawback of industry portfolio approach is the limited number of firms in some industries

making the estimation of country-level value sensitive to some outliers. To mitigate this issue, we winsorize the portfolios at the 1 and 99 percent levels. The estimate of the Korea discount is then obtained using industry portfolio-level pooled regression. The baseline model corresponds to equation (1)

$$PE_{c,k,t} = \alpha_0 + \delta_1 \, Korea + \delta_{2,k} \, Industry + \delta_{3,t} \, Year + \varepsilon_{c,k,t} \quad (1)$$

where the PE ratio of portfolio for industry *k* in country *c* in year *t* is regressed on a Korea indicator, a dummy variable equal to one in the firm is from Korea. The regression also includes an industry (ICB industry-level) and year fixed effects. Since our analysis has a time-series dimension, the inclusion of year dummies allows controlling for macroeconomic trend. The coefficient δ_1 measures the difference in PE ratios between Korean portfolios and benchmark portfolios (other countries) after controlling for industry and fixed effects.

Table 4 presents the results of different estimations of equation (1). In Panel A, the Korea discount is estimated relative to different geographical benchmarks (group of countries). The goal of this analysis is to check if the Korea discount appears only relative to a certain type of countries. We report that, regardless of the benchmark, the coefficients of the Korea indicator is negative and highly significant meaning that, on average, the Korean market is discounted relative to other markets. However, we find some differences in terms of magnitude depending on the benchmark group of countries used. Reported to the sample mean [19], the Korean market is discounted by 30.90% relative to developed markets, whereas the discount relative to other emerging markets is 25.64%. [20] The difference in discount magnitude depending on benchmark are consistent with observations made in the market portfolio approach (in Table 3). In Panel B, we estimate the Korea discount on the three sub-periods corresponding to pre-crisis, crisis, and post-crisis periods. The results of the industry portfolio approach confirm the decline in magnitude observed in the market portfolio approach. We observe the smallest Korea discount during the global financial crisis period which is consistent with our previous observations. The results for trailing ratios are provided in Appendix 4 and reveal some slight differences with results for forward earnings. We find that the discount relative to Asia-Pacific markets is larger than the discount relative to developed markets, whereas the discount for crisis-period is higher than the discount for post-crisis period. Results of Table 4 and Appendix 4 support the existence

[19] The mean is computed based on the sample of countries used as benchmark excluding Korea.
[20] The discount relative to the full sample is 29.29% and relative to other Asia-Pacific is 27.91%.

of a Korea discount which is robust to markets used as benchmark as well as to the periods studied.

Table 4 Estimation of the Korea discount for industry portfolio approach (forward PE)

	(1)	(2)	(3)	(4)
Panel A: Forward price-earnings by geographical benchmark				
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Constant	13.681***	9.763***	15.416***	12.441***
	(0.842)	(1.329)	(0.706)	(1.390)
Korea	-4.228***	-3.490***	-4.591***	-3.928***
	(0.288)	(0.483)	(0.325)	(0.407)
Observations	4412	1600	2971	1915
Adjusted R-squared	0.185	0.266	0.210	0.249
Panel B: Forward price-earnings by sub-periods				
	2002-16	2002-06	2007-09	2010-16
Constant	13.681***	15.090***	15.283***	14.693***
	(0.842)	(1.040)	(0.741)	(0.682)
Korea	-4.228***	-6.075***	-2.800***	-3.512***
	(0.288)	(0.516)	(0.344)	(0.265)
Observations	4412	1427	885	2100
Adjusted R-squared	0.185	0.168	0.190	0.208

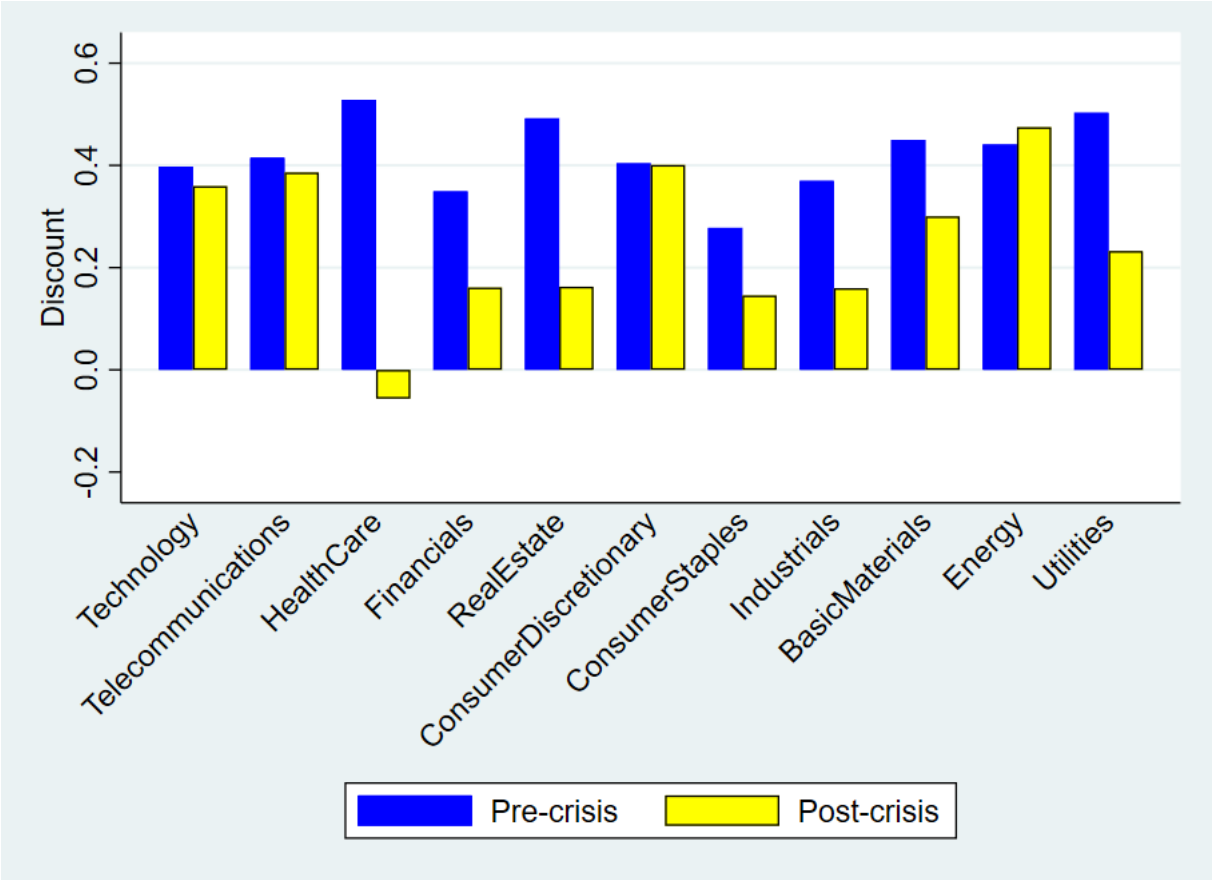
*The table presents the results of the estimation of the Korea discount using industry portfolio approach based on equation (1). Dependent variables are 12 months forward price-earnings ratio. In Panel A, regressions are run on the full sample length (2002-2016) on different geographical benchmark. In column (1), all countries are included. Columns (2), (3), and (4) show results when only emerging markets, developed markets and Asia-Pacific countries are used as benchmark. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In Panel B, the sample is divided in sub-periods corresponding to pre-crisis (column (2)), crisis (column (3)), and post-crisis (column (4)) periods. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Differences in industrial structure between countries can possibly bias the interpretation based on valuation of market index since valuation levels differ from an industry to another. In addition, the Korea discount may be an industry specific rather than market-wide phenomenon. Typically, the financial press illustrates the Korea discount with market-level valuations. Such comparisons do not allow identifying potential industry effects. To investigate the discount at the industry-level, we use an interaction term between the Korea indicator and industry variable. Coefficients of interaction terms provide industry-level Korea discount estimates. Figure 4 illustrates industry-level discount estimates for pre- and post-crisis periods. [21] To ease the

[21] The mean is computed for each industry based on the full sample length and countries excluding Korea.

reading, the discount is expressed in positive value and as percentage of the mean industry valuation.

Figure 4 Pre- and post-crisis Korea discount per industry



The figure presents the Korea discount by industry for pre-crisis (blue bar) and post-crisis (red bar) periods estimated using the industry portfolio approach and forward price-earnings ratio as dependent variable. Estimation is based on the following equation

$$PF_{c,k,t} = \alpha_0 + \delta_1 \, Korea * Industry + \delta_{2,k} \, Industry + \delta_{3,t} \, Year + \varepsilon_{c,k,t}$$

In which, the PE ratio of the portfolio for industry k of country c at time t is regressed on an interaction between Korea dummy and industry indicators. Regression includes year and industry (ICB industry-level) fixed effects. Portfolio PE are winsorized at 1 and 99 percent level. The sample is composed of 4412 industry-country-year portfolios.

In the pre-crisis period (dark bars), all industries are significantly discounted relative to similar industries in other countries. The magnitude of the discount ranges from 27.78% for consumer staples (ICB 45) to 52.83% in health care industry (ICB 20). In the post-crisis period (light bars), all industries remain discounted except health care industry exhibiting a non-significant premium. Consistent with previous observations, we also note a decline in magnitude of the discount in all industries except for the energy industry. However, this decline differs from an industry to another. The largest differences are observed for health care (ICB

20), financial (ICB 30), consumer staples (ICB 45), and industrial (ICB 50) firms. On the other hand, the discounts affecting technological (ICB 10), telecommunication (ICB 15), and consumer discretionary (ICB 40) firms remain stable. Industry-level analysis reveals that the Korea discount phenomenon affects all industries and is not due to the misvaluation of a specific industry. The analysis also provides an additional evidence of the decline of the Korea discount overtime.

While the market portfolio approach allows to replicate and confirm the results put forward by practitioners and media, the industry portfolio approach provides a strong statistical support to the existence of the Korea discount. Consistent with the observations made in Subsection 3.1, we find that the discount is statistically robust to the geographical area used as benchmark. We also find evidence of the persistence of the phenomenon even though the magnitude of the Korea discount decreases over time. Finally, our results show that the phenomenon is widely spread across Korean industries.

3.3 Individual stock approach

In this part of the analysis, we fully exploit the depth of the firm-level sample to address the issues related to the identification based on aggregated data. The identification strategy is based on pooled regression including a set of controls for size, time, and industry controls. Controlling for time, industry and size allows measuring a clean discount. To capture and measure the Korea discount, we add an indicator variable for Korean firms. The baseline model is given by equation (2).

$$EP_{i,t} = \alpha_0 + \delta_1 \, Korea + \delta_2 Size + \delta_3 \, Industry + \delta_{4,t} \, Year + \varepsilon_{i,t} \qquad (2)$$

where the earnings-to-price (EP) ratio of firm i at time t is regressed on the Korea indicator and the set of controls. Industry is controlled at an ICB sector-level. As control for size, we classify firms into deciles by relative market value at country-level. We then create dummy variables for each size decile. This measure has the advantages to be independent of exchange rates and to take into account differences in terms of size between markets. As a robustness check, we use the market value in USD as a control for size instead of decile size dummies. Estimation of the Korea discount does not change significantly (see Appendix 5).

Ideally, our study should analyze PE ratios as they are the standard measure used to document the Korea discount. However, one of the drawbacks of the PE ratio is that this metric becomes meaningless for firms generating negative earnings (Palepu et al., 2016, p. 313). In

addition, this measure presents a discontinuity around zero earnings. Indeed, the ratio switches from an infinitely positive value to an infinitely negative value when earnings turn negative (Welch, 2009, pp. 512-513). This specificity may generate several issues for empirical analyses involving individual stocks. [22] The non-linearity of the ratio (dependent variable) makes OLS inference difficult. For a given share price, two firms with extreme loss/gain have close PE despite of large differences in terms of earnings. On the other hand, the difference of ratios between two firms generating a small loss/gain is large. In addition, excluding firms with negative PE ratio may bias results since poor performing firms (in terms of earnings) are systematically excluded (Welch, 2009, p. 514). This is especially relevant considering that our sample includes the global financial crisis period and is likely to include a larger proportion of firms generating losses. For these reasons, as other authors do, we prefer to use the EP ratio instead of PE ratio. [23] Also called earning yield, EP ratio at a firm-level is computed as the earnings per share (forward or trailing) divided by the year-end share price. This ratio allows having a measure continuous through zero. This transformation implies to invert the interpretation of ratio as well. High EP ratio means low valuation and low EP denotes high firm valuation.

Table 5 presents results for individual stock approach. Since the dependent variable is earnings-to-price ratio instead of price-earnings, a positive coefficient on Korea dummy indicates a discount. As for the industry portfolio approach, we first test the robustness of the Korea discount relative to different geographical areas. Results are presented in Panel A and reveals a significant discount regardless the geographical area used as benchmark. Results are qualitatively consistent with the results obtained for the industry portfolio approach. The strongest discount appears when Korean firms are compared with developed market firms, whereas the discount relative to other emerging market firms is the smallest. A quantitative comparison of results is more difficult since weighting schemes of both approaches are not the same. Firms are value weighted in portfolio approaches, whereas they are equally weighted in pooled regressions. In addition, the individual stock approach includes controls for firm size. Results for trailing earnings ratio presented in the Appendix 6 are consistent except for the discount relative to emerging markets firms that becomes insignificant.

[22] Note that these problems are less severe or non-existent for portfolios, which justifies the use of PE for the market and portfolio approaches.
[23] See Beaver and Morse (1978), Ou and Penman (1989) and Penman (1996).

Table 5 Estimation of the Korea discount for individual stock approach (forward EP)

	(1)	(2)	(3)	(4)
Panel A: Forward earnings-to-price by geographical benchmark				
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Constant	0.008	0.208***	-0.014	0.177***
	(0.021)	(0.057)	(0.021)	(0.049)
Korea	0.066***	0.028***	0.074***	0.043***
	(0.005)	(0.006)	(0.005)	(0.006)
Observations	162495	28346	138773	58978
Adjusted R-squared	0.004	0.001	0.007	0.003
Panel B: Forward earnings-to-price by sub-periods				
	2002-16	2002-06	2007-09	2010-16
Constant	0.008	0.020	0.036	0.014
	(0.021)	(0.024)	(0.024)	(0.033)
Korea	0.066***	0.095***	0.051***	0.058***
	(0.005)	(0.008)	(0.007)	(0.007)
Observations	162495	48088	32879	81528
Adjusted R-squared	0.004	0.008	0.008	0.004

*The table presents the results for the individual stock approach corresponding to equation (2). Dependent variables are 12 months forward earnings-to-price ratio. In Panel A, regressions are run on the full sample length (2002-2016) sorted by geographical area. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In Panel B, the sample is divided in sub-periods corresponding to pre-crisis (column (2)), crisis (column (3)), and post-crisis (column (4)) periods. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Panel B of Table 5 presents the results for the evolution of the Korea discount over time. The decline in the discount between pre- and post-crisis periods observed in the portfolio approach is confirmed by the individual stock analysis. We also observe a lower discount during the financial crisis period. The results are similar for trailing valuation ratio (see Appendix 6). The decline of Korea discount may find an explanation in the development and reforms undertaken since the previous financial crisis in Korea. The 1997 Asian crisis triggered reforms in Korea aiming to improve internal and external corporate governance mechanisms (Claessens and Yurtoglu, 2013) as well as the financial situation of firms (Eichengreen et al., 2015, p. 95). In addition, the depreciation of the Korean won and fiscal response stimulated exports and domestic demand. As a result, Korea experienced a quick recovery after the 2008 financial crisis proving its resilience and the ability of authorities to answer crisis (OECD (2010); BOK (2016); The Economist (2020)). The upgrade of South Korea from emerging to developed country by FTSE in September 2009 is another illustration of the development and the economic strength of the country during the 2000s (Woods, 2013).

Finally, we compute industry-discount using an interaction between Korea indicator and industry dummies (at industry classification level). Results are provided in Appendix 7 and tend to confirm observations of Figure 4 suggesting that the Korea discount is a widespread rather than being limited to some industries.

The individual stock approach provides results consistent with those obtained for the market and industry portfolio approaches. They confirm the statistical robustness of the existence of the Korea discount even after accounting for size and industry effects. In addition, the results for the individual stock approach also document a decline over time of the level of the discount which has been observed in previous analyses. Finally, the Korea discount appears to be a market-wide phenomenon since most of Korean industries exhibit a discount relative with their global peers. If the results of different empirical approaches converge in terms of interpretation, they have their own specificity that does not allow comparing them quantitatively. Indeed, the weights of firms, industry, and country differ from an approach to another. In the market portfolio approach, countries and firms are value weighted. In addition, this approach takes into account the effects of exchange rate. In the industry portfolio approach, firms are value weighted within industries, but industries and countries are equally weighted. The individual stock approach attributes the same weight to all firms. The fact that the results converge qualitatively despite these differences indicates that the discount is a robust phenomenon affecting all Korean firms.

3.4 The Korea discount and country-specific characteristics

As the discount appears to be a pervasive phenomenon across Korean firms, it might be due to some country-specific characteristics. Market observers and practitioners provide different explanations regarding the cause of the phenomenon. Among them, the general level of corporate governance and poor shareholder protection are often cited as potential causes. In their survey on corporate governance in emerging markets, Claessens and Yurtoglu (2013) emphasize the importance of the general firm environment such as the legal framework, the level of financial development or macroeconomic conditions. They suggest that it is more appropriate to consider country-level characteristics to conduct comparative studies than to consider firm-specific variables. We therefore estimate the Korea discount by including country-level variables that reflect four possible types of explanations. We consider the quality of corporate governance, the level of financial development, general macroeconomic conditions

and country risk. Country differences between one of these dimensions could potentially explain the presence of the discount.

To control for corporate governance, we include a set of dummy variables reflecting the origin of the legal system. Porta et al. (1998) document a link between the type of legal system of a country and shareholder protection. Korea has a German inspired legal system offering a better shareholder protection than the French legal system, but less protection than common law countries. In addition, we add the minority shareholder protection score provided by the World Bank (WB). This score is part of the Doing business report published annually by the WB. To control for the development of financial markets, we use the relative market size measured by the total market capitalization of domestic firms expressed as the percentage of the GDP and the score of financial market development published by the World Economic Forum (WEF) and which is part of the Global Competitiveness score. We control for macroeconomic and financial conditions by including variables representing economic growth and stock market returns. The former is computed as the annual change in GDP per capita in local currency and the latter is measured as the annual returns on the country Datastream total market index. Finally, we also test a model controlling for financial risk based on the country risk score developed by The Economist Intelligence Unit. This score accounts for sovereign risk, currency risk and banking sector risk. Accounting for financial risk and vulnerability is important given that this kind of risk was at the origin of the 1997 Asian financial crisis that hit Korea (Eichengreen et al., 2015, p. 110). As the availability of data is limited and differ from a variable to another, we delete all observations with missing data in order to have a similar sample for the different specifications.

Table 6 Estimation of the Korea discount with country-level characteristics (forward ratios)

	(1)	(2)	(3)	(4)	(5)
	Without	Corporate governance	Financial market	Macro conditions	Country Risk EIU
Panel A: Industry portfolio approach (forward PE)					
Constant	16.123***	15.935***	14.419***	15.889***	17.114***
	(0.797)	(1.747)	(2.277)	(0.802)	(0.844)
Korea	-3.300***	-3.546***	-3.085***	-3.258***	-3.062***
	(0.264)	(0.436)	(0.303)	(0.264)	(0.286)
German		0.256			
		(0.872)			
French		-0.123			
		(0.747)			
Minority investor protection		0.003			
		(0.019)			
Relative market size			-0.002*		
			(0.001)		
Financial market development			0.372		
			(0.403)		
Market return				2.673**	
				(0.772)	
GDP Growth				-4.980	
				(5.522)	
Country Risk					-0.041
					(0.026)
Observations	2613	2613	2613	2613	2613
Adjusted R-squared	0.208	0.208	0.210	0.212	0.214

Table 6 (ctd)

	(1)	(2)	(3)	(4)	(5)
	Without	Corporate governance	Financial market	Macro conditions	Country Risk EIU
Panel B: Individual stock approach (forward EP)					
Constant	0.024	0.051	0.062	0.001	-0.003
	(0.059)	(0.071)	(0.079)	(0.063)	(0.059)
Korea	0.059***	0.055***	0.055**	0.051***	0.041**
	(0.011)	(0.005)	(0.015)	(0.009)	(0.012)
German		0.001			
		(0.018)			
French		-0.013			
		(0.025)			
Minority investor protection		-0.000			
		(0.001)			
Relative market size			0.000***		
			(0.000)		
Financial market development			-0.009		
			(0.014)		
Market return				-0.048	
				(0.029)	
GDP Growth				0.623***	
				(0.139)	
Country Risk					0.002*
					(0.001)
Observations	99656	99656	99656	99656	99656
Adjusted R-squared	0.004	0.004	0.004	0.004	0.004

*The table provides the results of the estimation of the Korea discount (based on forward earnings ratio) including country-level controls. Column (1) provides results for the baseline model without country-level controls for comparison purpose. Column (2) shows results for model with controls for legal origin and minority investor protection score (0 to 100) provided by the WB. Column (3) presents results for model including relative market size computed as the market capitalization of domestic firms as percentage of the GDP (WB) and financial market development score (1 to 10) provided by the WEF. Column (4) presents results for model including GDP growth and country stock index return. The GDP growth is based on annual change in GDP per capita in local currency. Stock index return is computed based on Datastream total market index. Column (5) includes the Economist Intelligence Unit's overall risk rating score accounting for sovereign risk, currency risk and banking sector risk. In Panel A, Korea discount is estimated by industry portfolio approach. The dependent variable is forward price-earnings ratio. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level. In Panel B, the Korea discount is estimated by individual stock approach. The dependent variable is forward earnings-to-price ratio. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

The results for models including country-level control variables are reported in Table 6. We observe that the Korea discount is robust to the inclusion of different groups of country-level controls regardless of the identification approach used (portfolio approach in Panel A and individual stock approach in Panel B). The results of these additional tests show that the Korea discount persists even after accounting for differences between countries in terms of corporate governance, macroeconomic and financial conditions. In addition, we observe that the magnitude of the discount varies only slightly with the addition of country-level characteristics. [24] The relatively modest impact of these additional control variables on the estimates of the discount suggests that the major part of the phenomenon has other origins. Appendix 8 presents the results in terms of trailing ratios. They are qualitatively similar.

3.5 Robustness tests

So far, all our three empirical approaches provide results supporting the existence of a Korea discount. However, these results could suffer from different empirical problems. We therefore conduct additional tests in this section to ensure the robustness of our results. First, we address omitted variable bias issues that could potentially affect the results of the individual stock approach. Second, we provide additional results for the discount using alternative valuation measures.

In the individual stock approach, the use of a limited number of controls allows to maximize the number of firms included in the sample and therefore to have the most comprehensive view on the phenomenon. However, this may induce an omitted variable bias on our results. A common approach to deal with this issue in panel data is to use firm fixed effects. This approach has the advantage of keeping the same sample size as it does not require additional data. Unfortunately, our empirical framework does not allow the use of firm fixed effect because the variable of interest, the Korea dummy (or firm nationality), is time invariant. Since a firm fixed effect captures all time invariant differences between firms, it would capture the country effect and therefore make the identification of the Korea discount impossible. To alleviate the omitted variable bias concern, we conduct robustness tests including additional firm-level control variables to our baseline model in the individual stock approach (equation (2)). These variables are all obtained from Worldscope. We add controls for growth opportunities proxied by Tobin's q computed as the price-to-book (item 09304), firm

[24] The Korea discount expressed in terms of PE is 23.19% in baseline model and varies between 21.52% and 24.92% after inclusion of country-level controls.

profitability proxied by ROA (item 08326), past return (item 08801), and payout ratio (item 09504). Since ownership may also impact firm value, we include variables for strategic holdings by foreign investors (item NOSHFR), state (item NOSHGV), and pension funds (item NOSHPF). Accounting practices and quality may differ from a country to another or from a firm to another. For this reason, we also include a dummy variable taking the value 1 for firms using either US-GAAP or IFRS as accounting standard (based on item 07536).

Table 7 Individual stock approach with additional firm controls (forward EP)

	(1)	(2)	(3)	(4)
Panel A: Forward earnings-to-price by geographical benchmark				
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Constant	0.013	0.091	0.001	0.164*
	(0.026)	(0.113)	(0.026)	(0.071)
Korea	0.069***	0.055**	0.072***	0.060***
	(0.004)	(0.021)	(0.005)	(0.009)
Q	-0.000	-0.002*	-0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Past return	0.000	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.001)
Payout	0.046***	0.015	0.044***	0.019
	(0.005)	(0.026)	(0.005)	(0.012)
ROA	0.018*	0.486*	0.016*	0.020
	(0.008)	(0.227)	(0.007)	(0.021)
Foreign ownership	0.039*	-0.029**	0.052**	0.041**
	(0.016)	(0.010)	(0.018)	(0.014)
State ownership	-0.000	0.016	-0.036**	0.023
	(0.010)	(0.014)	(0.013)	(0.012)
Pension fund ownership	-0.102	0.036	-0.125	0.057
	(0.060)	(0.095)	(0.074)	(0.040)
IFRS/USGAAP	-0.039***	-0.030	-0.036***	-0.036***
	(0.005)	(0.030)	(0.005)	(0.010)
Observations	117097	21455	99280	45529
Adjusted R-squared	0.007	0.001	0.010	0.003

Table 7 (ctd)

Panel B: Forward earnings-to-price by sub-periods				
	2002-16	2002-06	2007-09	2010-16
Constant	0.013	0.066*	-0.011	0.022
	(0.026)	(0.027)	(0.019)	(0.046)
Korea	0.069***	0.075***	0.027**	0.078***
	(0.004)	(0.010)	(0.009)	(0.006)
Q	-0.000	-0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Past return	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)
Payout	0.046***	0.024**	0.039***	0.051***
	(0.005)	(0.009)	(0.010)	(0.008)
ROA	0.018*	0.041	0.082	0.013*
	(0.008)	(0.032)	(0.062)	(0.005)
Foreign ownership	0.039*	0.030	0.034*	0.047*
	(0.016)	(0.030)	(0.014)	(0.024)
State ownership	-0.000	0.005	-0.007	0.002
	(0.010)	(0.016)	(0.016)	(0.015)
Pension fund ownership	-0.102	-0.174	-0.031	-0.111
	(0.060)	(0.118)	(0.045)	(0.081)
IFRS/USGAAP	-0.039***	-0.036***	-0.016**	-0.051***
	(0.005)	(0.005)	(0.005)	(0.010)
Observations	117097	32267	22308	62522
Adjusted R-squared	0.007	0.011	0.028	0.005

*The table presents the results for the individual stock approach corresponding to equation (2) including additional firm-level controls. Dependent variables are 12 months forward earnings-to-price ratio All regressions include Tobin's q as proxy for investment opportunity and measured as the price-to-book ratio (item 09304), total return for previous year (item 08801), payout ratio (item 09504), return on assets (item 08326). Ownership variables are based on Datastream variables NOSHFR, NOSHGV, and NOSHPF referring to foreign investors, state, and pension funds strategic holdings. IFRS/USGAAP is a dummy variable based on item 07536. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. In Panel A, regressions are run on the full sample length (2002-2016) sorted by geographical area. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In Panel B, the sample is divided in sub-periods corresponding to pre-crisis (column (2)), crisis (column (3)), and post-crisis (column (4)) periods. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Table 7 presents the results for the individual stock approach including the above-mentioned additional controls. First, we observe that the number of firms in the full and sub-samples decreases by 30% in comparison with Table 5. Regarding the estimates for the additional controls, we report that stricter accounting standards such as US-GAAP or IFRS have a significantly negative coefficient for all samples which means that they have a positive impact on PE. The other significant additional control variables are payout, ROA and foreign ownership. In Panel A, the results for the Korea discount are close to those of Table 5. In the sub-period analysis presented in Panel B, we also observe a decline of the discount during the

financial crisis as in Table 5. Overall, the results in Table 7 show that we can be confident that the existence of the Korea discount documented so far is not affected by an omitted variable bias.

The Korea discount is essentially described and discussed in terms of price-earnings ratio by market observers. To have a comprehensive view of the phenomenon, we conduct a similar analysis using two alternative valuation measures namely the price-to-book (PB) and the price-to-sales (PS) ratios. The Korea discount is seldomly discussed in terms of PB ratio, although this ratio is also commonly used as a valuation measure. However, PB and PE ratios differ in their scope. From an accounting point of view, earnings come from the income statement while the book value is obtained from the balance sheet (Penman, 1996). In other words, the PE ratio values an accounting flow, whereas the PB ratio indicates the valuation of an accounting stock (Welch, 2009, p. 496 and 520). Welch (2009, p. 448) also notes that book value of equity should be treated with caution due to its role to equalize assets and liabilities. Like earnings ratios, sales ratios reflect an accounting flow. Sales figures have the advantage to be less affected by accounting rules and manipulations compared with earnings ratio and therefore adapted to international comparisons. However, sales figures do not measure firm profitability since they do not account for costs and are therefore less adapted to measure performance (Welch, 2009, p. 522).

Table 8 Estimation of Korea discount with alternative valuation ratios (trailing ratios)

	(1)	(2)	(3)	(4)
	Industry portfolio approach		Individual stock approach	
Dependent variable	Price-to-book	Price-to-sales	Book-to-price	Sales-to-price
Constant	2.267***	2.339***	2.118***	3.055***
	(0.200)	(0.430)	(0.184)	(0.089)
Korea	-0.942***	-1.709***	0.155***	0.762***
	(0.091)	(0.354)	(0.039)	(0.105)
Observations	4313	4237	118909	147735
Adjusted R-squared	0.278	0.106	0.009	0.094

*The table presents estimation of the Korea discount with alternative ratios. Columns (1) and (2) presents results for industry portfolio approach. The dependent variables are price-to-book (column (1)) and price-to-sales (column (2)) ratios respectively. Industry-country portfolio PB and PSales are winsorized at 1 and 99 percent level. Regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. Columns (3) and (4) presents results for the individual stock approach. The dependent variables are book-to-price (column (3)) and sales-to-price (column (4)) ratios respectively. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB industry-level) and year fixed effect. All regressions are run on the full sample length (2002-2016). p-value *<5% **<1% ***<0.1%*

Table 8 presents estimates of the Korea discount using book- and sales-based valuation ratios. The results for the industry portfolio approach are presented in columns (1) and (2). For

both PB and PS ratios, we observe a significant discount for Korean firms relative to firms from other countries. Columns (3) and (4) of Table 8 show the results for estimates based on the individual stock approach. To obtain comparable results with the price-earnings ratio analysis, we use book-to-price (BP) and sales-to-price (SP) ratios. Consistent with the earnings-based analysis, we observe a positive and significant coefficient on Korea dummy meaning that Korean firms are discounted compared to their foreign peers. In a sub-sample and sub-periods analysis, we observe that Korea discount is significant regardless of the group of countries used as benchmark [25]. In addition, we note a decline in the phenomenon over time consistent with our previous findings.

The tests in this subsection document the presence of a significant discount for Korean stocks in alternative settings. First, we observe that Korea discount is robust to the inclusion of additional firm-level controls suggesting that an omitted variable bias is unlikely to affect our findings. Second, we show that the Korea discount is also observed when using valuation ratios that are less frequently used and mentioned in the discussions by practitioners.

4. Role of chaebols in the Korea discount

Since numerous observers attribute the main cause of the discount to the presence of chaebols (The Economist, 2012), we analyze specifically the link between the Korea discount and chaebols. Chaebols are family-run business groups that play a central role in the Korean economy. The emergence and development of chaebols came hand to hand with the industrialization of South Korea. To rebuild and industrialize the country after the devastations of World War II and the Korean War, the government decided to develop certain industries. Selected entrepreneurs benefited from support and privileged access to scarce resources in reward for implementing government strategy. The support and protection of the government transformed some initially small family businesses into large and diversified business groups (Eichengreen et al., 2015, pp. 142-147). Chaebols contributed to turn Korea from one of the poorest countries to one of the most advanced economies and largest exporters in the world (Eichengreen et al., 2015, p. 1). However, the success of chaebols also generated some problems. The Korean economy became heavily dependent on those business groups that accumulated a substantial economic power. The excessive economic power of chaebols is likely to affect market competition and harm competitiveness of SMEs (OECD, 2018, p. 74). In addition, preferential loans provided by government fostered debt financing of chaebols. The

[25] To save space, we do not present the detailed results here. They are available upon request.

high leverage made some chaebols financially vulnerable. As consequence, the 1997 Asian financial crisis led to the collapse of some chaebols and the country was heavily affected by this crisis requiring the intervention of the International Monetary Fund (IMF). This later conditioned its help to tight conditions and reforms of the economy (Kim and Kim, 2008).

4.1 Corporate governance of chaebols

Firms affiliated to a chaebol potentially suffer from a poor corporate governance and their non-controlling shareholders are exposed to expropriation by controlling shareholders (Chang and Shin, 2007). In addition, chaebols grew during decades without caring for shareholder value creation since they were unconditionally supported by the government and benefited from economic power and political influence (Kim and Kim, 2008). The structure of chaebols are the roots of these risks. Indeed, unlike conglomerates in which subsidiaries are wholly owned, firms affiliated to a business group are often publicly traded and rarely fully owned by the controlling shareholder (Colpan and Hikino, 2010, p. 27). Different mechanisms such as cross-shareholding, pyramids as well as appointment of individuals related to chaebols on the board of directors and/or in executive positions provide control over affiliates to shareholders with a limited amount of equity investment (Bae et al. (2008); Hwang and Seo (2000)). Therefore, the presence of a controlling shareholder with relative low equity stake creates principal-principal agency conflicts worsened by the fact that group-level interests are often prioritized over affiliate-level (and thus minority shareholder) interests (OECD (2018, p. 79); Shin and Park (1999); Hwang and Seo (2000)). In addition, controlling families are often accused of nepotism and to favor their own interest instead of other shareholder wealth (Brown, 2001). Minority shareholders are exposed to different forms of expropriation such as tunneling through securities transactions or related party transactions (Kim and Kim (2008); Black et al. (2015)). Academic literature also reports case of minority shareholder expropriations during acquisitions (Bae et al. (2002); Bae et al. (2008)), or during successions (Hwang and Kim, 2016). It is reasonable to think that poor governance in chaebols is reflected in the valuation of the whole market, leading to the existence of the Korea discount, since the finance literature documents a positive association between corporate governance and firm valuation (Gompers et al. (2003); Bebchuk et al. (2009)) and chaebol affiliates account for a large share of Korean stock market (30% of firms and 68% on market value in our sample).

4.2 Chaebols and the Korea discount

We analyze the role of chaebols using both industry portfolio and individual stock approaches. The procedure for industry portfolio approach is similar to the one used in Section 3 except that we split Korea portfolio into chaebol and non-chaebol firms portfolios. This method allows us computing discount for chaebol and non-chaebol firms by including a dummy variable for Korean chaebol and Korean non-chaebol portfolios in equation (1). In addition to the portfolio approach, we also test the difference in valuation between chaebol and non-chaebol firms using the individual stock approach. To do so, we add to equation (2) a set of two dummy variables taking a value of one for Korean non-chaebol firms and one for Korean chaebol firms respectively, and zero for non-Korean firms. If the affiliation to a chaebol (and therefore poor corporate governance) is the main driver of the discount, we should only find a lower valuation for chaebol affiliates and no discount for unaffiliated firms.

Table 9 presents results for the estimation of the discount affecting chaebol and non-chaebol Korean firms relative to their foreign peers. Both industry portfolio (Panel A) and individual stock (Panel B) approaches provide qualitatively similar results. [26] First, we observe that, except during the global financial crisis period, both chaebol and non-chaebol firms exhibit a significant discount contradicting the common belief that discount is a phenomenon only associated with chaebols. Second, we observe that chaebol affiliates exhibit a lower discount than non-chaebol firms over the full sample length as well as on the different sub-periods analyzed. In other words, it is non-chaebol firms that drive down the value of Korean market. Over the full period and in terms of forward PE, the chaebol portfolio is discounted by 14.31% in comparison with other country portfolios, whereas non-chaebol portfolio exhibits a discount of 26.43%. In addition, the results exhibited in Table 9 are consistent with the decline in the Korea discount observed in the market-level analysis. The discount on non-chaebol firms declines from 41.93% during the pre-crisis to 18.84% in the post-crisis period. In the case of chaebol affiliates, the discount relative to foreign firms drops from 32.63% to 10.65%. During the financial crisis, the discount on chaebol firms even turns into a non-significant premium.

[26] The quantitative comparison of the magnitude of the discount estimated based on industry portfolio and individual stock approaches is difficult due to the different valuation ratio used, PE and EP respectively. In the case of industry portfolio approach, the Korea discount reflects in a lower ratio, whereas it is the inverse in the case of individual stock approach using the EP as valuation ratio.

Table 9 Estimates of the chaebol and non-chaebol Korea discounts (forward ratios)

	(1)	(2)	(3)	(4)
	2002-16	2002-06	2007-09	2010-16
Panel A: Industry portfolio approach (forward PE)				
Constant	13.969***	15.510***	15.162***	13.993***
	(0.965)	(1.095)	(0.723)	(0.756)
Chaebol	-2.068***	-4.678***	0.709	-1.590***
	(0.264)	(0.538)	(0.367)	(0.278)
Non-chaebol	-3.821***	-6.011***	-2.547***	-2.813***
	(0.289)	(0.598)	(0.390)	(0.294)
Observations	2933	953	588	1392
Adjusted R-squared	0.195	0.166	0.170	0.238
F-test Chaebol=Non-chaebol	657.02***	67.50***	678.87***	827.74***
Panel B: Individual stock approach (forward EP)				
Constant	0.008	0.020	0.035	0.014
	(0.021)	(0.024)	(0.024)	(0.033)
Chaebol	0.030***	0.086***	-0.004	0.016**
	(0.005)	(0.015)	(0.009)	(0.005)
Non-chaebol	0.080***	0.099***	0.076***	0.072***
	(0.006)	(0.008)	(0.009)	(0.009)
Observations	162495	48088	32879	81528
Adjusted R-squared	0.004	0.008	0.008	0.004
F-test Chaebol=Non-chaebol	41.39***	0.70	40.01***	34.10***

*The table presents the results for models including indicators for chaebol and non-chaebol firms based on forward earnings. Chaebol indicator takes value 1 for firms affiliated to one of the top 30 chaebols based on KFTC classification. Non-chaebol indicator takes value 1 for Korean firms that are not affiliated to a top 30 chaebols. Columns (1) presents results for the full sample length. Columns (2), (3), and (4) present results for pre-crisis, crisis, and post-crisis periods respectively. Panel A presents result for industry portfolio approach and dependent variable is forward price-earnings. Portfolio for financial (ICB 30), real estate (ICB 35), energy (ICB 60), and utilities (ICB 65) are excluded due to low number of Korean firms. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level and showed in parentheses. Panel B presents results for individual stock approach and dependent variable is forward earnings-to-price. Regressions include control for size based on a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

In order to test if the there is a significant difference between the discounts observed on chaebol and non-chaebol firms, we perform tests for the equality of coefficients (F-test) on the two groups of firms. For the full sample as well as for all sub-periods studied, the difference between discounts on chaebol and non-chaebol firms is statistically significant illustrating the difference of valuation associated with affiliation. Appendix 9 presents the results in terms of trailing ratios. They are qualitatively similar. The higher valuation of chaebol affiliates relative to unaffiliated firms is, to some extent, consistent with the existing literature as it finds that chaebol affiliation is associated with a valuation premium during the 2000s (Black et al. (2006); Lee et al. (2010)). However, the relative valuation of chaebol firms is found to be changing over time. During the 1980s, affiliation to a chaebol had a value enhancing effect (Lee et al., 2010) that turned into a discount during the 1990s (Ferris et al. (2003); Lee et al. (2010)).

Different reasons can explain the gap between chaebol and non-chaebol firms in terms of valuation as well as the strongest decline of discount observed for chaebol firms. First, it is likely that chaebol affiliates suffered less and recovered faster from the global financial crisis than unaffiliated Korean firms as reported by Oliver (2010). Academic literature provides both theoretical and empirical evidence of the benefits of business group affiliation during crisis periods. Indeed, business groups are often seen an answer to institutional voids or market failures (Leff, 1978). During the 1997 Asian financial crisis, chaebol affiliates were on average less affected by the crisis (Chang (2006); Almeida et al. (2015)), benefited from better access to financing (Gormley et al., 2015), and experienced faster recovery (Lee et al. (2010); Goh et al. (2016)). Empirical evidence also suggests a positive effect of business group affiliation in Chile (Santioni et al., 2020) and Italy (Buchuk et al., 2020) during the global financial crisis.

The improvements in the governance of chaebols following the 1997 Asian financial crisis can potentially explain the difference in discount between chaebol and non-chaebol firms. During decades, growth and diversification were the priorities of chaebols, whereas profitability was secondary since they benefited from government support. The Asian financial crisis induced reforms and changes aiming to improve governance and shareholder value creation (Kim and Kim, 2008). First, the crisis led to important restructuring of chaebols either on a voluntary basis or decided by the government resulting in more focused and financially stronger groups (Eichengreen et al., 2015, p. 170). Many reforms triggered by the crisis targeted directly or indirectly chaebols since they were considered to be a major cause of the crisis contagion in Korea. They included regulation of cross-debt guarantee, cross-shareholding, leverage, and trade between affiliates (Kim et al., 2004a). Empirical evidence suggests a positive effect of those reforms on firm value and performance (Black and Kim (2012); Choi et al. (2007)). In order to make ownership structure of chaebols more transparent and allow a better monitoring by minority shareholders, holding structures are allowed and encouraged since the beginning of 2000s (KFTC, 2016). Empirical evidence shows that holding structures allow to reduce risk sharing and financial interdependence between affiliates (Kim et al., 2012). The switch to holding structures is allowed since 1999 but it occurred mostly during the second part of the 2000s (Kim et al., 2012). In 2009, a series of reforms targeting primarily business groups abolished some equity investment restrictions and increased disclosure requirement to promote market monitoring (KFTC (2009); KFTC (2010)). In addition to change in the legal framework, the mid-2000s have been marked by an increase in domestic activism through non-governmental organizations and institutional investors. Such investors concentrated primarily

on chaebols. For instance, the National Pension Service [27] included in its voting guidelines the increase of long-term shareholder value as an objective. In 2006, domestic activists created an activist mutual fund (Korea Corporate Governance Fund) (Song (2006); Kim and Kim (2008)). The removal of restrictions on foreign ownership introduced after the Asian financial crisis also allowed activism by foreign investors. For instance, in 2006, a group of investors led by Carl Icahn entered in the capital of KT&G pushing for changes to enhance shareholder value (Lim (2006); Kim and Kim (2008)). Another example is the Dubai-based Sovereign Asset Management that entered in the capital of SK Corp and asked for changes in the management (Song (2012); Kim and Kim (2008)).

These elements may have induced a change in the investor perception of some large Korean firms relative to their foreign competitors. The fact that MSCI still classifies South Korea as an emerging market whereas FTSE upgraded the country in 2009 illustrates the debate regarding the classification of Korea (Woods, 2013). Despite of this ambiguous classification, some Korean firms gained an international reputation and visibility in playing a leading role in some industries such as consumer electronics, semiconductors or automotive since the mid-2000s. [28] Throughout their history, chaebols adapted to their environment and international competition in entering high-end markets (Kim et al., 2004a). Access to resources such as capital, skilled workforce and knowledge represent a competitive advantage for chaebol affiliates relative to unaffiliated firms especially in the context of globalized and fierce competition requiring investment in R&D. These elements are likely to have an impact on the perception of foreign investors, who might treat chaebol firms differently from other Korean firms due to their international reputation.

Resilience and recovery from the financial crisis, rise of shareholder activism and governance reforms as well as changes in investor perception towards large Korean firms are all likely to reduce the discount affecting chaebols firms and therefore increase the difference in valuation between chaebol and non-chaebol firms. This difference is also consistent with an alternative explanation, less discussed in the context of the Korea discount, which is related to the substantial economic power that chaebols have accumulated over time. Indeed, policymakers and international organizations point out the negative effect of the dominance of

[27] Formerly National Pension Fund

[28] For instance, Samsung dominates the semiconductor industry, whereas SK Hynix an affiliate of SK Group is another key player in this industry. The success of Samsung in consumer products such as smartphones contributes to the visibility of the brand. On this market, the share of Samsung jumped from 3.3 to 20.4% between 2009 and 2015. For instance, in the annual ranking of brand value established by Brand Finance (Brand Finance (2007); Brand Finance (2022)), Samsung jumped from the 32nd to the 3rd rank between 2007 and 2016, whereas during the same period Hyundai moved from the 154th to the 36th rank

chaebols on competition and competitiveness of other firms. The lower valuations of non-affiliated firms could therefore simply reflect the fact that these firms are harmed by the presence of chaebols.

4.3 The Korea discount and characteristics of affiliated firms

Our results show that chaebol affiliates are less discounted than other Korean firms. This finding suggests that chaebols are not the main cause of the Korea discount, contrary to what many market observers claim. However, our analysis currently treats affiliated firms as a homogeneous group, although it is likely that there are differences among them that can possibly affect their valuation. Some affiliated firms could therefore be more discounted than others and eventually be even more discounted than non-chaebol firms. In this section, we propose additional analyses considering different characteristics which are relevant in the context of chaebols. [29] We first consider the ownership structure and more specifically the ownership by insiders and controlling families. Second, we identify and examine periods of succession at the head of chaebols that may lead to conflicts between heirs and therefore affect firm performance. We also consider firms affiliated to smaller chaebols that are ranked below the largest 30 and which are usually not considered by many studies and are even eventually allocated to the group of non-chaebol firms. Lastly, we check if the lower discount of chaebol affiliates is due to cross-listed affiliates.

We first consider the ownership of chaebol affiliates. Family ownership varies from an affiliate to another with potential effects on tunneling activities (Chang and Shin, 2007). We use two alternative measures of ownership. The first variable is based on data provided by Datastream and more specifically the item NOSHEM defined as strategic holdings (more than 5%) by "employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting (typically family members)." Based on this variable, we classify chaebol affiliates into two sub-groups depending whether the insider ownership is above or below 20%. [30] The second variable is specific to chaebol affiliates and it is based on KFTC data. Every year and for each chaebol affiliated firms, the KFTC discloses the ownership of controlling shareholder and his/her related parties. We use this information to

[29] We thank an anonymous referee for suggesting these additional analyses.

[30] We use a threshold of 20% for two reasons. First, the academic literature considers that this level of ownership usually confers the control of a firm (e.g. La Porta et al. (1999) and Faccio and Lang (2002)) and can therefore lead to agency problems such as tunneling. Second, the KFTC is currently planning to restrict intra-group business transactions for which chaebol families own a stake of more than 20% (Park, 2018).

compute the ownership of the controlling shareholder and his/her family. [31] Then, we classify chaebol affiliates into two sub-groups depending if the same person and his/her family holds directly more or less than 20% of the firm capital.

Table 10 presents the results for the individual stock approach and differentiate chaebol affiliates according to different characteristics related to chaebols. In columns (1) and (2), we present results for classification of chaebol firms based on their ownership. In column (1), affiliated firms are split based on Datastream data regarding insider ownership. We observe that when insiders hold a stake exceeding 20%, the discount is slightly larger than the discount of other chaebol firms but the difference is non-significant (p-value of F-test=0.92). In column (2), we use KFTC data to split the chaebol affiliates between affiliates in which controlling family has a stake exceeding 20% of the capital. Consistent with the results reported in column (1), affiliates in which insiders own more than 20% of the capital are more discounted than other chaebol affiliates. But the difference between both sub-groups of chaebol affiliates is not statistically significant (p-value of F-test=0.36). This result is consistent with Chang and Shin (2007) who do not find relation between family ownership and affiliates performance. Although affiliated firms with large insider stakes have a slightly higher discount than other affiliated firms, it remains below the discount of non-chaebol firms. Moreover, F-tests reject the null of equal coefficients between affiliated firms with high insider (or family) ownership and non-chaebols firms (p-values are both close to zero for both measures).

Succession in family firms is a sensitive period. Typically, family feuds may harm firm performance during succession. As family-controlled business groups, chaebols are subject to such issues. For instance, some chaebols split off due to conflicts between heirs. Amongst others we can cite Samsung or Hyundai during the late 1990 and early 2000 (Gam et al., 2020). The empirical evidence suggests an impact of successions on firm outcomes in Korea. Lee et al. (2015) find a positive association between the risk of succession tournament and affiliated firms' risk taking. Using a reform of inheritance law introduced in Korea in 1991, Gam et al. (2020) find evidence suggesting that sibling rivalries may harm performance of family firms. Moreover, because of the high level of inheritance taxes in Korea, families use different mechanisms to avoid the tax burden and keep group control during successions. This can also potentially impact minority shareholder wealth. Hwang and Kim (2016) show that controlling families use related party transactions in a mechanism called “pyramiding financed by related-party transactions” to finance equity transfer during succession periods. Shin (2020) documents

[31] The controlling shareholder is called "same person" by the KFTC.

an intensive use of between affiliates mergers to avoid inheritance tax. To test the impact of succession periods on the level of the discount, we create a dummy variable indicating that a chaebol affiliate is in a succession period. We follow Hwang and Kim (2016) and use KFTC data as the main source of information regarding succession at the head of chaebols. KFTC publishes the name of the chaebol controlling shareholder on a yearly basis. We consider as a succession year, the year before the change of controlling shareholder is reported by the KFTC. Chaebol affiliates are then split in a group of firms affiliated to a chaebol experiencing succession and other chaebol affiliates. Since succession may be seen as a process, we also test a specification for which chaebols are considered as being in a succession during a period of three years (one before and one after the effective change of controlling shareholder). Columns (3) and (4) of Table 10 present the results for models where affiliated firms belong either to a chaebol experiencing a succession period or not. In column (3), we only consider the year before transition as a succession period, whereas in column (4) we consider a period of three years. In both cases, we observe a significantly higher discount for firms affiliated to a chaebol experiencing succession compared with other chaebol affiliates (p-value of F-tests=0.02 and 0.02). The discount exhibited by affiliates of chaebols under succession period is even higher than discount on non-chaebol Korean firms. However, this difference is not significant (p-value of F-tests=0.24 and 0.81). We conclude that succession periods increase the discount measured for chaebols firms up to the level of the discount of non-chaebol firms.

Most of the literature dedicated to chaebols focuses on firms belonging to the 30 largest groups (according to the total value of their assets). In addition to this commonly accepted and widespread definition of chaebols, we test a specification of our model including an indicator for membership to smaller chaebols. This variable is equal to one for firms affiliated to a business group whose value of total assets exceeds the threshold value defined by the KFTC to belong to a chaebol, but the chaebol is ranked below the top 30 chaebols. In column (5) of Table 10, we report the results for the coefficient of the dummy variable reflecting this broader definition of a chaebol as well as the coefficient for the top 30. We observe that affiliates to smaller chaebols are slightly more discounted than affiliates to a top 30 chaebol, but the discounts affecting affiliates of top 30 and smaller chaebol do not differ significantly (p-value of F-tests=0.75).

Table 10 Estimates of the chaebol and non-chaebol Korea discounts with chaebol related characteristics (forward EP)

	(1)	(2)	(3)	(4)	(5)	(6)
	NOSHEM	KFTC	Succession	Succession [-1;+1]	Small chaebols	Excluding ADR
Panel A: Coefficients of chaebol characteristics						
Constant	0.009	0.008	0.008	0.008	0.008	0.008
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Non-chaebol	0.080***	0.080***	0.080***	0.080***	0.084***	0.080***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)
Chaebol and insider<20%	0.027***					
	(0.005)					
Chaebol and insider>20%	0.028**					
	(0.009)					
Chaebol and family<20%		0.029***				
		(0.006)				
Chaebol and family>20%		0.038***				
		(0.008)				
Chaebol outside succession period			0.030***	0.029***		
			(0.005)	(0.005)		
Chaebol in succession period			0.130**	0.086***		
			(0.043)	(0.024)		
Chaebol (top 30)					0.031***	0.029***
					(0.005)	(0.005)
Small chaebol					0.034***	
					(0.007)	
Observations	162495	162495	162495	162495	162495	162399
Adjusted R-squared	0.004	0.004	0.004	0.004	0.004	0.004

Table 10 (ctd)

Panel B: F-tests of coefficients equality						
Chaebol and insider<20% = Chaebol and insider>20%	0.01					
	(0.924)					
Chaebol and insider>20% = Non-chaebol	23.39***					
	(0.000)					
Chaebol and family<20% = Chaebol and family>20%		0.82				
		(0.367)				
Chaebol and family>20% = Non-chaebol		18.56***				
		(0.000)				
Chaebol outside succession period = in succession period			5.54*	5.41*		
			(0.019)	(0.020)		
Chaebol in succession period = Non-chaebol			1.38	0.06		
			(0.240)	(0.806)		
Chaebol (top 30) = Small chaebol					0.10	
					(0.751)	
Chaebol (top 30) = Non-chaebol					43.65***	43.00***
					(0.000)	(0.000)

*The table presents results for individual stock approach with chaebol related characteristics. The dependent variable is forward earnings-to-price ratio. Chaebol affiliates are classified depending on chaebol related characteristics. Chaebol affiliates are defined as firms affiliated to one of the 30 largest business groups as classified by the KFTC. Non-chaebol firms refer to other Korean firms. In column (1), chaebol affiliates are classified depending on the insider strategic holding with a threshold of 20% (based on item NOSHEM provided by Datastream). In column (2), chaebol affiliates are classified depending on the family ownership with a threshold of 20% (based on KFTC data). In columns (3) and (4), chaebol affiliates are classified depending on their membership to a chaebol experiencing succession period. In column (3), succession is defined as the year preceding the change of same person as reported by the KFTC. In column (4), succession is defined as a period of three years surrounding the year of transition. In column (5), the model includes, in addition to the dummy for affiliation to a top 30 chaebol, an indicator for affiliation to a smaller chaebol (below the 30th rank) as classified by the KFTC. In column (6), affiliated firms cross-listed in the US are excluded. Panel A presents the coefficients estimates of different chaebol related characteristics and Panel B presents the results of F-tests of coefficient equality. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level. In Panel A, standard errors are in parentheses. In Panel B, p-value are in parentheses. p-value *<5% **<1% ***<0.1%*

We finally consider the possibility that the lower discount of chaebol affiliates is possibly due to the presence of cross-listed affiliates since cross-listing on well-developed market requires to comply to stricter rules (than in the home country) regarding governance and disclosure. Improvements along those dimensions are beneficial from an investor perspective and should be reflected in a higher valuation and a lower cost of capital. These improvements should be especially relevant for markets with low shareholder protection such as Korea (Karolyi, 2012). The existing literature provides empirical evidence supporting the beneficial effect of cross-listing on major US markets on corporate governance (Lel and Miller, 2008), firm value (Doidge et al., 2004) and cost of capital (Hail and Leuz, 2009). As it is commonly the practice in financial literature (Black and Kim (2012); Doidge et al. (2007); Doidge et al. (2009); Foucault and Frésard (2012)), we collect data regarding Korean firms cross-listed on the NYSE and NASDAQ from Citibank, Bank of New York Mellon, J. P. Morgan, Deutsche Bank, and SEC. As additional sources, we also use Thomson Reuters Eikon and Korea Securities Depository (KSD). We also use different sources to check the start and end dates of ADR program (Citibank, Eikon, SEC). To check if the relative higher value of chaebol affiliates is due to cross listed affiliates, we exclude affiliated firms that have ADR listed on NYSE and NASDAQ from our sample. The results are presented in column (6) of Table 10. However, after excluding cross-listed affiliates, the difference in discounts between chaebol and other Korean firms remains significant (p-value of F-test=0.00). We can conclude that the higher valuation of those firms is not driven by cross-listing.

The results of the additional tests of this section essentially support our previous findings. They provide additional evidence that chaebol affiliates are not the main cause of the Korea discount observed in terms of earnings valuation, since non-affiliated firms exhibit higher discount than their affiliated counterparts. The only exception is when chaebols experience succession. This process harms the value of affiliates and increases their discount at the same level of those of non-affiliated firms.

4.4 Robustness tests

Our results suggest a difference in valuation between chaebol and non-chaebol firms. This result is not surprising considering the existing literature. [32] In addition, we observe in the previous section that such a difference persists even after accounting for characteristics of

[32] Note that existing financial literature focuses on other valuation measures such as Tobin's q rather the price-earnings ratio that is mostly used by practitioners.

affiliated firms that could lead to lower valuations. However, the difference in valuation may be due to some difference in fundamentals between affiliated and unaffiliated firms. In other words, the difference in valuation associated with chaebol affiliation may be affected by an omitted variable bias. For the same reason discussed in section 3.5, firm fixed effects cannot be used in our framework. Indeed, both Korean nationality and chaebol affiliation status are mostly time invariant (Joh, 2003). To mitigate the problem of omitted variable bias, we conduct robustness tests with models including the same additional firm-level controls used in section 3.5. We find that our main conclusions are not affected by the inclusion of these control variables. [33] We observe that both chaebol and non-chaebol firms are discounted relative to foreign firms. In addition, the discount on chaebol affiliates is significantly lower than the discount on other Korean firms. We also report that the discount on affiliated firms disappears during the crisis period. We then reproduce the analysis of section 4.3 adding firm-level controls to the characteristics of affiliated firms. Inclusion of firm-level controls does not affect our findings. These additional tests show that the difference in the discounts affecting chaebol and non-chaebol firms is not due to the omission of firm-level characteristics. Finally, we repeat the analysis for affiliated firms with high and low insider ownership with thresholds of 10% or 30% instead of the threshold of 20% considered in Table 10. The results are qualitatively similar as the differences in the discount between the two groups of affiliated firms are not statistically significant.

5. Conclusion

Different observers of the Korean economy claim that domestic stocks are undervalued and trade at a discount relative to foreign firms. This phenomenon is called "the Korea discount". However, so far, this claim is only based on anecdotal evidence comparing different indexes or different individual stocks. This paper is the first to provide scientific evidence on the existence of this discount. Using a large sample of international stocks over the period 2002-2016, we find that Korean stocks exhibit, on average, a PE ratio significantly lower by 30% than their global peers. We use different approaches to document empirically the existence of this discount. They all converge to the same conclusions and our results show that the phenomenon is pervasive as it affects most Korean stocks. It is present in all industries and over the whole sample period. The discount is significant with respect to all countries/group of

[33] To save space, we do not present the detailed results of robustness tests discussed in this subsection. They are available upon request.

countries used as reference to measure it. Korean stocks have lower PE ratios than firms from developed and emerging markets, as well stocks from the Asia-Pacific region. We also document that the discount tends to decrease over time and that is smaller in recent years. It has even completely disappeared during the peak of the financial crisis in 2008. The presence of the discount is robust to factors such as differences between countries in terms of corporate governance, financial development, macroeconomic conditions as well as in terms of country risk. The second part of our analysis investigates the link between the Korea discount and chaebols. These powerful business groups dominate the Korean economy and are often cited as a potential cause of the Korea discount. Observers assume that they are responsible of the discount because of their poor corporate governance and the high risk of minority shareholder expropriation, which should drive down their market valuation. Our results do not support this explanation as we find that the discount affects both chaebol and non-chaebol firms. Furthermore, we find that the discount of chaebol firms is significantly lower than the discount of other Korean firms since 2007. This result is possibly associated with the substantial market power of chaebols and its effect on unaffiliated firms. It could also be due to the fact that some chaebol firms gained an international reputation and visibility which could also lead investor to consider chaebol firms differently than less known Korean firms. However, the exact identification of the determinants of the discount is beyond the scope of this paper. We leave it for further research. Nevertheless, our paper contains two main contributions. It documents the existence of "the Korea discount", an issue often discussed by practitioner but not addressed by the academic literature so far, and analyzes the role of chaebols, showing that they are not the main cause of the discount.

Appendices

Appendix 3 References to the Korea discount in the financial press

Author(s)	Year	Journal	Measure	Benchmark
Norton	2005	Barron's	P/E	Asia ex-Japan
Norton	2005	Barron's	P/E (Samsung)	Taiwan Semiconductor Manufacturing
Norton	2006	Barron's	P/E	Asia
Norton	2007	Barron's	P/E	Asia ex-Japan and emerging markets
Norton	2010	Barron's	P/B	Asia's cheapest market after Japan
Norton	2011	Barron's	P/E	India, China, Taiwan
Zhong	2015	Barron's	P/E Fd	MSCI Asia-ex-Japan Index
Norton	2010	Barron's	P/E	cheapest outside Pakistan and Vietnam
FT	2005	FT	P/E Fd	emerging market
Hasung	2006	FT	P/E	
FT	2010	FT	P/B	Asia ex-Japan
Noble	2010	FT	P/B	China, India
Noble	2010	FT	P/E	China, India
Oliver	2010	FT	P/E Fd	MSCI World
Song and Noble	2013	FT	P/E	India, Indonesia
Song and Noble	2013	FT	P/E	rest of the region
Song	2014	FT	P/B	MSCI All-Country World Index
Mundy	2014	FT	P/E	foreign
Mundy	2014	FT	P/E Fd	MSCI World
Song	2015	FT	P/E Tr (?)	Japan and Hong-Kong
Song	2015	FT	P/E Fd (Hyundai)	Toyota and Honda
Song	2017	FT	P/E Fd	MSCI Asia Pacific index
Harris	2017	FT	P/E	global peers
FT	2018	FT	P/E	global peers.
The Economist	2011	The Economist	P/E	Asia
The Economist	2012	The Economist	P/E Fd	other Asian stock markets
Song	2003	WSJ	P/B	Taiwan
Santini	2006	WSJ	P/E	Asia excluding Japan
WSJ	2007	WSJ	P/E Fd (Hyundai)	Toyota, Honda and Nissan
Sternberg	2011	WSJ	e. g. P/B	Asia
Park	2011	WSJ	P/E	peers in Asia

The table presents articles in the US press discussing/mentioning the Korea discount.
Keyword: "Korea discount", Journals: The Wall Street Journal (WSJ), The New York Times, Newsweek, The Financial Times (FT), Forbes, Bloomberg, The Economist, Barron's, Databases: Europresse, Factiva. The measures are price-earnings ratio (P/E), price-to-book ratio (P/B). P/E can forward (fd) or trailing (tr).

Appendix 4 Estimation of the Korea discount for industry portfolio approach (trailing PE)

	(1)	(2)	(3)	(4)
Panel A: Trailing price-earnings by geographical benchmark				
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Constant	17.731***	11.624***	20.305***	17.380***
	(1.769)	(2.018)	(2.092)	(3.209)
Korea	-4.435***	-4.069***	-4.616***	-4.719***
	(0.408)	(0.730)	(0.490)	(0.692)
Observations	4412	1600	2971	1915
Adjusted R-squared	0.064	0.139	0.063	0.114
Panel B: Trailing price-earnings by sub-periods				
	2002-16	2002-06	2007-09	2010-16
Constant	17.731***	18.003***	23.686***	19.249***
	(1.769)	(2.203)	(2.139)	(1.381)
Korea	-4.435***	-7.659***	-5.165***	-1.874***
	(0.408)	(0.622)	(0.855)	(0.416)
Observations	4412	1427	885	2100
Adjusted R-squared	0.064	0.055	0.073	0.074

*The table presents results for estimation of Korea discount using industry portfolio approach based on equation (1). Dependent variables are 12 months trailing price-earnings ratio. In panel A, regressions are run on the full sample length (2002-2016) on different geographical benchmark. In column (1), all countries are included. Columns (2), (3), and (4) show results when only emerging markets, developed markets and Asia-Pacific countries are used as benchmark. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In panel B, the sample is divided in sub-periods corresponding to pre-crisis (column (2)), crisis (column (3)), and post-crisis (column (4)) periods. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Appendix 5 Estimation of the Korea discount with alternative controls for size (forward EP)

	(1)	(2)	(3)	(4)
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Panel A: Dummy size				
Constant	0.008	0.208***	-0.014	0.177***
	(0.021)	(0.057)	(0.021)	(0.049)
Korea	0.066***	0.028***	0.074***	0.043***
	(0.005)	(0.006)	(0.005)	(0.006)
Observations	162495	28346	138773	58978
Adjusted R-squared	0.004	0.001	0.007	0.003
Panel B: Market value (USD)				
Constant	0.063***	0.188***	0.052***	0.158***
	(0.012)	(0.026)	(0.012)	(0.035)
Korea	0.067***	0.026***	0.075***	0.042***
	(0.005)	(0.006)	(0.005)	(0.006)
Observations	162495	28346	138773	58978
Adjusted R-squared	0.004	0.001	0.005	0.003

*The table presents results for individual stock approach corresponding to equation (2). Dependent variable is 12 months forward earnings-to-price ratio. Regressions are run on the full sample length (2002-2016) sorted by geographical area. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In panel A, size effect is controlled by a set of dummy variables for domestic market capitalization deciles. In panel B, size effect is controlled by market value in USD. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Appendix 6 Estimation of the Korea discount for individual stock approach (trailing EP)

	(1)	(2)	(3)	(4)
Panel A: Trailing earnings-to-price by geographical benchmark				
	Full sample	Emerging markets	Developed markets	Asia-Pacific
Constant	-0.182***	0.099	-0.215***	0.060
	(0.023)	(0.070)	(0.023)	(0.039)
Korea	0.064***	0.012	0.075***	0.031***
	(0.005)	(0.006)	(0.005)	(0.006)
Observations	162495	28346	138773	58978
Adjusted R-squared	0.008	-0.000	0.013	0.002
Panel B: Trailing earnings-to-price by sub-periods				
	2002-16	2002-06	2007-09	2010-16
Constant	-0.182***	-0.159***	-0.121***	-0.124***
	(0.023)	(0.027)	(0.027)	(0.033)
Korea	0.064***	0.096***	0.048***	0.055***
	(0.005)	(0.009)	(0.010)	(0.007)
Observations	162495	48088	32879	81528
Adjusted R-squared	0.008	0.014	0.016	0.007

*The table presents results for individual stock approach corresponding to equation (2). Dependent variables are 12 months trailing earnings-to-price ratio. In panel A, regressions are run on the full sample length (2002-2016) sorted by geographical area. Emerging markets include Brazil, Chile, India, Indonesia, Israel (until 2009), South Africa, South Korea, Taiwan, Thailand, and Philippines. All other countries (including Israel since 2010) are classified as developed markets. Classification is based on MSCI. Korea is excluded from the emerging market and developed market portfolios to avoid overlap issue. Asia-Pacific countries include Australia, Hong-Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. Korea is excluded from the Asia-Pacific portfolio to avoid overlap issue. In panel B, the sample is divided in sub-periods corresponding to pre-crisis (column (2)), crisis (column (3)), and post-crisis (column (4)) periods. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Appendix 7 Estimates of the Korea discount for industries

	Forward earnings-to-price				Trailing earnings-to-price			
	(1) 2002-16	(2) 2002-06	(3) 2007-09	(4) 2010-16	(5) 2002-16	(6) 2002-06	(7) 2007-09	(8) 2010-16
Constant	0.008	0.021	0.036	0.014	-0.181***	-0.159***	-0.121***	-0.124***
	(0.021)	(0.023)	(0.024)	(0.033)	(0.023)	(0.027)	(0.027)	(0.034)
Technology	0.060***	0.038*	0.067***	0.064***	0.051***	0.040	0.004	0.060***
	(0.008)	(0.017)	(0.014)	(0.009)	(0.010)	(0.020)	(0.034)	(0.010)
Telecommunications	0.115***	0.178***	0.077*	0.101***	0.117***	0.170***	0.089**	0.115***
	(0.014)	(0.036)	(0.032)	(0.016)	(0.021)	(0.048)	(0.028)	(0.032)
Health Care	0.156***	0.242***	0.249***	0.120***	0.164***	0.242***	0.281***	0.126***
	(0.012)	(0.039)	(0.031)	(0.010)	(0.014)	(0.040)	(0.049)	(0.011)
Financials	0.051***	0.079***	0.056	0.035***	0.047***	0.034	0.083**	0.039***
	(0.009)	(0.014)	(0.030)	(0.007)	(0.011)	(0.030)	(0.027)	(0.007)
Real Estate	0.077*	0.079***	0.273***	0.086	0.104*	0.107***	0.477***	0.101
	(0.034)	(0.012)	(0.030)	(0.053)	(0.043)	(0.018)	(0.036)	(0.068)
Consumer Discretionary	0.042***	0.086***	0.032**	0.021**	0.051***	0.090***	0.050*	0.028**
	(0.006)	(0.016)	(0.012)	(0.007)	(0.008)	(0.017)	(0.020)	(0.010)
Consumer Staples	0.026**	0.046**	0.006	0.026*	0.026*	0.037	0.027	0.027
	(0.008)	(0.016)	(0.016)	(0.013)	(0.010)	(0.019)	(0.026)	(0.015)
Industrials	0.049***	0.110***	0.025	0.036***	0.029**	0.111***	0.008	0.009
	(0.007)	(0.017)	(0.014)	(0.008)	(0.011)	(0.013)	(0.021)	(0.017)
Basic Materials	0.075***	0.107***	0.031	0.076***	0.095***	0.144***	0.036	0.097***
	(0.011)	(0.012)	(0.020)	(0.017)	(0.014)	(0.017)	(0.026)	(0.022)
Energy	0.338	0.085**	0.035**	0.526	0.266	0.083***	0.069***	0.394
	(0.263)	(0.027)	(0.012)	(0.421)	(0.157)	(0.021)	(0.015)	(0.250)
Utilities	0.067***	0.098***	0.017	0.068***	0.063***	0.105***	0.008	0.057***
	(0.010)	(0.021)	(0.012)	(0.010)	(0.013)	(0.024)	(0.015)	(0.016)
Adjusted R-squared	0.004	0.008	0.008	0.004	0.008	0.014	0.016	0.007
Observations	162495	48088	32879	81528	162495	48088	32879	81528

*The table presents relative valuation of Korean industries based on equation (2) including an interaction between Korea and industry indicators. Coefficients correspond to interaction between Korea indicator and industry dummy (at industry-level). Dependent variables are 12 months forward earnings-to-price ratio (left hand) and 12 months trailing earnings-to-price ratio (right hand). Columns (1) and (5) present results for the whole period. Columns (2) to (4) and (6) to (8) present results for sub-periods corresponding to pre-crisis, crisis, and post-crisis periods respectively. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Appendix 8 Estimation of the Korea discount with country factors (trailing ratios)

	(1)	(2)	(3)	(4)	(5)
	Without	Corporate governance	Financial market	Macro conditions	Country Risk EIU
Panel A : Industry portfolio approach (trailing PE)					
Constant	20.614***	20.010***	22.450***	20.020***	20.682***
	(1.611)	(3.488)	(3.553)	(1.936)	(1.771)
Korea	-2.586***	-2.337	-2.781***	-2.569***	-2.570***
	(0.453)	(1.840)	(0.733)	(0.458)	(0.482)
German		-0.003			
		(2.518)			
French		0.656			
		(1.341)			
Minority investor protection		0.006			
		(0.040)			
Relative market size			-0.001		
			(0.001)		
Financial market development			-0.297		
			(0.615)		
Market return				1.886	
				(3.063)	
GDP Growth				3.029	
				(10.071)	
Country Risk					-0.003
					(0.044)
Observations	2613	2613	2437	2613	2613
Adjusted R-squared	0.076	0.076	0.074	0.076	0.076

Appendix 8 (ctd)

	(1)	(2)	(3)	(4)	(5)
	Without	Corporate governance	Financial market	Macro conditions	Country Risk EIU
Panel B : Individual stock approach (trailing EP)					
Constant	-0.108	-0.062	-0.061	-0.143	-0.149*
	(0.068)	(0.094)	(0.132)	(0.073)	(0.064)
Korea	0.051***	0.046***	0.049	0.042***	0.024
	(0.013)	(0.010)	(0.024)	(0.010)	(0.014)
German		0.001			
		(0.024)			
French		-0.015			
		(0.033)			
Minority investor protection		-0.001			
		(0.001)			
Relative market size			0.000***		
			(0.000)		
Financial market development			-0.015		
			(0.022)		
Market return				-0.030	
				(0.032)	
GDP Growth				0.808***	
				(0.192)	
Country Risk					0.002**
					(0.001)
Observations	99656	99656	90625	99656	99656
Adjusted R-squared	0.006	0.006	0.008	0.007	0.007

*The table provides the results of the estimation of the Korea discount (based on trailing earnings ratio) including country-level controls. Column (1) provides results for the baseline model without country-level controls for comparison purpose. Column (2) shows results for model with controls for legal origin and minority investor protection score (0 to 100) provided by the WB. Column (3) presents results for model including relative market size computed as the market capitalization of domestic firms as percentage of the GDP (WB) and financial market development score (1 to 10) provided by the WEF. Column (4) presents results for model including GDP growth and country stock index return. The GDP growth is based on annual change in GDP per capita in local currency. Stock index return is computed based on Datastream total market index. Column (5) includes the Economist Intelligence Unit's overall risk rating score accounting for sovereign risk, currency risk and banking sector risk. In Panel A, Korea discount is estimated by industry portfolio approach. The dependent variable is trailing price-earnings ratio. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level. In Panel B, the Korea discount is estimated by individual stock approach. The dependent variable is trailing earnings-to-price ratio. Size effect is controlled by a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Appendix 9 Estimates of the chaebol and non-chaebol Korea discounts (trailing ratios)

	(1)	(2)	(3)	(4)
	2002-16	2002-06	2007-09	2010-16
Panel A: Industry portfolio approach (trailing PE)				
Constant	17.935***	18.195***	24.117***	18.334***
	(2.311)	(2.428)	(2.135)	(1.471)
Chaebol	-1.700***	-3.750***	-1.198	-0.563
	(0.448)	(0.806)	(0.919)	(0.481)
Non-chaebol	-2.620***	-5.396***	-3.350**	-0.354
	(0.474)	(0.863)	(0.967)	(0.517)
Observations	2933	953	588	1392
Adjusted R-squared	0.056	0.042	0.073	0.058
F-test Chaebol=Non-chaebol	53.35***	25.76***	52.97***	4.56*
Panel B: Individual stock approach (trailing EP)				
Constant	-0.182***	-0.159***	-0.122***	-0.124***
	(0.023)	(0.027)	(0.027)	(0.033)
Chaebol	0.006	0.072***	-0.015	-0.013
	(0.008)	(0.017)	(0.013)	(0.010)
Non-chaebol	0.086***	0.105***	0.078***	0.078***
	(0.006)	(0.010)	(0.013)	(0.008)
Observations	162495	48088	32879	81528
Adjusted R-squared	0.008	0.014	0.016	0.007
F-test Chaebol=Non-chaebol	71.48***	3.33	22.95***	55.33***

*The table presents the results for models including indicators for chaebol and non-chaebol firms based on trailing earnings. Chaebol indicator takes value 1 for firms affiliated to one of the top 30 chaebols based on KFTC classification. Non-chaebol indicator takes value 1 for Korean firms that are not affiliated to a top 30 chaebols. Columns (1) presents results for the full sample length. Columns (2), (3), and (4) present results for pre-crisis, crisis, and post-crisis periods respectively. Panel A presents result for industry portfolio approach and dependent variable is forward price-earnings. Portfolio for financial (ICB 30), real estate (ICB 35), energy (ICB 60), and utilities (ICB 65) are excluded due to low number of Korean firms. Industry-country portfolio PE are winsorized at 1 and 99 percent level. All regressions include industry (ICB industry-level) and year fixed effect. Robust standard errors are clustered at country-level and showed in parentheses. Panel B presents results for individual stock approach and dependent variable is forward earnings-to-price. Regressions include control for size based on a set of dummy variables for domestic market capitalization deciles. All regressions include industry (ICB sector-level) and year fixed effect. Robust standard errors are clustered at firm-level and showed in parentheses. p-value *<5% **<1% ***<0.1%*

Chapter 2

Investors' perception of business group membership during an economic crisis

Evidence from the COVID-19 pandemic♣

Abstract

This paper examines how investors perceive business group membership in Korea during the COVID-19 pandemic. Stock price performance analysis reveals evidence of a time-varying and heterogeneous value of affiliation: investors discount business group affiliation during a market collapse, but are willing to pay a premium for affiliation during market recovery. Overall, this pattern is more pronounced for financially weak affiliates and large business groups. The results further show that business group membership alleviates investors' concerns regarding financial flexibility, highlighting the role of internal capital markets as a substitute for external finance.

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1. Introduction

This paper exploits the COVID-19 pandemic to examine investors' perception of business group membership during a crisis period. Starting in early 2020, the COVID-19 pandemic spread quickly across Asia and the rest of the world. The shock from this unprecedented event in recent history serves as an interesting opportunity to empirically investigate the costs and benefits of business group affiliation. First, the COVID-19 crisis exhibits the desired features of a natural experiment (Ramelli and Wagner, 2020). This event was highly unexpected. In fact, environmental issues and climate were the focus of most concerns at the beginning of 2020 (WEF, 2020a). Additionally, as a health crisis, the COVID-19 crisis is exogenous to the financial and economic fields, in contrast to previous crises (Goldstein et al., 2021). Second, the effects of the COVID-19 crisis on the economy are likely to revive some benefits associated with business group affiliation. Indeed, the literature often describes the ability of business groups to pool and reallocate resources among affiliates as a factor in their success, especially when markets are underdeveloped or inefficient (Holmes Jr et al., 2018). During the COVID-19 pandemic, governments had to take extraordinary measures to mitigate the spread of the disease altering, the functioning of the product, labor, and financial markets. This situation led to a supply and demand shock and generated strong uncertainty among managers and investors (Altig et al., 2020).

Business groups are prevalent in many countries around the world (Dau et al., 2021) and South Korea (henceforth "Korea") presents interesting features for studying this type of business structure. Since the end of the Korean War, large business groups, commonly called chaebols, have dominated the Korean economy. In the 1980s, the power accumulated by chaebols led the government to monitor their activities (Eichengreen et al., 2015). To this end, the Korea Fair Trade Commission (KFTC) discloses a list of large business groups and their affiliates every year, simplifying the identification of business groups and their affiliated firms. Korea was one of the first countries hit by the COVID-19 pandemic outside China. Therefore, Korean firms and investors had little time to respond, ensuring the exogeneity of the economic shock compared with other countries that reported their first cases months later.

This paper provides new evidence about the perception of business group affiliation by market participants during an economic downturn. The cross-sectional analysis of stock price performance reveals a time-varying value of business group membership. During the first months of the pandemic, investors discounted affiliation. The growing uncertainty and financial market volatility tended to exacerbate the costs of affiliation due to the risk of minority

shareholder expropriation, liquidation, and restructuring. In addition, the economy-wide shock annihilated some of the value enhancing mechanisms associated with business group membership in normal times. Empirical results indicate a stronger discount for affiliates with a higher risk of minority shareholder expropriation and for affiliation with groups exposed to the financial distress of their affiliates. Later, policy interventions reassured market participants and investors were willing to pay a premium for business group affiliates. Further, access to internal capital markets associated with business group affiliation alleviated concerns regarding financing during the crisis. Consequently, the positive association between financial flexibility proxies and stock returns observed for unaffiliated firms is not significant for firms belonging to a business group. Evidence of heterogeneity in affiliation value also highlights the financing role of internal capital markets. Affiliation pricing is more pronounced for affiliates with weaker balance sheets, whereas investors ignore affiliation with small business groups with fewer resources to share.

My paper extends several fields of finance literature. First, it contributes to the growing literature on the COVID-19 pandemic and its impact on firms and stock markets. As a quasi-natural experiment, this pandemic has generated a substantial number of research papers in finance. Several articles examine market responses to the pandemic within a country (e.g. Baker et al. (2020), Bretscher et al. (2020) and Carletti et al. (2020)) or at a global level (e. g. Ding et al. (2021)). A number of authors investigate financing issues during the COVID-19 pandemic. Among others, Acharya and Steffen (2020) and Halling et al. (2020) examine the access to debt or bond markets during the pandemic, whereas Fahlenbrach et al. (2021) and Ramelli and Wagner (2020) discuss the effect of financial flexibility. My results confirm prior findings regarding the value of financial flexibility during a crisis and highlight the role of internal capital markets as a subsidiary source of financing during economic crisis.

The results regarding the value of affiliation also complement the literature on business groups. Many scholars examine internal capital markets and business groups in the context of underdeveloped markets or crisis periods. However, the value of affiliation remains unclear. Some authors find a positive effect explained by access to scarce resources (Khanna and Yafeh, 2007), risk reduction (Lincoln et al., 1996), or mutual support (Gopalan et al., 2007). Others point out the risks associated with governance (Baek et al., 2004) and expropriation of minority shareholders (Johnson et al., 2000b). The present study offers new insights into this literature by explicitly focusing on investors' perception through an analysis of stock price performance. This approach contrasts with the majority of prior studies that use operating or valuation

measures of performance. [34] Stock price analysis allows a finer analysis of changes in investors' perception and market expectation throughout the different phases of the crisis. [35] Hence, I observe a switch in the affiliation value between the market collapse and market recovery periods. This finding explains the lack of consensus in prior works. Indeed, it suggests that the sample period and sample length used to estimate affiliation value affect the final result. Additionally, the evidence of between-affiliate and between-group heterogeneity highlights the potential effect of sample composition and business group definition.

As a third contribution, my paper extends the existing literature on Korean chaebols, which mostly focuses on the 1997 Asian financial crisis (e. g. Baek et al. (2004), Bae et al. (2012), Almeida et al. (2015), Gormley et al. (2015)). Several elements call for a reexamination of this topic in light of the substantial changes in the Korean institutional framework. First, the 1997 Asian financial crisis led to numerous reforms aimed at curbing the power of chaebols, improving corporate governance, and promoting free market economy. The lifting of restrictions on foreign ownership opened the Korean stock market to foreign investors (Eichengreen et al., 2015). Second, Korea has improved its competitive position and has become one of the most innovative and competitive countries in the world (WEF, 2019). Some Korean companies have also gained significant international recognition and visibility. Finally, the nature and context of the 1997 Asian financial crisis and COVID-19 crisis differ. In the 1990s, Korean economic growth was driven by investments fueled by foreign capital inflows. The economic slowdown and withdrawal of foreign capital precipitated the insolvency of Korean companies and the financial system (Eichengreen et al., 2015). The COVID-19 pandemic is a global health crisis that triggered a sudden revenue shock and high uncertainty regarding the economic outlook (Altig et al., 2020).

The remainder of this paper is organized as follows. Section 2 reviews the literature on business groups and internal capital markets. In Section 3, I discuss the role of financial flexibility and affiliation with a business group during an economic crisis. The testable hypotheses are presented in the same section. Section 4 presents the empirical framework of this study (sample, variables, and timeline). Empirical results are presented and discussed in Section 5 and Section 6 concludes the paper.

[34] Baek et al. (2004) and Bae et al. (2012) also propose analyses based on stock price performance of Korean firms around the 1997 Asian financial crisis. However, their focus is on corporate governance rather than business group affiliation per se.

[35] Ramelli and Wagner (2020) use a similar approach to investigate financial policies and international trade exposure drive value of US firms during the COVID-19 pandemic.

2. Business groups and internal capital market

2.1 Business groups and Korean chaebols

Business group is a form of business organization common in many regions around the world including both developed and emerging markets (Dau et al., 2021). Khanna and Yafeh (2007) define business groups as groups of "*legally independent firms, operating in multiple (often unrelated) industries, which are bound together by persistent formal and informal ties*" (p. 331). Unlike conglomerates, business group' affiliates are usually not fully owned but controlled by an individual or family through complex and often control-magnifying ownership structures (Kandel et al., 2019). The centralized control allows affiliates to act in a coordinated manner and pursue common strategy. In addition, it creates a group identity (Granovetter, 2010). The level of diversification differs between groups. Risk reduction and the lack or inefficiency of external markets are often cited as motives for diversification of business groups especially in less developed countries (Khanna and Yafeh, 2007).

Business groups have played a prominent role in Korea in historical, political, and economic terms. [36] As partners of the government, they contributed to the economic development and industrialization of the country during the second half of the twentieth century. Access to preferential loans and foreign capital, tax benefits, and tariff exemptions allowed chaebols to expand and diversify their activities. This growth came hand in hand with the accumulation of significant economic and political power. Chaebols also benefited from government support in facing different crises. Despite their contribution to the economic development of Korea, chaebols were criticized for their role in the 1997 Asian financial crisis that led to an IMF rescue package. In the aftermath of the crisis, the government implemented several reforms targeting chaebols, with the aim to improve governance, financial resilience, and transparency of chaebols (Eichengreen et al., 2015). However, these reforms did not lead to the disappearance of business groups in Korea. Chaebols still play the role of the spearhead of the Korean economy (Kandel et al., 2019) and several chaebol affiliates become world players in industries such as electronics and automotive.

Despite the well-developed literature, the value of business group membership remains unclear. In their meta-analysis, Carney et al. (2011) show that the effect of affiliation is heterogeneous and depends on the institutional framework, group organization and firm characteristics. Among the costs associated with business group membership, corporate governance issues and

[36] For details, interested readers are referred to chapter 5 in Eichengreen et al. (2015).

the risk of minority shareholder expropriation are recurring topics (Holmes Jr et al., 2018). The complex ownership structure, intra-group transactions, and the presence of a controlling shareholder worsen these risks (Faccio et al., 2001). Indeed, controlling shareholders might privilege group-level interests at the expense of minority shareholders. For instance, Bae et al. (2002) show that some strategic decisions are value-enhancing at a group level but value-destroying for minority shareholders.

Nevertheless, business group membership offers some advantages. Khanna and Yafeh (2007) suggest that internalization of resources and transactions benefits affiliates through better access to scarce resources and lower transaction costs. As large and important economic actors, Edwards (1955) argues that business groups have a better access to authorities and stronger market power. Affiliation with a business group also provides advantages in terms of financing. Shin and Park (1999) find that business group affiliates are less financially constrained and have lower investment to cash flow sensitivity. Gopalan et al. (2007) show that affiliated firms benefit from lower borrowing costs, and Larrain et al. (2019) find that business group affiliates have better access to the debt market. These advantages are mainly associated with the ability of business groups to pool and allocate financial, human, technological or other resources between affiliates, creating internal resource markets (Holmes Jr et al., 2018). This paper focuses more specifically on internal capital markets.

2.2 Internal capital markets and business group membership

According to Stein (2003), internal capital markets create value through "more-money" and "smarter-money" effects. Business groups have several features that can explain their ability to raise a larger amount of external financing. First, Lewellen (1971) points out the lower risk induced by the diversification of cash flow sources among different affiliates and industries (co-insurance effect). Second, internal capital markets can be used as collateral to increase debt capacity at the group level. For instance, unused debt capacity (Larrain et al., 2019) or assets of one affiliate (Chang and Hong, 2000) can be used to provide access to external debt to another affiliate. Finally, given their size and economic power, business groups might benefit from "too big to fail" belief (Gormley et al., 2015) and from political ties (Minetti and Yun, 2015) to access external finance. The "smarter-money" effect refers to the ability to transfer resources among affiliates, depending on financial needs and investment opportunities. Stein (1997) argues that low within group information asymmetry enables efficient monitoring and winner-picking activities. Combined with the "more-money" effect, internal capital markets ensure that

the most promising projects receive financing and reduce the risk of canceling profitable investments due to the lack of financing (Almeida et al., 2015).

However, a number of authors observe evidence of propping and mutual insurance within business groups, in contrast to the common definition of efficient resource allocation. Bae et al. (2008) define propping as cross-subsidizations, aiming to support financially constrained affiliates. According to Friedman et al. (2003), the controlling shareholders might engage in propping to preserve private benefits. Lincoln et al. (1996) and Gopalan et al. (2007) suggest that propping and mutual insurance lower profit volatility and bankruptcy risk, to promote long-term group interests. Additionally, internal capital markets can play the role of a substitute and mitigate financial market failures during economic crises or shocks (Matvos and Seru, 2014). For instance, Buchuk et al. (2020) and Santioni et al. (2020) document the role played by internal capital markets during the global financial crisis in Chile and Italy. In both cases, access to internal capital markets helps affiliated firms in facing crises.

The literature provides evidence of the existence of internal capital markets within Korean chaebols. Several authors examine the functioning and ties between affiliates. For instance, Chang and Hong (2000) document a relationship between group-level resources and affiliate-level performance. Ferris et al. (2003) observe that chaebols allocate resources to smooth profits and support weak affiliates. Shin and Park (1999) find a relationship between the investment of one affiliate and the cash flow and investment opportunities of the other affiliates of the same group. Almeida et al. (2015) observe that capital reallocation within chaebols mitigate the effect of the crisis on affiliates' value and investments during the 1997 Asian financial crisis. A number of scholars also document the spillover effect within chaebols at credit rate (Kwon et al. (2016) and Joe and Oh (2018)) and earnings announcements (Bae et al., 2008). Kwon et al. (2019) also find a positive association for stock price crash risk between affiliates of the same business group. Other articles examine the advantage of chaebol membership in terms of fundraising. Gormley et al. (2015) find that chaebol affiliates benefit from the "too big to fail" belief to raise a larger amount on the debt market than non-chaebol firms during the 1997 Asian financial crisis. Minetti and Yun (2015) find that during the pre-crisis period, political ties help chaebol affiliates to raise funds under better conditions than unaffiliated firms. However, this advantage disappears after the 1997 Asian financial crisis, suggesting the effectiveness of some reforms.

3. Hypotheses development

In this section, I present and develop testable hypotheses regarding investors' perception of business group membership when firms face an economic shock. The section starts by discussing the benefits and costs of affiliation to predict the overall value of affiliation. Next, the market response to a sudden revenue drop is modeled given firm financial flexibility and access to internal capital markets. Finally, I address the between-affiliate and between-group heterogeneity of business group membership value.

3.1 Value of business group membership

The overall value of business group membership corresponds to the sum of the benefits and costs of affiliation. Affiliated firms have access to internal markets. The literature documents several benefits provided by internal markets such as access to scarce resources, lower transaction costs, and flexible resource allocation (Kim et al., 2004a). In terms of financing, affiliated firms benefit from "more-money" and "smarter-money" effects associated with internal capital markets. Business group members might also benefit from mutual insurance in case of financial distress (Hoshi et al., 1991). Nevertheless, business group affiliation is also associated with some costs given the conflict of interest between controlling and non-controlling shareholders or the misallocation of resources (Khanna and Yafeh, 2007).

The current analysis is conducted in the context of a sudden and unexpected economic shock. Therefore, the benefits and costs of business group membership need to be reexamined in such circumstances. Resource based view theories argue that internal markets constitute a competitive advantage of business groups when external markets are underdeveloped or inefficient (Khanna and Yafeh, 2007). Economic shocks alter functioning and restrain access to external capital markets by increasing uncertainty, risk of bankruptcy, and information asymmetry. Therefore, access to internal capital markets is likely to be more valuable during such period. This prediction is supported by Santioni et al. (2020), who observe that firms rely more on internal capital markets when their bank faces a deteriorating balance sheet. In addition, they also find a higher survival rate for affiliated firms suggesting that mutual insurance might constitute another benefit of business group membership during an economic downturn. Hence, I propose the following hypothesis:

H1a: *Investors perceive business group membership as value-enhancing when an economic shock occurs.*

However, economic crises might also reduce some benefits and increase the costs associated with business group affiliation. An economy-wide shock annihilates the co-insurance effect based on the diversification of cash flow among different affiliates and industries (Khanna and Yafeh, 2005). Therefore, affiliates might lose the benefits of mutual support and insurance associated with business group membership in normal times. In addition, financial ties between affiliates may generate a systemic risk at the group level (Bae et al., 2008). Economic crises also tend to exacerbate corporate governance costs. Johnson et al. (2000a) and Lemmon and Lins (2003) document that during periods of economic crisis minority shareholder expropriation is more frequent. Bae et al. (2012) explain the increase in minority shareholder expropriation during crisis periods due to poor investment opportunities and economic prospects. Moreover, in the case of business groups, controlling shareholders are likely to prioritize their own or group-level interests at the expense of minority shareholders. Considering the loss of some benefits and the increase in the costs of affiliation during economic crises, I propose the following alternative hypothesis:

H1b: *Investors perceive business group membership as more costly when an economic shock occurs.*

Hypotheses 1a and 1b are not competing hypotheses and the overall value of business group membership will depend on the extent to which one hypothesis dominates the other. Therefore, the value of affiliation is likely to change over time, given the evolution of market conditions and prospects.

3.2 Economic crisis and internal capital markets

This section starts with a simple example to describe the transmission of an economic shock to stock prices. Then, I develop hypotheses related to the mediating role of financial flexibility. Finally, the hypotheses are complemented given the possibility for the firm to be affiliated with a business group.

3.2.1 Economic shock and equity value [37]

To illustrate how an economic shock integrates into stock prices, assume an unlevered firm with an infinite lifespan earning in each period t a revenue R, incurring costs C, and investing amount I. Following Fama et al. (1972, pp. 87-88), the equity value of this firm is given by Equation (1):

$$V_0 = \sum_{t=1}^{\infty} \frac{R_t - C_t - I_t}{(1+r)^t} = \sum_{t=1}^{\infty} \frac{X_t - I_t}{(1+r)^t} \quad (1)$$

where, the firm market value, V_0, is the sum of future net cash flows discounted at the rate r. Net cash flow is the revenue, R, minus operating costs, C, and investments, I. Through simplification, net cash flow can be written as the difference in operating cash flow X (with $X_t \equiv R_t - C_t$), and the investments, I.

Now, assume an economic shock triggering a reduction in firm revenue during several periods. For constant costs, the firm's operating cash flow decreases leading to a loss in equity value. For a crisis of length T, the value of the firm facing a crisis, V_0', can be written as

$$V_0' = \sum_{t=1}^{T} \frac{X_t' - I_t'}{(1+r)^t} + \sum_{t=T+1}^{\infty} \frac{X_t - I_t}{(1+r)^t} \quad (2)$$

where, X' and I' denote operating cash flows and investments during the crisis with $X' < X$, and $I' \leq I$. The total value of the firm is given by the sum of the present value of net cash flows during the crisis and the present value of post-crisis net cash flows. Under the assumption that post-crisis net cash flows are equal to cash flows in a state without crisis (Equation (1)), the value loss, ΔV_0, due to the crisis is given by Equation (3):

$$\Delta V_0 = \sum_{t=1}^{T} \frac{\Delta X_t - \Delta I_t}{(1+r)^t} \quad (3)$$

Equation (3) shows that value loss increases with the length of the crisis, T, and the magnitude of the operating cash flow drop, ΔX_t, but is reduced by investment reduction, ΔI_t. The hypotheses developed later in this section assume an efficient market as defined by Fama (1970). Under this assumption, stock price changes reflect the market's expectations regarding the magnitude of the cash flow shortfall and the length of the crisis. As the crisis unfolds, market

[37] Interested readers can also read Fahlenbrach et al. (2021).

participants correct their expectations to the latest information available leading to stock price adjustments. As crisis length is common to all firms, only the magnitude of changes in operating cash flow and investment drive the cross-sectional differences in stock price changes.

3.2.2 Value of financial flexibility

Denis (2011) defines financial flexibility as "*the ability of a firm to respond in a timely and value-maximizing manner to unexpected changes in the firm's cash flows or investment opportunity set*". When a firm faces an economic shock, financial flexibility allows the firm to offset the revenue drop with alternative sources of financing. This analysis considers two sources of financing: cash reserves as internal financing and debt as outside financing.

The literature describes internal financing as a cheaper source of financing than external funds because of lower information asymmetry (Myers and Majluf, 1984). Gamba and Triantis (2008) observe that firms manage their cash balance to avoid the risk of financial distress given the current prospects. Hence, firms increase cash reserves for precautionary purposes if they anticipate a revenue shock, financial constraints or investment opportunities. When an unexpected cash flow shortfall occurs, cash reserves play the role of a buffer to avoid liquidation or fire sales (Almeida et al., 2004). Additionally, holding cash allows firms to maintain profitable investments when external financing is either unavailable or too costly (Denis and Sibilkov, 2010). These findings are confirmed by a survey of CFOs conducted by Campello et al. (2010). The survey also shows that firms with limited access to external financing use internal liquidity to fund investments and liquidated assets to generate cash during the global financial crisis. Finally, most authors point at a higher value of cash holding for financially constrained firms (e.g. Almeida et al. (2004) and Denis and Sibilkov (2010)). However, a high level of uncertainty, revenue decline, and limited access to external finance are likely to generalize the value of cash holding during crisis periods. For instance, Fahlenbrach et al. (2021) and Ramelli and Wagner (2020) document the positive value of cash holding during the COVID-19 pandemic in the US. Therefore, I expect the following:

H2: *Cash holding is positively associated with stock returns when firms experience a sudden economic shock.*

As external funds, debt is costlier than internal liquidity (Myers and Majluf, 1984). Debt also constitutes a source of fixed costs due to interest and repayment. Therefore, a higher debt level implies higher costs to fund and a larger value loss in the case of a revenue shock. In

addition, a high level of debt exposes firms to debt payments and rollover risks (Fahlenbrach et al., 2021). These negative effects are especially relevant for short-term debt (Duchin et al., 2010). Debt also restrains the ability of the firm to raise additional external funds, thus reducing its financial flexibility. Accordingly, I propose the following hypothesis regarding the value of debt:

H3: *Debt ratio is negatively associated with stock returns when firms experience a sudden economic shock.*

Investments can be considered as another aspect of financial flexibility. A revenue drop alters the firm's ability to fund new projects especially if the firm has a limited internal liquidity and restricted access to external financing. Therefore, as the survey by Campello et al. (2010) indicates, many firms have to cut profitable investments to lower their costs during crisis periods. In the short run, cutting investments limits the drop in equity value as illustrated by Equation (3). However, it might reduce firm value in the long run by altering future revenue (the second part of the right-hand side of Equation (2)). Therefore, investment-intensive firms are likely to suffer more from revenue shocks. First, if investment cancelation is not possible in the short run, investment-intensive firms have to cover higher costs increasing the value loss. Second, reducing investments is likely to strongly alter the future value of investment-intensive firm. For these reasons, I propose the following hypothesis:

H4: *Investment intensity is negatively associated with stock returns when firms face a sudden economic shock.*

3.2.3 Value of financial flexibility and business group affiliation

Hypotheses 2 to 4 discuss the value of financial flexibility when economic shocks occur, assuming that the firm is independent and relies on internal liquidity and external finance. This subsection introduces the possibility of a business group affiliation. Unlike independent firms, firms affiliated with a business group have access to internal capital markets (see Section 2.2). When an economic shock occurs, access to internal capital markets might help affiliated firms to fund the revenue drops and offset the restricted access to external finance. This assumption requires to revisit and complement previous hypotheses.

As access to internal capital markets relaxes financial constraints (Shin and Park, 1999), the value of cash holding might be lower for business group affiliates than for unaffiliated firms.

Indeed, as a flexible source of financing, internal capital markets offset a lack of internal liquidity, when firm revenue drops. In addition, the co-insurance effect and mutual insurance substitute the precautionary and buffer effects of cash holding. Hypothesis 2 can be developed as follows:

H5: *When an economic shock occurs, cash holding is a less relevant pricing factor for affiliated firms than for unaffiliated firms.*

For similar reasons, business group membership is likely to mitigate the negative association between debt level and equity value when a revenue drop occurs. The mutual insurance effect alleviates the risk of bankruptcy associated with interest and debt repayments. In addition, through the "more-money" effect, internal capital markets ease access to debt financing and reduces its costs or acts as a substitute for external debt for affiliates unable to raise external financing. Accordingly, Hypothesis 3 can be revised as follows:

H6: *When an economic shock occurs, debt ratio is a less relevant pricing factor for affiliated firms than for unaffiliated firms.*

Due to lower information asymmetry, internal capital markets allow for a more efficient resource allocation than external markets (Stein, 1997). Almeida et al. (2015) observe that during crisis period, affiliates with high growth opportunities benefit from internal capital markets to fund investments. Hoshi et al. (1991) and Shin and Park (1999) empirically show that business group affiliation is associated with a lower investment to cash flow sensitivity. Therefore, the access to internal capital markets reduces the likelihood of investment cancelation in the case of cash flow drops. Accordingly, I suggest revising Hypothesis 4 as follows:

H7: *When an economic shock occurs, investment intensity is a less relevant pricing factor for affiliated firms than for unaffiliated firms.*

3.3 Heterogeneity of business group membership value

According to Hypotheses 1a and 1b, the value of business group membership depends on the extent to which an economic meltdown increases the benefits and costs of affiliation.

However, an important limitation of these hypotheses is the assumption of a homogeneous affiliation value. The following hypotheses relax this assumption and examine between-affiliate and between-group heterogeneity.

3.3.1 Between-affiliate heterogeneity of business group membership value

Affiliates with weaker balance sheets are likely to benefit more from business group affiliation. Internal capital markets constitute a valuable source of funding for affiliates with low cash reserves or high debt, given their limited access to outside financing (Bae et al., 2008). In addition, Gormley et al. (2015) show that affiliation also eases access to the debt market. Finally, propping and mutual insurance may benefit weaker affiliates (Friedman et al., 2003). According to these arguments,

H8a: *The value of business group membership is positive for affiliates with weaker balance sheets*.

However, an economic crisis might reduce some benefits of affiliation, particularly for weak affiliates. As discussed earlier in this section, economy-wide shocks annihilate the co-insurance effect of internal markets. Friedman et al. (2003) also suggest that propping is likely to stop in the case of severe macroeconomic shocks. Financially weak affiliates also face higher agency costs due to the risk of bankruptcy and restructuring (Jensen and Meckling, 1976) as well as minority shareholder expropriation (Friedman et al., 2003). Finally, financial distress might lead business groups to liquidate the weakest affiliates to focus on core businesses (Kim et al., 2004a). Therefore, the following hypothesis is proposed:

H8b: *The value of business group membership is negative for affiliates with weaker balance sheets.*

As an additional source of financing, internal capital markets help affiliates to fund investments above their internal capacity (Belenzon et al., 2013). When access to external funding tightens, investment-intensive affiliates can rely on internal capital markets to maintain an optimal level of investment. For instance, Almeida et al. (2015) find that internal capital markets allow business group affiliates to maintain their investments during and after financial crisis. As discussed previously, investment-intensive firms face a double burden due to higher costs and the risk of altering future value by canceling investments. Hence,

H9: *The value of business group membership is positive for firms with high investment intensity.*

3.3.2 Between-group heterogeneity of business group membership value

The value of affiliation is likely to vary between groups depending on the benefits and risks associated with each group. The resource based view approach suggests a positive link between the benefits of affiliation and business group size (Carney et al., 2011). Byun et al. (2013) argue that the co-insurance effect and group size are positively associated. Group size also provides some intangible benefits such as higher market and political power (Khanna and Yafeh, 2007), the "too big to fail" belief (Gormley et al., 2015), and better visibility and reputation, easing business relations (Morck et al., 2005). As this analysis focuses on investors' perception, these benefits are especially relevant. Therefore,

H10: *The value of business group membership is higher for the largest business groups.*

Group financial vulnerability might be a source of concern for investors. First, the lack of resources decreases the benefits of internal capital markets such as propping and co-insurance. Second, as observed by Gopalan et al. (2007) in India, the bankruptcy of an affiliate increases the bankruptcy risk of other affiliates. The collapse of Korean chaebols during the 1997 Asian financial crisis provides another example of this spillover effect (Eichengreen et al., 2015). Hence, I expect the following:

H11: *The value of business group membership is negative for business groups exposed to affiliate financial distress.*

The value of business group membership during economic downturns depends on the extent to which economic shocks influence the benefits and costs of affiliation. On the one hand, investors might perceive business group affiliation as beneficial when firm experiences revenue shock and access to external financing is limited. Indeed, access to internal capital markets reduces the affiliates' reliance on cash reserves and outside financing. In addition, business groups might support their distressed affiliates through propping and mutual insurance. On the other hand, the uncertainty that characterizes crisis periods exacerbates the conflicts of interest between controlling and non-controlling shareholders. A strong economic shock might also reduce some of the benefits of affiliation. For these reasons, the value of

affiliation is likely to differ between affiliates depending on their financial conditions and capital needs. Finally, the value of business group membership also depends on the group's financial strength and its ability to provide advantages to its affiliates.

4. Sample and variables

4.1 Sample selection

As discussed in the introduction, the Korean market provides an ideal field for analyzing business groups and internal capital markets. A single country analysis also ensures consistency in business group definition and homogeneity in the institutional framework (Byun et al., 2013). The sample consists of firms listed on the two main divisions (KOSPI and KOSDAQ) of the Korean stock market (KRX) as of January 2, 2020. [38] Following common practice in the literature, financial and utility firms are excluded from the sample (ICB industry codes 30 and 65). To avoid bias due to the pandemic, firms with fiscal ends other than the end of December 2019 are dropped. After deleting firms with missing data, the final sample is composed of 1870 listed firms including 704 listed on the KOSPI and 1166 listed on the KOSDAQ division.

4.2 Dependent and independent variables

Accounting and financial data are retrieved from Refinitiv Datastream and Worldscope. The main dependent variable of the analysis is the cumulative excess return [39] computed as the sum of daily excess returns defined as the natural logarithm of one plus the daily stock return minus the risk free rate. The total return index (RI) provided from Refinitiv Datastream is used to compute daily returns. The risk-free rate is the yield of one-year treasury bonds provided by the Bank of Korea. Cumulative excess returns are computed for different sub-periods (see Section 4.3) and are described in Section 5.1.

The independent variables include proxies for financial flexibility and investment. Cash holding is used as a measure for the internal source of financing. The analysis uses three different measures of debt to assets ratios: short-term, long-term, and total debt. Net short-term debt computed as short-term debt in excess of cash combines internal and external financing. Investment intensity is measured as the ratio of capital expenditure to lagged assets. In further

[38] Established in 1956, the KOSPI is the main and historical market division of the Korean stock market. The largest Korean multinational enterprises are listed on this division. Founded in 1996, the KOSDAQ aims to provide an access to capital market for SMEs. The list of listed firms comes from the KRX website.
[39] This methodology follows Fahlenbrach et al. (2021) and Ramelli and Wagner (2020) who use cumulative returns to investigate the market reaction during the COVID-19 pandemic.

analysis, Tobin's q is used as a proxy for investment opportunities. Following Fahlenbrach et al. (2021), I use five variables to control for cross-sectional variation in stock returns. These variables are profitability, size, value, market beta, and momentum. Profitability is measured using return on assets (ROA). Firm size is the natural logarithm of the year-end market capitalization. The book-to-market ratio is a proxy for firm value. These variables are measured at the end of 2019. Market beta is the regression slope of daily stock excess returns on a constant and daily excess market returns for 2019. [40] Momentum is the sum of the daily log excess stock returns of year 2019. All variables are winsorized at the 1 percent level in each tail. The industry indicator is based on the ICB supersectors definition. Appendix 10 defines the independent variables in more detail.

Summary statistics of the independent variables are presented in Panel A of Table 11. The average (median) firm has a cash to assets ratio of 10.33 percent (7.61 percent). In terms of debt structure, we observe a higher proportion of long-term debt than short-term debt, with ratios of 14.54 percent (11.39 percent) and 7.60 percent (4.04 percent), respectively. Firms have, on average, positive net short-term leverage meaning that their short-term debt exceeds their cash reserves. In 2019, the average (median) capital expenditure to lagged assets is 4.88 percent (2.51 percent).

Every year, the KFTC discloses a list of the largest business groups and their affiliates. This specificity of the Korean framework is an interesting and convenient feature for researchers. Following common practice in the literature, the chaebol affiliation indicator is based on this classification. Unlike some authors, this analysis does not restrict the definition of chaebol to the 30 largest business groups, and instead includes all business groups with a value of total assets above the threshold of 5 trillion KRW. The final sample comprises 52 groups and 237 listed affiliates. [41] Ownership variables for chaebol affiliates are based on KFTC data. Following a common practice in the literature (e. g. Baek et al. (2004) and Bae et al. (2012)), the disparity between control and cash flow rights of controlling shareholders (and their families) is used as a proxy for governance and expropriation risks. For a given firm, the controlling shareholder' cash flow rights are the sum of direct and indirect equity ownership, which is computed as the product of ownership stakes obtained along the control chain. Control rights are the sum of direct equity ownership and the sum of equity ownership of other affiliates

[40] KOSPI Composite and KOSDAQ Composite are used as benchmark markets depending on which market stocks are listed.
[41] Among the 64 business groups identified by the KFTC, some business groups do not have listed affiliates.

in the given affiliate. [42] Like Bae et al. (2012), I trace indirect equity stakes up to the second pyramid layer. [43] Then, chaebol affiliates are classified into two groups depending on whether their ratio of control to cash flow rights is higher or lower than the median. [44]

Table 11 Summary statistics

	Obs.	Mean	Min	p25	Median	p75	Max	SD
Panel A: All sample firms								
Cash (%)	1870	10.331	0.001	3.525	7.606	13.819	51.721	9.859
Net ST debt (%)	1870	4.208	-47.754	-7.195	3.005	15.935	51.221	18.338
ST debt (%)	1870	14.537	0.000	2.699	11.386	22.588	57.441	13.418
LT debt (%)	1870	7.603	0.000	0.556	4.040	11.391	41.880	9.149
CAPEX/Assets (%)	1870	4.881	0.014	0.847	2.508	6.251	35.109	6.447
Tobin's q	1870	1.393	0.429	0.841	1.072	1.548	6.672	1.011
ROA (%)	1870	1.509	-39.625	-0.791	2.602	6.159	19.719	9.157
Log(MV)	1870	18.827	14.005	17.955	18.552	19.422	26.661	1.282
Book-to-Market	1870	1.101	0.068	0.477	0.861	1.500	4.063	0.833
Beta	1870	0.915	0.000	0.645	0.919	1.187	1.979	0.405
Momentum (%)	1870	0.164	-114.406	-19.987	-0.814	18.842	108.329	36.847
Panel B: Non-chaebol firms								
Cash (%)	1633	10.726	0.001	3.763	8.016	14.383	51.721	10.107
Net ST debt (%)	1633	4.251	-47.754	-7.569	3.011	16.863	51.221	18.837
ST debt (%)	1633	14.974	0.000	2.573	12.056	23.640	57.441	13.717
LT debt (%)	1633	6.755	0.000	0.469	3.462	9.924	41.880	8.346
CAPEX/Assets (%)	1633	5.008	0.014	0.829	2.526	6.394	35.109	6.620
Tobin's q	1633	1.427	0.429	0.850	1.111	1.598	6.672	1.036
ROA (%)	1633	1.147	-39.625	-1.522	2.279	6.106	19.719	9.574
Log(MV)	1633	18.580	14.005	17.890	18.409	19.116	23.135	1.004
Book-to-Market	1633	1.062	0.068	0.461	0.816	1.434	4.063	0.820
Beta	1633	0.920	0.000	0.646	0.924	1.196	1.979	0.413
Momentum (%)	1633	0.618	-114.406	-20.111	-0.357	20.004	108.329	37.921
Panel C: Chaebol firms								
Cash (%)	237	7.609	0.001	2.751	5.770	9.880	51.721	7.409
Net ST debt (%)	237	3.909	-47.754	-3.607	2.854	12.467	51.221	14.463
ST debt (%)	237	11.523	0.000	3.524	8.911	17.284	57.441	10.696
LT debt (%)	237	13.445	0.000	1.874	11.391	21.627	41.880	11.914
CAPEX/Assets (%)	237	4.007	0.014	0.965	2.448	4.964	32.600	5.023
Tobin's q	237	1.160	0.429	0.799	0.931	1.256	6.672	0.777
ROA (%)	237	4.007	-20.977	2.164	3.668	6.313	19.719	4.793
Log(MV)	237	20.526	16.975	19.252	20.288	21.626	26.661	1.654
Book-to-Market	237	1.369	0.095	0.626	1.262	1.880	4.063	0.875
Beta	237	0.885	0.000	0.635	0.891	1.149	1.841	0.347
Momentum (%)	237	-2.970	-114.406	-19.798	-3.352	10.939	94.998	28.233
Cash flow right (%)	237	20.562	0	4.359	14.744	32.176	84.980	18.954
Voting rights (%)	237	40.127	0	29.850	40.740	55.050	84.980	19.768

The table presents summary statistics of independent variables. Variables are computed at the end of 2019. Appendix 10 defines variables in detail. All variables are winsorized at the 1 percent level in each tail. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream and Worldscope.

[42] I consider both listed and unlisted affiliates in the computation of indirect control and cash flow rights.
[43] Almeida et al. (2011) observe that pyramids in Korean chaebols are rarely longer than two or three firms.
[44] An affiliate located above the second layer (23 listed affiliates over 237) is considered as an affiliate with high control to cash flow right disparity.

Panels B and C of Table 11 contain summary statistics of firm characteristics sorted based on their affiliation status. On average, chaebol affiliates are larger, more profitable, and less risky than their unaffiliated counterparts. They exhibit higher book-to-market ratio and negative returns for the year 2019. In terms of financial position, unaffiliated firms hold more cash and use less debt than chaebol affiliates. However, the debt structure between the two groups differs. Affiliated firms use more long-term debt, and unaffiliated firms rely more on short-term debt.

4.3 Economic shock and timeline of COVID-19 pandemic in Korea [45]

As an exogenous and unexpected shock, the COVID-19 crisis provides a perfect setting to empirically test the hypotheses developed in Section 3. Firms are unlikely to have had time to adjust their financial positions, given the rapid spread of the virus around the world. In addition, the shock alleviates concerns regarding the endogeneity of business group formation. The COVID-19 pandemic is also interesting because of its non-financial origin, in contrast to previous economic crises (Albuquerque et al., 2020). Finally, this crisis differs from previous ones due to the rapid and massive policy interventions, allowing a strong rebound of stock markets (WEF, 2020b). The sample period covers the first months of the pandemic from January 2 to May 13, 2020. To investigate the market reaction during the different phases of the crisis, I adapt the methodology used by Ramelli and Wagner (2020) to the Korean case and split the sample period into three sub-periods: the Uncertainty, the Panic, and the Recovery periods.

On December 31, 2019, Chinese authorities reported cases of an unknown pneumonia in Wuhan to the World Health Organization (WHO) local office. The following day, the local authorities closed the food market identified as the source of contamination (WHO, 2020b). The Uncertainty period starts on January 2, corresponding to the first trading day afte the closing of the Huanan Seafood Wholesale Market. Increasing uncertainty characterized the first months of the pandemic with the rise of new infections and the spread of the disease outside China. Ramelli and Wagner (2020) note that the COVID-19 pandemic started catching the attention of managers and analysts from mid-January. Korea introduced a screening for passengers from Wuhan on January 3. The detection of the first imported case on January 20

[45] Center for Strategic and International Studies (CSIS) and World Health Organization (WHO) provide comprehensive timelines of COVID-19 in South Korea and worldwide at the following URL: https://www.csis.org/analysis/timeline-south-koreas-response-covid-19
and https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline.

triggered the heightening of the 4-level National Infectious Disease Risk Alert System from level 1 to level 2. Seven days later, the alert level was raised to level 3. From the end of January, Korea organized charter planes to bring citizens back, and traveling restrictions were introduced in early February. Meanwhile, large-scale mask distributions were organized in vulnerable workplaces and testing facilities were opened (MOFA, 2020).

On February 20, Korea reported the first COVID-19 death (WHO, 2020a) marking the beginning of the Panic period. During the following days, the health situation deteriorated in Korea. The infectious disease alert was raised to its highest level (MOFA, 2020). The potential role of a religious circle in the spread of the virus drew international attention on the country (Shin and Cha, 2020). By the end of February, distancing measures were introduced (MOFA, 2020). During this period, Korean and international stock markets faced severe turbulence with a price drop and increasing volatility (WEF, 2020b). The Panic period corresponds to an economy-wide shock as defined in the hypotheses. Most industries faced difficulties. Local lockdowns and border restrictions disrupted supply chains and production. In addition, the spread of the disease and the increase in cases around the world generated high uncertainty.

The announcement of a USD 60 billion swap arrangement between the Bank of Korea and the US Federal Reserve (BOK, 2020a) marked the beginning of the Recovery period on March 20, 2020 (the first trading day after the announcement). This intervention reassured market participants and dispelled the risk of a credit crunch. The Recovery period ends on May 13 when the Bank of Korea announced additional support for SMEs (BOK, 2020b).

5. Empirical results

This section starts by presenting an overview of the Korean stock market reaction to the COVID-19 pandemic. Next, the hypotheses developed in Section 3 are empirically tested and discussed.

5.1 Korean market and COVID-19 pandemic

The COVID-19 pandemic triggered an unprecedented collapse of stock markets around the world. Between January 2 and March 19, 2020, the main Korean index (KOSPI) lost 33.68 percent and dropped to its lowest level since the global financial crisis. [46] However, rapid policy responses around the world allowed a rebound of the stock markets (WEF, 2020b). However,

[46] The KOSPI ended the year 2019 at 2197.97 points and plunged to 1457.64 points. During the same period, the KOSDAQ dropped from 669.83 to 428.35 points.

the V-shaped recovery of financial markets is in contrast with the difficulties experienced by the real economy (Goldstein et al., 2021).

Table 12 Cumulative excess returns

	Obs.	Mean	Min	p25	Median	p75	Max	SD
Panel A: Cumulative excess returns (in %) of all sample firms								
Uncertainty	1,870	-0.40	-38.61	-9.33	-1.96	6.55	50.05	14.88
Panic	1,865	-55.74	-109.25	-73.06	-57.65	-41.22	16.41	24.37
Recovery	1,841	48.65	-1.63	34.82	48.46	62.03	110.73	21.78
Full	1,841	-7.33	-126.69	-23.21	-10.76	4.76	94.49	27.17
Panel B: Cumulative excess returns (in %) of non-chaebol firms								
Uncertainty	1,633	0.34	-38.61	-8.42	-1.16	7.08	50.05	15.18
Panic	1,630	-56.12	-109.25	-73.64	-58.33	-41.21	16.41	25.05
Recovery	1,606	49.29	-1.63	35.34	49.12	63.33	110.73	22.04
Full	1,606	-6.31	-126.69	-22.19	-9.45	5.39	94.49	27.41
Panel C: Cumulative excess returns (in %) of chaebol firms								
Uncertainty	237	-5.53	-27.06	-13.47	-7.59	0.50	34.62	11.39
Panic	235	-53.12	-98.21	-66.41	-53.34	-41.55	-2.55	18.87
Recovery	235	44.33	-1.63	31.60	43.02	55.63	110.73	19.40
Full	235	-14.31	-57.92	-32.18	-16.32	-3.30	80.19	24.38

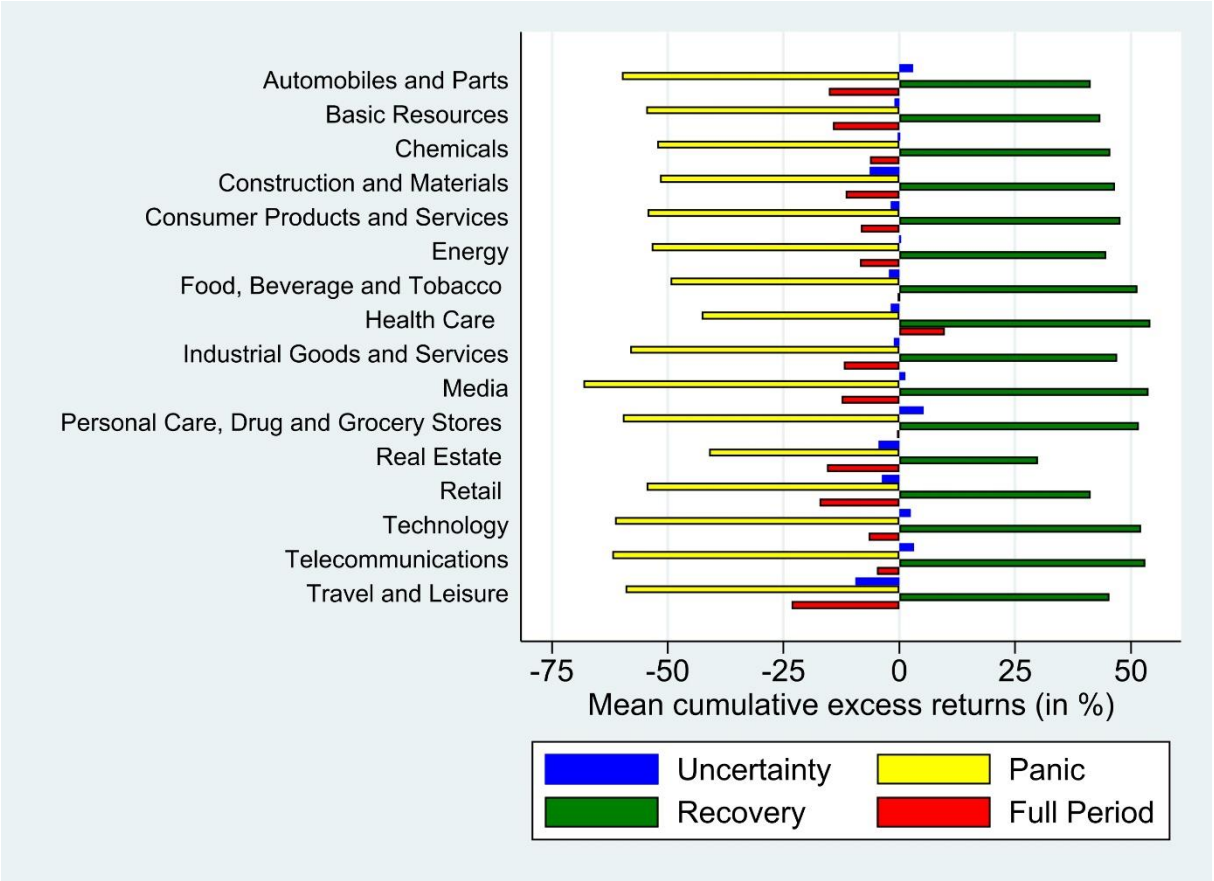
The table presents summary statistics of cumulative excess returns for different sub-periods and the full period. The Uncertainty period starts on January 2 and ends on February 19, 2020, the Panic period starts on February 20 and ends on March 19, 2020, the Recovery period starts on March 20 and ends on May 13, 2020. Full period starts on January 2 and ends on May 13, 2020. Panel A presents returns of all sample firms. Panel B presents returns of non-chaebol firms and panel C presents returns of chaebol firms. Chaebol affiliation is based on the KFTC classification. Cumulative excess return is computed as the sum of daily excess returns defined as the natural logarithm of one plus the daily stock return minus the risk free rate. Daily return is computed based on the total return index (RI) retrieved from Refinitiv Datastream and the risk free rate is the yield of one-year treasury bonds provided by the Bank of Korea. Cumulative excess returns are winsorized at the 1 percent level in each tail. Financial and utility firms are excluded from the sample.

Panel A of Table 12 contains summary statistics of cumulative excess returns for all sample firms over the three sub-periods (Columns (1) to (3)) and the whole sample length (Column (4)). In the Uncertainty period, the Korean stock market entered a downtrend with a slightly negative average cumulative excess return. The actual market collapse occurred during the Panic period. Between February 20 and March 19, 2020, the average cumulative excess return was -55.74 percent. Even firms in the top quartile exhibited a negative cumulative return (-41.22 percent), illustrating the severity of the shock. During the Recovery period, the market rebounded, and firms earned, on average, a positive cumulative return of 48.65 percent. However, despite the strong upturn, the mean and median cumulative returns were negative (-7.33 and -10.76 percent, respectively) over the full sample length.

Panel A of Table 12 presents an overall view of the Korean stock market reaction during the first months of the COVID-19 outbreak. Prior empirical studies show that all firms were not affected by the COVID-19 pandemic to the same extent. Market reaction depended on different

factors, such as the sector of activities and resilience to different health measures (Pagano et al., 2020), financial flexibility (Fahlenbrach et al., 2021), or exposure to foreign markets (Ramelli and Wagner, 2020). To illustrate the heterogeneity of market reactions, Figure 5 plots mean the cumulative excess returns by industry over the different phases of the COVID-19 pandemic.

Figure 5 Stock returns by industry



The figure plots average cumulative stock excess returns for each supersector based on ICB classification and each sub-periods: the Uncertainty period (blue bars, January 2 - February 19, 2020), the Panic period (yellow bars, February 20 - March 19, 2020), the Recovery period (green bars, March 20 - May 13, 2020), and full period (red bars, January 2 - May 13, 2020). Cumulative excess return is computed as the sum of daily excess returns defined as the natural logarithm of one plus daily stock return minus risk free rate. Daily return is computed based on total return index (RI) retrieved from Refinitiv Datastream and risk free rate is the yield of one-year treasury bonds provided by the Bank of Korea. Financial and utility firms are excluded from the sample.

In January, stock and currency markets showed the first signs of concern regarding the potential impact of the health situation. Treasury yield declined and the Korean won depreciated. Later, some economic indicators such as industrial production, retail sales, and construction, started to decline (KDI, 2020). During the Uncertainty period (blue bars), travel and leisure firms performed the worst, with a negative cumulative excess return of 9.47 percent. Travel restrictions and health measures aimed at mitigating the spread of the virus immediately

and heavily affected this industry. In annual comparison, the number of visitor arrivals declined by 43 percent in February. [47] Hit by a slowdown in new orders and investments (KDI, 2020), construction and real estate firms also performed poorly and earned negative returns of 6.37 and 4.49 percent, respectively. Other sectors such as, automobile, technology and telecommunications, and non-durable household goods retailers still generated positive cumulative returns.

During the Panic period (yellow bars), the effects of the pandemic on the real economy became more salient with a drop in domestic demand and decline in employment. The COVID-19 pandemic also altered prospects regarding the global economy affecting export-oriented firms (KDI, 2020). Unsurprisingly, all industrial sectors experienced a severe stock price drop during the Panic period. The media performed the worst, with a cumulative excess return of -68.17 percent. No systematic link between performance during the Uncertainty and the Panic periods was observed. For instance, non-durable household goods retailers earned a positive cumulative return during the Uncertainty period (+5.20 percent), but experienced one of the most severe price drops during the Panic period (-59.68 percent).

Central bank intervention and the declining number of domestic COVID-19 cases reassured market participants and allowed the stock market to rebound in mid-March (KDI, 2020). All sectors generated positive cumulative returns on average during the Recovery period (green bars). However, the rebound was not strong enough to offset the price drop in the previous months. Only healthcare firms exhibited, on average, a positive cumulative return of 9.82 percent over the entire sample length (red bars).

Panels B and C of Table 12 report the cumulative returns for non-chaebol and chaebol firms. Unlike unaffiliated firms, chaebol affiliates earned on average negative returns during the Uncertainty period but experienced a lower price drop during the following period. Finally, a stronger rebound during the Recovery period allowed unaffiliated firms to outperform chaebol affiliates over the full sample length. Baek et al. (2004) find similar results for the 1997 Asian financial crisis. On average, chaebol firms outperformed unaffiliated firms during the market collapse following the announcement of the IMF rescue package, but unaffiliated firms experienced a stronger rebound after the announcement of the sovereign debt rollover by international creditors. Table 12 also reveals that a larger fraction of unaffiliated firms disappeared from the sample due to trading suspension, delisting or bankruptcy. This observation illustrates the higher survival rate of affiliated firms during crisis (Santioni et al.,

[47] See https://kto.visitkorea.or.kr/eng/tourismStatics/keyFacts/KoreaMonthlyStatistics.kto.

2020). The disappearance of the weakest unaffiliated firms from the sample might also explain part of the outperformance of unaffiliated firms during the Recovery period. The results reported in Table 12 do not account for the cross-sectional differences in stock returns explained by firm characteristics. Therefore, it is not possible to draw any conclusions regarding the value of business group membership. This question is empirically tested and discussed in the remainder of this section.

5.2 Value of business group membership during crisis

The identification strategy to estimate the affiliation value is based on the cross-sectional regression of stock returns on an affiliation indicator. To capture the value of affiliation net of the effects of other firm characteristics, the regression model includes a series of control variables that explain cross-sectional variation in stock returns. The baseline model is given by Equation (4):

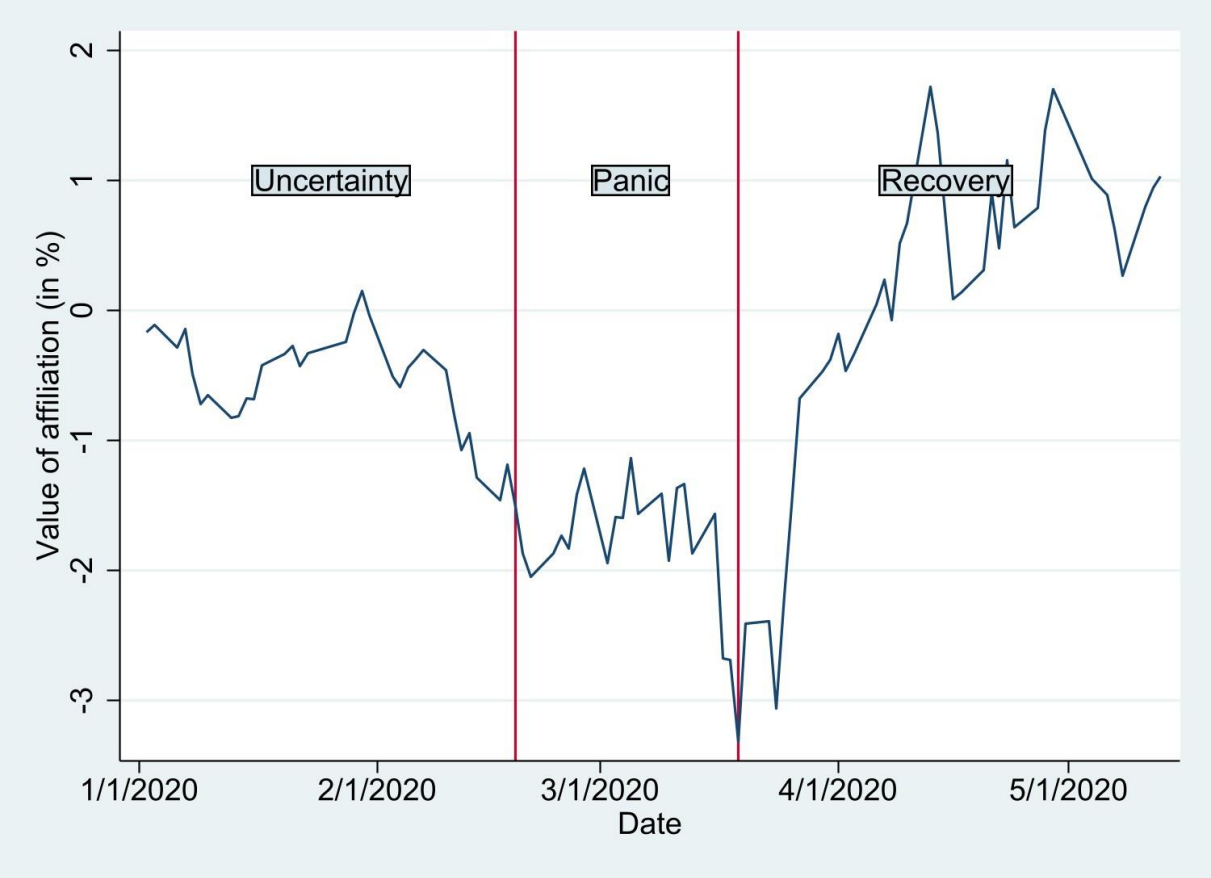
$$y_i = \alpha + \delta Chaebol_i + \gamma X_i + Industry_i + Market_i + \varepsilon_i \quad (4)$$

where, y_i is the stock price performance of firm i. $Chaebol_i$ is an indicator for business group affiliation taking value 1 if firm i is affiliated with a chaebol and 0 otherwise. X_i is a vector of firm characteristics including value, size, market beta, profitability, and momentum computed at the end of 2019. $Industry_i$ and $Market_i$ are indicators for industry and market division (see Section 4.2 and Appendix 10 for more details).

Figure 6 illustrates the evolution of investors' perception evolves as the crisis unfolds. Equation (4) is estimated on a daily basis with daily stock returns as the dependent variable. The values of the coefficient on the affiliation indicator are then cumulated over the sample period to provide the daily cumulative value of business group membership.

During the first months of the crisis, investors discount affiliation suggesting that business group affiliation is perceived as value-destroying during this period of high uncertainty and market downturn. The reverse can be observed during the Recovery period. When policy interventions stabilize markets and dispel risk of systemic crisis, business group affiliation is perceived as value-enhancing.

Figure 6 Evolution of value of chaebol affiliation



The figure presents the evolution of the coefficient on business group affiliation indicator. Regression (4) is estimated on daily basis with daily excess returns as dependent variable. Independent variables are affiliation indicator, size, value, beta, momentum, and profitability. The chaebol indicator takes value 1 for firms affiliated with a business group as defined by the KFTC in 2019. Regressions include ICB supersector and market indicators. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Date are indicated as month/day/year

Table 13 presents the estimates of the business group membership value during the different phases of the crisis. Following Equation (4), the cumulative excess return for each sub-period is regressed on the affiliation indicator and control variables. The coefficients on the chaebol membership indicator are statistically significant for all phases. Consistent with Figure 6, business group membership is associated with lower cumulative stock returns net of other firm characteristics effects of 1.74 and 2.61 percent during the Uncertainty and the Panic periods, respectively. The value of affiliation turns positive and business group membership is associated with a 5.00 percent higher return during the Recovery period. Over the entire sample period, the coefficient on business group affiliation is not significant. This result suggests that the negative and positive effects offset each other.

Table 13 Affiliation value

	(1)	(2)	(3)	(4)
	Uncertainty	Panic	Recovery	Full period
	Jan 2 – Feb 19	*Feb 20 – Mar 19*	*Mar 20 – May 13*	*Jan 2 – May 13*
Constant	0.267***	-0.853***	1.093***	0.480***
	(0.065)	(0.101)	(0.094)	(0.113)
Chaebol	-0.017*	-0.026*	0.050***	0.003
	(0.010)	(0.016)	(0.016)	(0.020)
Book-to-Market	-0.010**	-0.002	-0.023***	-0.033***
	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.024***	-0.189***	0.175***	0.015
	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.014***	0.023***	-0.039***	-0.029***
	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.022*	-0.041**	0.012	-0.018
	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.328***	-0.059	0.268***	0.560***
	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES
Observations	1870	1865	1841	1841
Adj. R-sq.	0.097	0.163	0.171	0.104

*The table presents results from cross-sectional regressions of cumulative excess returns on an indicator for chaebol affiliation and firm characteristics. The chaebol indicator takes value 1 for firms affiliated with a large business group as defined by the KFTC in 2019. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

The evidence of a time-varying value of affiliation emerges from Figure 6 and Table 13. During the first phases of the COVID-19 pandemic, the costs of affiliation (Hypothesis 1b) exceed its benefits (Hypothesis 1a). Consequently, investors penalize business group membership. The increasing uncertainty and risk of financial distress expose investors to expropriation by controlling shareholders. Additionally, the severity of the crisis raises the fear of systemic risk as observed during the 1997 Asian financial crisis when several chaebols collapsed. This event changed the perception of chaebols among Korean society and investors (Kim et al., 2004a). Business group affiliates also lose some benefits associated with affiliation with a business group in normal times. The economy-wide shock annihilates the co-insurance effect associated with the diversification of business groups. Therefore, business groups might not support their affiliates through propping or mutual insurance. Finally, the negative value of affiliation during the Uncertainty and Panic periods suggests that investors do not believe in the "too big to fail" or the possible government bailout of chaebols (Minetti and Yun, 2015).

The Recovery period starts with the intervention of the central bank aiming to stabilize financial market and financially support households and businesses (MOFA, 2020). This quick policy response dispels concerns that a deterioration of the situation threaten chaebols

existence. Therefore, the benefits of affiliation surpass the costs, reflecting in the positive value of business group membership. Several authors document the beneficial effect of business group membership during the post-crisis period. For instance, Kim and Lee (2003), and Almeida et al. (2015), document that chaebol affiliates perform better and recover faster from the 1997 Asian financial crisis than unaffiliated firms. Additionally, Almeida et al (2015) find that access to internal capital markets allows chaebol affiliates to maintain investments.

Table 14 Affiliation value and governance risks

	(1)	(2)	(3)	(4)
	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Constant	0.267***	-0.855***	1.094***	0.479***
	(0.065)	(0.100)	(0.094)	(0.113)
Aff. with low disparity	-0.020	-0.003	0.041*	0.015
	(0.013)	(0.021)	(0.021)	(0.026)
Aff. with high disparity	-0.015	-0.046**	0.058***	-0.007
	(0.012)	(0.018)	(0.019)	(0.023)
Book-to-Market	-0.010**	-0.003	-0.023***	-0.034***
	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.024***	-0.189***	0.175***	0.015
	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.014***	0.023***	-0.039***	-0.029***
	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.022*	-0.041**	0.012	-0.018
	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.328***	-0.061	0.268***	0.559***
	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES
Observations	1870	1865	1841	1841
Adj. R-sq.	0.097	0.164	0.170	0.103

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. Affiliates are classified in "high" ("low") disparity group, if their voting and cash flow rights disparity is in the higher (lower) than the median. Affiliates located below the second pyramid layer are considered as high risk affiliates. Chaebol affiliation is based on the 2019 KFTC classification. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

To test whether an increase in governance risks explains the affiliation discount observed during the market collapse, chaebol affiliates are classified into two groups depending on whether the control to cash flow rights disparity is above or below the median. Affiliates with high disparity are expected to be more exposed to expropriation and governance risks. The

results presented in Table 14 support the hypothesis that affiliation discount is associated with governance risk. During the Panic period, only affiliates with a high level of control to cash flow rights disparity exhibit a discount. However, both groups of affiliates benefit from a premium during the Recovery period, suggesting that governance issues are less of a concern during this period. These results are also consistent with findings of Bae et al. (2012) who document an increase in the risk of expropriation during market collapse and a decrease in this risk when the market recovers around the 1997 Asian financial crisis. [48]

Overall, the empirical analysis reveals how investors' perception of business group membership evolves as the crisis unfolds. This finding shows that the value of affiliation can switch from a discount to a premium in a short period of time. This variability might explain the lack of consensus in prior studies, as the results are highly sensitive to the sample period used to estimate affiliation value.

5.3 Pricing of financial flexibility and investment

This section presents empirical tests of the hypotheses relative to the value of financial flexibility and the role of internal capital markets. The estimation of financial flexibility value follows the methodology used to estimate affiliation value (see also Fahlenbrach et al. (2021)). Cumulative excess returns are regressed on proxies for financial flexibility and firm characteristics to account for the cross-sectional variation in returns. The baseline model to assess the value of financial flexibility is presented in Equation (5):

$$CR_i = \alpha + \beta FinancialProxies_i + \gamma X_i + Industry_i + Market_i + \varepsilon_i \quad (5)$$

where, CR_i is the cumulative excess return of firm i for a given period. $FinancialProxy_i$ is a vector of financial variables computed as of the end of year 2019. X_i, $Industry_i$ and $Market_i$ are the same vector of firm characteristics and indicators for industry and market, respectively, as used in Equation (4). Two specifications of Equation (5) are tested. The first specification uses net short-term and long-term debt as the financial proxies. The second specification considers cash and short-term debt separately, in addition to long-term debt. Both approaches are complementary. Gamba and Triantis (2008) point out that different combinations of cash reserves and debt leverage might result in a similar net debt position, but

[48] Bae et al. (2012) define the crisis period as the 15 months following the announcement of the Baht devaluation in July 1997 and the recovery period as the following 15 months.

have different implications in terms of firm value, taxation, and financial flexibility. In the context of a sudden economic and revenue shock, both measures are informative. Net short-term debt reflects the capacity of the firm to face financial obligations in the short run without revenue. Taken separately, cash holding represents the capacity of the firm to fund a revenue drop without raising outside financing, whereas short-term debt represents the financial obligations that it needs to meet in the short run. Table 15 reports the estimates for both specifications.

Panel A of Table 15 presents the results for all sample firms. As expected, financial flexibility explains returns during periods of high uncertainty and market turmoil. A one-standard deviation of net short-term debt is associated with a lower cumulative return (net of the effects of other firm characteristics) of 0.73 and 1.87 percent during the Uncertainty and Panic periods, respectively. When cash and short-term debt are considered separately, results show that investors penalize debt holding during the Uncertainty period and value cash holding during the Panic period. This result illustrates the relevance and different nature of these two balance sheet components depending on the crisis phase. During the first months of the pandemic, financial market turmoil raises concerns regarding access to external finance, leading to a discount on short-term debt. However, when the risk materializes through an actual revenue drop, investors are willing to pay a premium for the buffer effect of cash holding. During the Recovery period, the market rebounds and policy interventions dissipate concerns regarding financing. None of the coefficients on the financial proxies are significant. The results also show that investors do not significantly price long-term debt, supporting the interpretation that financial distress is the first concern during a revenue shock.

Overall, Hypotheses 2 and 3 are supported by the empirical results. During the full sample period, a one standard deviation of cash holding is associated with a 1.94 percent higher cumulative excess return net of firm characteristics and, a one standard deviation of short-term debt is associated with a 1.72 percent lower cumulative return. The positive (negative) value of cash holding (debt) during the crisis period is consistent with the existing literature regarding the COVID-19 pandemic (e.g. Fahlenbrach et al. (2021) and Ramelli and Wagner (2020)) and the Korean market during the 1997 Asian financial crisis (Baek et al., 2004).

Table 15 Pricing of financial flexibility proxies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Panel A: All firms								
Constant	0.324***	-0.747***	0.969***	0.532***	0.342***	-0.772***	0.950***	0.512***
	(0.060)	(0.090)	(0.083)	(0.104)	(0.061)	(0.094)	(0.087)	(0.108)
Net ST Debt	-0.040**	-0.102***	-0.001	-0.154***				
	(0.020)	(0.034)	(0.031)	(0.039)				
Cash					0.002	0.151**	0.040	0.197***
					(0.039)	(0.061)	(0.055)	(0.074)
ST Debt					-0.063**	-0.068	0.025	-0.128**
					(0.028)	(0.048)	(0.044)	(0.055)
LT Debt	0.014	0.042	-0.025	0.041	0.012	0.044	-0.023	0.043
	(0.040)	(0.063)	(0.055)	(0.073)	(0.040)	(0.063)	(0.055)	(0.073)
Book-to-Market	-0.012**	-0.005	-0.021***	-0.035***	-0.013***	-0.004	-0.020***	-0.034***
	(0.005)	(0.007)	(0.007)	(0.009)	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.024***	-0.190***	0.174***	0.014	0.025***	-0.191***	0.174***	0.013
	(0.009)	(0.016)	(0.014)	(0.018)	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.017***	0.017***	-0.032***	-0.032***	-0.018***	0.018***	-0.032***	-0.031***
	(0.003)	(0.005)	(0.004)	(0.006)	(0.003)	(0.005)	(0.004)	(0.006)
Momentum	0.022*	-0.042**	0.009	-0.021	0.022*	-0.042**	0.009	-0.021
	(0.012)	(0.019)	(0.017)	(0.024)	(0.012)	(0.019)	(0.017)	(0.024)
ROA	0.315***	-0.094	0.255***	0.497***	0.309***	-0.086	0.261***	0.503***
	(0.049)	(0.084)	(0.074)	(0.103)	(0.049)	(0.084)	(0.074)	(0.103)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1870	1865	1841	1841	1870	1865	1841	1841
Adj. R-sq.	0.098	0.167	0.166	0.112	0.098	0.167	0.166	0.112

Table 15 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Panel B: Non-chaebol firms								
Constant	0.453***	-0.828***	0.993***	0.580***	0.480***	-0.859***	0.976***	0.567***
	(0.082)	(0.130)	(0.118)	(0.146)	(0.083)	(0.134)	(0.121)	(0.150)
Net ST Debt	-0.039*	-0.111***	-0.011	-0.172***				
	(0.021)	(0.036)	(0.032)	(0.040)				
Cash					-0.016	0.167**	0.044	0.200**
					(0.041)	(0.065)	(0.058)	(0.079)
ST Debt					-0.072**	-0.071	0.010	-0.156***
					(0.030)	(0.051)	(0.045)	(0.057)
LT Debt	0.048	0.106	-0.100	0.071	0.045	0.109	-0.098	0.073
	(0.047)	(0.072)	(0.064)	(0.087)	(0.047)	(0.072)	(0.063)	(0.086)
Book-to-Market	-0.009*	0.001	-0.026***	-0.031***	-0.010*	0.002	-0.025***	-0.031***
	(0.005)	(0.008)	(0.008)	(0.010)	(0.005)	(0.008)	(0.008)	(0.010)
Beta	0.031***	-0.190***	0.182***	0.029	0.032***	-0.191***	0.181***	0.028
	(0.010)	(0.017)	(0.015)	(0.019)	(0.010)	(0.017)	(0.015)	(0.019)
Log(MV)	-0.025***	0.021***	-0.034***	-0.036***	-0.026***	0.022***	-0.034***	-0.035***
	(0.004)	(0.007)	(0.006)	(0.008)	(0.004)	(0.007)	(0.006)	(0.008)
Momentum	0.025*	-0.045**	0.017	-0.014	0.025*	-0.045**	0.016	-0.014
	(0.013)	(0.020)	(0.018)	(0.025)	(0.013)	(0.020)	(0.018)	(0.025)
ROA	0.352***	-0.135	0.267***	0.506***	0.344***	-0.125	0.272***	0.509***
	(0.051)	(0.086)	(0.075)	(0.107)	(0.051)	(0.087)	(0.075)	(0.106)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1633	1630	1606	1606	1633	1630	1606	1606
Adj. R-sq.	0.098	0.172	0.168	0.095	0.099	0.172	0.168	0.095

Table 15 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Panel C: Chaebol firms								
Constant	-0.120	-0.999***	1.691***	0.577***	-0.154	-0.998***	1.664***	0.521**
	(0.101)	(0.159)	(0.176)	(0.205)	(0.100)	(0.166)	(0.171)	(0.203)
Net ST Debt	-0.055	0.008	0.110	0.060				
	(0.053)	(0.096)	(0.121)	(0.127)				
Cash					0.188**	-0.012	-0.003	0.167
					(0.094)	(0.145)	(0.202)	(0.211)
ST Debt					0.016	0.006	0.178	0.192
					(0.066)	(0.129)	(0.153)	(0.162)
LT Debt	-0.073	-0.084	0.121	-0.028	-0.072	-0.084	0.119	-0.030
	(0.079)	(0.129)	(0.109)	(0.164)	(0.079)	(0.129)	(0.108)	(0.164)
Book-to-Market	-0.035***	-0.001	-0.028*	-0.064***	-0.034***	-0.001	-0.027*	-0.062***
	(0.011)	(0.017)	(0.015)	(0.021)	(0.011)	(0.017)	(0.015)	(0.021)
Beta	-0.039*	-0.161***	0.048	-0.158***	-0.041*	-0.161***	0.047	-0.161***
	(0.022)	(0.037)	(0.039)	(0.052)	(0.022)	(0.037)	(0.039)	(0.052)
Log(MV)	0.011**	0.028***	-0.057***	-0.018	0.011**	0.028***	-0.056***	-0.017
	(0.005)	(0.008)	(0.009)	(0.011)	(0.005)	(0.008)	(0.009)	(0.011)
Momentum	0.020	0.012	-0.106**	-0.078	0.025	0.012	-0.102**	-0.071
	(0.028)	(0.045)	(0.045)	(0.062)	(0.029)	(0.045)	(0.045)	(0.062)
ROA	-0.347*	0.645***	-0.233	0.028	-0.354*	0.645***	-0.235	0.022
	(0.182)	(0.214)	(0.357)	(0.337)	(0.187)	(0.215)	(0.354)	(0.331)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	237	235	235	235	237	235	235	235
Adj. R-sq.	0.179	0.173	0.301	0.278	0.183	0.169	0.301	0.280

*The table presents results from cross-sectional regressions of cumulative excess returns on financial proxies and firm characteristics. In panel A, the sample consists of all sample firms. In panel B, the sample consists of firms not affiliated with a chaebol as defined by the KFTC. In panel C, the sample consists of firms affiliated with a chaebol as defined by the KFTC. In columns (1) to (4), financial proxies are net short-term debt and long-term debt. In columns (5) to (8), financial proxies are cash, short-term debt, and long-term debt. Financial proxies and firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

To test whether investors price financial flexibility proxies differently depending on business group membership and access to internal capital markets, Equation (5) is estimated separately for non-chaebol and chaebol firms. The results are reported in Panels B and C, respectively, of Table 15. Consistent with general predictions, investors value financial flexibility for unaffiliated firms. During the full sample period, a one standard deviation of cash holding is associated with a 2.02 percent higher cumulative return and a one standard deviation of short-term debt is associated with a 2.14 percent lower cumulative return. However, the results of Panel C indicate that investors do not price financial flexibility proxies for firms affiliated with a business group supporting Hypotheses 5 and 6. Except for cash holding during the Uncertainty period, none of the coefficients on financial flexibility proxies are significant.

Table 16 presents estimates of Equation (5) including investment intensity proxy. Investment intensity is proxied by the ratio of capital expenditure scaled by the lagged assets. Columns (1) to (4) report results for all sample firms. Investment intensity is negatively associated with stock returns during the Panic period. During this period, a one standard deviation of investment is associated with a 1.36 percent lower cumulative return. Consistent with the prediction of Hypothesis 4, investment expenses exacerbate the loss in equity value when the revenue drops. Investors might also anticipate a deterioration of future prospects if firms are unable to maintain their optimal investment level. The next columns report results for non-chaebol (columns (5) to (8)) and chaebol (columns (9) to (12)) firms. The negative association is significant only in the case of unaffiliated firms supporting Hypothesis 7. Overall, the results presented in Table 15 and Table 16 suggest that business group membership and access to internal capital markets alleviate investors' concerns about financing during crisis period.

Table 16 Pricing of investment intensity

	Full-sample				Non-chaebol				Chaebol			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Constant	0.310***	-0.801***	0.972***	0.469***	0.436***	-0.914***	0.995***	0.485***	-0.124	-0.994***	1.706***	0.592***
	(0.058)	(0.089)	(0.081)	(0.100)	(0.081)	(0.130)	(0.118)	(0.145)	(0.101)	(0.162)	(0.175)	(0.201)
CAPEX/Assets	0.067	-0.211**	-0.029	-0.067	0.069	-0.238***	-0.027	-0.086	0.013	0.019	0.101	0.137
	(0.063)	(0.082)	(0.082)	(0.100)	(0.067)	(0.087)	(0.087)	(0.106)	(0.203)	(0.250)	(0.249)	(0.344)
Book-to-Market	-0.011**	-0.005	-0.021***	-0.034***	-0.008	0.001	-0.025***	-0.028***	-0.035***	0.000	-0.026*	-0.061***
	(0.005)	(0.008)	(0.007)	(0.009)	(0.005)	(0.008)	(0.008)	(0.010)	(0.011)	(0.018)	(0.016)	(0.022)
Beta	0.024***	-0.187***	0.175***	0.016	0.031***	-0.185***	0.182***	0.032*	-0.044**	-0.163***	0.056	-0.157***
	(0.009)	(0.016)	(0.014)	(0.018)	(0.010)	(0.017)	(0.015)	(0.019)	(0.022)	(0.037)	(0.038)	(0.050)
Log(MV)	-0.017***	0.021***	-0.033***	-0.028***	-0.024***	0.027***	-0.034***	-0.031***	0.011**	0.027***	-0.058***	-0.020*
	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)	(0.007)	(0.006)	(0.008)	(0.005)	(0.008)	(0.008)	(0.011)
Momentum	0.023*	-0.038**	0.010	-0.017	0.025*	-0.040**	0.018	-0.009	0.021	0.014	-0.103**	-0.074
	(0.013)	(0.019)	(0.017)	(0.024)	(0.013)	(0.020)	(0.018)	(0.025)	(0.028)	(0.045)	(0.046)	(0.062)
ROA	0.328***	-0.044	0.259***	0.563***	0.362***	-0.088	0.280***	0.575***	-0.294*	0.677***	-0.337	0.004
	(0.048)	(0.083)	(0.073)	(0.104)	(0.050)	(0.085)	(0.075)	(0.108)	(0.168)	(0.203)	(0.344)	(0.319)
Supersector ind.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1870	1865	1841	1841	1633	1630	1606	1606	237	235	235	235
Adj. R-sq.	0.097	0.165	0.167	0.104	0.097	0.169	0.167	0.085	0.172	0.175	0.293	0.281

*The table presents results from cross-sectional regressions of cumulative excess returns on investment intensity and firm characteristics. Investment intensity and firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. In columns (1) to (4), the sample consists of all sample firms. In columns (5) to (8), the sample consists of firms not affiliated with a chaebol as defined by the KFTC. In columns (9) to (12), the sample consists of firms affiliated with a chaebol as defined by the KFTC. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses.p-value * < 10% ** < 5% *** < 1%*

5.4 Heterogeneity of value of business group membership

5.4.1 Value of business group membership and affiliates characteristics

This section starts by examining the between-affiliate heterogeneity of the value of business group membership. So far, the costs and benefits of affiliation are assumed to be homogeneous across affiliates. However, financial flexibility and the need for funds are likely to influence the value of affiliation as discussed in Section 3. To capture between-affiliate heterogeneity, affiliates are first sorted based on their financial ratios.

Panel A of Table 17 presents the results for classification based on net short-term debt. In columns (1) to (4), affiliates are sorted by the sign of net short-term debt. During the Uncertainty and Panic periods, investors discount business group membership for affiliates with positive net debt. These affiliates are unable to meet short-term financial obligations without revenue and/or additional financing. In normal times, they can rely on group support or external finance to face a sudden drop in revenue. However, the economy-wide dimension of the COVID-19 crisis reduces the ability of groups to provide support and access to external finance. In addition, financial vulnerability exacerbates the risk of liquidation or expropriation by controlling shareholders (Friedman et al., 2003). Once the market rebounds and the financial outlook brightens, the risk of liquidation is dispelled and affiliates might benefit from advantages such as propping and mutual insurance. Consequently, the coefficient on affiliation turns positive during the Recovery period. Overall, investors do not price business group membership for affiliates with negative net debt. These affiliates are less exposed to financial distress because they are able to fund short-term financial obligations with their own cash reserves. In columns (5) to (8), affiliates are sorted into three groups based on the value of net short-term debt. Affiliates in the highest and lowest quartiles form two distinct groups ("high" and "low"). The reference group ("middle") is composed of affiliates in the two middle quartiles. The results are consistent with the sorting based on the sign. However, this finer classification allows to observe that investors first discount the weakest affiliates (with a high net debt ratio) and then affiliates with a middle ratio when the economic situation deteriorates. During the Recovery period, business group membership is associated with significantly higher returns for affiliates with high and middle levels of net short-term debt. The results based on quartile classification also confirm the non-significance of the affiliation value for the strongest affiliates.

Table 17 Between-affiliate heterogeneity of affiliation value (financial flexibility)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Panel A: net short-term debt sorting								
	Positive net short-term debt				Net Debt			
Constant	0.267***	-0.853***	1.093***	0.480***	0.276***	-0.855***	1.086***	0.481***
	(0.065)	(0.100)	(0.094)	(0.113)	(0.065)	(0.102)	(0.095)	(0.114)
Aff. with net ST Debt<0	-0.000	0.002	0.028	0.026				
	(0.014)	(0.022)	(0.022)	(0.025)				
Aff. with net ST Debt>0	-0.029**	-0.045**	0.065***	-0.012				
	(0.012)	(0.018)	(0.019)	(0.024)				
Aff. with high ratio					-0.047***	-0.034	0.081***	-0.004
					(0.014)	(0.027)	(0.027)	(0.034)
Aff. with middle ratio					-0.011	-0.034*	0.049**	0.001
					(0.014)	(0.020)	(0.020)	(0.024)
Aff. with low ratio					0.003	-0.004	0.019	0.015
					(0.016)	(0.026)	(0.027)	(0.030)
Book-to-Market	-0.010**	-0.001	-0.024***	-0.033***	-0.010**	-0.002	-0.024***	-0.033***
	(0.005)	(0.008)	(0.007)	(0.009)	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.025***	-0.188***	0.174***	0.016	0.025***	-0.189***	0.174***	0.015
	(0.009)	(0.016)	(0.014)	(0.018)	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.014***	0.023***	-0.039***	-0.029***	-0.015***	0.023***	-0.039***	-0.029***
	(0.003)	(0.005)	(0.005)	(0.006)	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.023*	-0.040**	0.011	-0.017	0.023*	-0.041**	0.011	-0.018
	(0.013)	(0.019)	(0.017)	(0.024)	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.324***	-0.064	0.272***	0.555***	0.327***	-0.061	0.269***	0.559***
	(0.048)	(0.083)	(0.073)	(0.104)	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1870	1865	1841	1841	1870	1865	1841	1841
Adj. R-sq.	0.098	0.164	0.171	0.104	0.098	0.163	0.171	0.103

Table 17 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Panel B: Cash and debt sorting								
	Cash holding				Total debt			
Constant	0.272***	-0.864***	1.093***	0.475***	0.269***	-0.860***	1.102***	0.486***
	(0.066)	(0.101)	(0.094)	(0.113)	(0.065)	(0.102)	(0.095)	(0.114)
Aff. with high ratio	0.014	0.002	0.024	0.037	-0.032**	-0.051*	0.072***	-0.015
	(0.015)	(0.026)	(0.028)	(0.031)	(0.016)	(0.027)	(0.025)	(0.032)
Aff. with middle ratio	-0.020	-0.050***	0.058***	-0.015	-0.010	-0.029	0.058***	0.016
	(0.013)	(0.019)	(0.017)	(0.024)	(0.013)	(0.020)	(0.022)	(0.027)
Aff. with low ratio	-0.044***	-0.009	0.060*	0.004	-0.017	0.002	0.017	-0.002
	(0.016)	(0.027)	(0.031)	(0.035)	(0.016)	(0.024)	(0.024)	(0.026)
Book-to-Market	-0.010**	-0.001	-0.024***	-0.032***	-0.010**	-0.002	-0.023***	-0.033***
	(0.005)	(0.008)	(0.007)	(0.009)	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.024***	-0.189***	0.175***	0.016	0.024***	-0.189***	0.174***	0.015
	(0.009)	(0.016)	(0.014)	(0.018)	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.014***	0.024***	-0.039***	-0.029***	-0.014***	0.023***	-0.040***	-0.029***
	(0.003)	(0.005)	(0.005)	(0.006)	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.023*	-0.040**	0.011	-0.017	0.022*	-0.041**	0.011	-0.018
	(0.013)	(0.019)	(0.017)	(0.024)	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.326***	-0.062	0.269***	0.557***	0.327***	-0.063	0.273***	0.560***
	(0.048)	(0.083)	(0.073)	(0.104)	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1870	1865	1841	1841	1870	1865	1841	1841
Adj. R-sq.	0.099	0.164	0.170	0.103	0.097	0.163	0.171	0.103

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. To capture between-affiliate heterogeneity, affiliates are classified based on financial ratio. Panel A presents results for affiliates sorting based on net short-term debt computed as the difference between cash and short-term debt scaled by total assets. Columns (1) to (4) present results for sorting based on the sign of net short-term debt. Columns (5) to (8) present results for quartile sorting. Panel B presents results for quartile sorting. In columns (1) to (4), affiliates are sorted based on cash holding. In columns (5) to (8), affiliates are sorted based on total debt ratio. Affiliates are classified in "high" ("low") ratio group, if their ratio is in the top (bottom) quartile, and "middle" if they are in the two middle quartiles. Chaebol affiliation is based on the 2019 KFTC classification. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

In Panel B, affiliates are sorted by cash holding (columns (1) to (4)) and total debt (columns (5) to (8)) quartiles following the same procedure as described above. Overall, the results are similar and consistent with the net short-term debt classification. Business group membership does not explain the strongest affiliates' returns. Cash-rich firms do not rely on internal capital markets to fund revenue drops and firms with moderate or low debt are usually able to face their financial obligations. Additionally, these affiliates keep debt capacity to raise additional financing. During the first two phases of the crisis, as the situation worsens, investors discount affiliates with low cash reserves and/or high debt levels. During the Uncertainty period, only affiliates with the lowest cash reserves are discounted. However, when the market collapses and the crisis hits the real economy, the discount also affects affiliates with middle cash reserves. Given the risk of financial distress due to debt, investors discount affiliates with a high debt ratio during the first two periods. Consistent with earlier observations, once financial markets recover, affiliates with weaker balance sheets might benefit from their affiliation and the coefficient on affiliation turns positive during the Recovery period.

The results for sorting based on investment intensity (reported in Table 18) do not allow any conclusion regarding the association between investment intensity and the value of business group membership. During the Uncertainty period, investors discount affiliation for affiliates with middle investment intensity only. During the Recovery, positive coefficients on affiliation indicator are observed for affiliates with high and low investment intensity. These results do not support Hypothesis 9. A plausible explanation is that investors anticipate an efficient allocation of resources as consistent with the "smarter-money" effect and prior literature (e. g. Shin and Park (1999) and Almeida et al. (2015)). In other words, they expect that only affiliates with good prospects benefit from propping to maintain their investments. To examine this hypothesis, affiliates are sorted by investment intensity and investment opportunities proxied by Tobin's q. [49] Overall, the results presented in Appendix 11 support this hypothesis. During the Uncertainty period, the discount observed for middle investment-intensive affiliates is not valid for those with high investment opportunities and the premium observed during the Recovery period is not significant for affiliates with poor investment opportunities.

[49] To avoid multicollinearity with Tobin's q, regressions do not include book-to-market ratio as control variables.

Table 18 Between-affiliate heterogeneity of affiliation value (investment intensity)

	(1)	(2)	(3)	(4)
	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Constant	0.255***	-0.844***	1.088***	0.474***
	(0.066)	(0.102)	(0.095)	(0.115)
Aff. with high ratio	-0.003	-0.017	0.070***	0.045
	(0.018)	(0.027)	(0.024)	(0.031)
Aff. with middle ratio	-0.039***	-0.021	0.031	-0.031
	(0.013)	(0.019)	(0.020)	(0.025)
Aff. with low ratio	0.007	-0.041	0.066**	0.028
	(0.015)	(0.027)	(0.028)	(0.033)
Book-to-Market	-0.010**	-0.002	-0.022***	-0.032***
	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.025***	-0.190***	0.176***	0.016
	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.013***	0.023***	-0.039***	-0.029***
	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.022*	-0.041**	0.012	-0.017
	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.327***	-0.059	0.268***	0.560***
	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES
Observations	1870	1865	1841	1841
Adj. R-sq.	0.099	0.163	0.171	0.105

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. To capture between-affiliate heterogeneity, affiliates are classified based on investment intensity ratio. Affiliates are classified in "high" ("low") ratio group, if their ratio is in the top (bottom) quartile, and "middle" if they are in the two middle quartiles. Chaebol affiliation is based on the 2019 KFTC classification. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

5.4.2 Value of business group membership and business group characteristics

The results show that financial strength and the need for capital explain the between-affiliate heterogeneity of affiliation value. Therefore, it is also likely that the value of affiliation depends on the ability of business groups to provide resources and support to their affiliates. As discussed in Section 3, resource availability is associated with the group size. To capture between-group heterogeneity, the affiliation indicator is redefined based on the KFTC classification ranking. [50]

[50] KFTC classification is based on the value of total assets of all group affiliates (listed and unlisted).

Table 19 Group size and affiliation value

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Uncertainty	Panic	Recovery	Full period	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*	*Jan 2-Feb 19*	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
	Top30				Top10			
Constant	0.267***	-0.871***	1.097***	0.467***	0.286***	-0.871***	1.083***	0.472***
	(0.066)	(0.101)	(0.094)	(0.114)	(0.066)	(0.104)	(0.097)	(0.117)
Top 30 chaebols	-0.016	-0.049***	0.055***	-0.014				
	(0.011)	(0.018)	(0.017)	(0.022)				
Top 10 chaebols					0.001	-0.049**	0.043*	-0.010
					(0.016)	(0.023)	(0.023)	(0.026)
Top 11-30 chaebols					-0.030**	-0.049**	0.065***	-0.018
					(0.014)	(0.022)	(0.021)	(0.028)
Other chaebols	-0.020	0.024	0.039	0.041	-0.018	0.024	0.038	0.041
	(0.016)	(0.022)	(0.027)	(0.031)	(0.016)	(0.022)	(0.027)	(0.031)
Book-to-Market	-0.010**	-0.003	-0.023***	-0.034***	-0.010**	-0.003	-0.023***	-0.034***
	(0.005)	(0.008)	(0.007)	(0.009)	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.024***	-0.190***	0.175***	0.015	0.024***	-0.190***	0.175***	0.015
	(0.009)	(0.016)	(0.014)	(0.018)	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.014***	0.024***	-0.040***	-0.028***	-0.015***	0.024***	-0.039***	-0.028***
	(0.003)	(0.005)	(0.005)	(0.006)	(0.004)	(0.006)	(0.005)	(0.006)
Momentum	0.022*	-0.042**	0.012	-0.018	0.023*	-0.042**	0.012	-0.018
	(0.013)	(0.019)	(0.017)	(0.024)	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.328***	-0.061	0.268***	0.558***	0.330***	-0.061	0.266***	0.559***
	(0.048)	(0.083)	(0.073)	(0.104)	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES	YES	YES	YES	YES
Observations	1870	1865	1841	1841	1870	1865	1841	1841
Adj. R-sq.	0.097	0.165	0.170	0.104	0.097	0.165	0.170	0.104

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. To capture between-group heterogeneity, business groups are classified based on their rank in the KFTC classification (based on value of total assets). In columns (1) to (4), large business groups listed by the KFTC are split between the 30 largest (top 30 chaebols) and the smaller chaebols (other chaebols). In columns (5) to (8), large business groups listed by the KFTC are sorted into three categories: the 10 largest (top 10 chaebols), the business groups ranked between the 11th and 30th rank (top 11-30 chaebols) and the smaller chaebols (other chaebols). Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

Columns (1) to (4) of Table 19 present the results for a classification distinguishing the 30 largest chaebols (top 30) from smaller ones (Other chaebols). The coefficients on indicators for affiliation with a top 30 chaebol are significant during the Panic and Recovery periods. Investors discount business group affiliation when the market collapses but pay a premium during the market rebound. This result is consistent with the findings in Table 13. However, only the indicator for top 30 chaebols affiliation is significant, suggesting that only affiliation with a large business group matters for investors. The visibility and publicity of the top 30 chaebols are likely to explain this result. Indeed, before using the value of total assets as a threshold for its classification, the KFTC only considered the 30 largest business groups (Almeida et al., 2011). Moreover, some authors still consider only the 30 largest business groups as chaebols. [51] Therefore, investors may ignore smaller business groups. [52] Another explanation is the size, diversification, and economic power that characterize the largest chaebols (Bae et al., 2002). Therefore, investors might disregard an affiliation with a business group with few affiliated firms and less resources to share.

Columns (5) to (8) present an alternative specification classifying chaebols into three groups: the 10 largest chaebols (top 10), the chaebols ranked between the 11th and 30th positions (top 11-30), and smaller chaebols (Other chaebols). The results differ slightly from the results for the top 30 classification. During the Uncertainty period, the coefficient on affiliation with a middle-sized chaebol is negative and significant, whereas the coefficient on affiliation with a top 10 chaebol is not. During this period, investors might perceive the largest chaebols to be strong enough to face the increasing uncertainty and potential losses. However, middle-sized chaebols might appear as riskier given their lower resources and diversification. However, when the crisis worsens and the market collapses during the Panic period, the threat of expropriation and liquidation touch affiliates of the largest chaebols as well. In addition, given the severity and scale of the crisis, neither the size nor diversification of the largest chaebols ensure group strength and viability. During the Recovery period, investors value affiliation with both the top 10 and middle-sized chaebols. The evidence that investors only price affiliation with the largest chaebols confirms Hypothesis 10.

When a sudden and economy-wide shock occurs, investors may be concerned with the financial vulnerability of business groups. The proportion of listed affiliates with positive net short-term debt is used as a proxy for group financial vulnerability. Chaebols are ranked in

[51] See Bae et al. (2002) and Bae et al. (2011)
[52] In addition, business groups close to the threshold of total assets are more likely to enter or exit the KFTC classification.

quartiles according to the proportion of the listed weak affiliates. Chaebols in the highest and lowest quartiles are classified as "high risk" and "low risk", respectively, whereas chaebols belonging the middle quartiles are classified as "middle risk".

Table 20 Group risk and affiliation value

	(1)	(2)	(3)	(4)
	Uncertainty *Jan 2-Feb 19*	Panic *Feb 20-Mar 19*	Recovery *Mar 20-May 13*	Full period *Jan 2-May 13*
Constant	0.277***	-0.845***	1.094***	0.498***
	(0.064)	(0.101)	(0.094)	(0.111)
Low risk chaebols	0.028*	0.001	0.064**	0.088***
	(0.017)	(0.023)	(0.029)	(0.032)
Middle risk chaebols	-0.028**	-0.025	0.036**	-0.022
	(0.012)	(0.020)	(0.017)	(0.022)
High risk chaebols	-0.053***	-0.077***	0.082**	-0.044
	(0.017)	(0.020)	(0.033)	(0.042)
Book-to-Market	-0.010**	-0.002	-0.023***	-0.032***
	(0.005)	(0.008)	(0.007)	(0.009)
Beta	0.026***	-0.188***	0.176***	0.018
	(0.009)	(0.016)	(0.014)	(0.018)
Log(MV)	-0.015***	0.023***	-0.039***	-0.030***
	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.023*	-0.040**	0.012	-0.016
	(0.013)	(0.019)	(0.017)	(0.024)
ROA	0.324***	-0.062	0.268***	0.554***
	(0.048)	(0.083)	(0.073)	(0.104)
Supersector indicators	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES
Observations	1870	1865	1841	1841
Adj. R-sq.	0.101	0.164	0.171	0.107

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. To capture between-group heterogeneity, business groups are classified based on the proportion of listed affiliates with positive net short-term debt. Chaebols are classified in "high risk" ("low risk"), if the proportion of affiliates with positive net short-term debt is in the top (bottom) quartile, and "middle risk" if they are in the two middle quartiles. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

In Table 20, we observe that during the Uncertainty period, affiliation with a low-risk chaebol is associated with a premium, whereas affiliates of riskier chaebols suffer from a discount. During the Panic period, only affiliation with the riskiest chaebols is associated with a significant discount. Consistent with Hypothesis 11, these results suggest that the severe

economic shock and uncertainty raise fears of chaebol collapse among investors. The no bail-out policy adopted by the Korean government in the aftermath of the 1997 Asian financial crisis may have exacerbated this fear (Minetti and Yun, 2015). As observed at a firm-level, the market rebound and policy interventions dispel these concerns. Hence, affiliates of all chaebols benefit from a premium during the Recovery period.

6. Conclusion

My paper exploits the exogeneity of the economic shock triggered by the COVID-19 pandemic to provide novel evidence about investors' perception of business group membership. A stock price analysis indicates a switch from an affiliation discount to an affiliation premium as the crisis unfolded.

During the first months of the pandemic, global turmoil raised investors' skepticism regarding business groups. The high level of uncertainty and the severity of the economic shock revived the fear of chaebols collapse and exacerbated governance risks, leading investors to discount affiliation. This pattern is more pronounced for both chaebols exposed to their affiliates distress and affiliates with a high risk of minority shareholder expropriation. Nevertheless, policy intervention and market stabilization dispelled these risks and reassure investors. Hence, business group affiliation becomes a value-enhancing factor once the market rebounded.

My analysis also highlights the role of internal capital markets during a financial crisis. Hence, I observe that financial flexibility is a significant stock price driver only for unaffiliated firms. This finding suggests that access to internal capital markets associated with business group affiliation alleviates investors' concerns regarding financing. The evidence of between-affiliates and between-groups heterogeneity of affiliation value also emphasizes the important role of internal capital markets as a source of financing. Indeed, affiliation appears to be a more relevant pricing factor for affiliates with weak balance sheets. Additionally, investors tend to price affiliation only for large business groups with more resources to share.

Overall, this paper highlights how current economic uncertainty affects the anticipations of market participants regarding the benefits and costs of business group affiliation. Future research might compare these expectations with the real effect of business group membership in terms of operating performance during the pandemic.

Appendices

Appendix 10 Variable definition

Variable name	Definition
Cash holding	The ratio of cash (WC02003) to total assets (WC02999).
Short-term debt	The ratio of short-term debt and current portion of long-term debt (WC03051) to total assets (WC02999).
Long-term debt	The ratio of long-term debt (WC03251) to total of assets (WC02999).
Total debt	The ratio of total debt (WC03255) to total assets (WC02999).
Net short-term debt	The ratio of short-term debt (WC03051) minus cash (WC02003) divided by total of assets (WC02999)
Investment intensity	The ratio of capital expenditure (WC04601) to lagged assets (WC02999).
Tobin's q	The ratio of total assets (WC02999) minus book value of common equity (WC03501) plus year end market capitalization (WC08001) divided by total assets. (WC02999).
ROA	The ratio of operating income (WC01250) to total assets (WC02999).
Firm size	The natural logarithm of year end market capitalization (WC08001).
Book-to-market	The ratio of book value of common equity (WC03501) to year end market capitalization (WC08001).
Market beta	The regression slope of daily stock excess returns on a constant and daily excess market returns for year 2019.
Momentum	The sum of daily log excess stock returns of year 2019.
Chaebol affiliation	Dummy variable taking value 1 for firms affiliated with a business group in the KFTC list, 0 otherwise.
Cash flow rights	Sum of direct ownership and indirect ownership, which is computed as the product of ownership stakes obtained along the control chain.
Voting rights	Sum of the direct ownership and the sum of ownership of other affiliates in a given affiliate.
Industry indicators	Set of dummy variables for ICB supersectors.
KOSPI indicator	Dummy variable taking value 1 for firms listed on the KOSPI market, 0 otherwise.

This appendix contains the definitions of all independent variables. Data are retrieved from Refinitiv Datastream and Worldscope. Chaebol affiliation is based on the KFTC classification.

Appendix 11 Between-affiliate heterogeneity of affiliation value (investment intensity and opportunities)

	(1)	(2)	(3)	(4)
	Uncertainty	Panic	Recovery	Full period
	Jan 2-Feb 19	*Feb 20-Mar 19*	*Mar 20-May 13*	*Jan 2-May 13*
Constant	0.234***	-0.841***	0.982***	0.359***
	(0.062)	(0.096)	(0.089)	(0.109)
Chaebol*Hi-invest*Hi-Q	0.023	0.112***	-0.018	0.111*
	(0.036)	(0.041)	(0.046)	(0.064)
Chaebol*Hi-invest*Mid-Q	0.004	-0.082***	0.095***	0.013
	(0.021)	(0.031)	(0.025)	(0.036)
Chaebol*Hi-invest*Low-Q	-0.085***	0.050	0.102	0.059
	(0.026)	(0.076)	(0.079)	(0.051)
Chaebol*Mid-invest*Hi-Q	0.007	0.057*	0.011	0.078
	(0.026)	(0.034)	(0.048)	(0.054)
Chaebol*Mid-invest*Mid-Q	-0.040**	-0.047*	0.021	-0.070**
	(0.018)	(0.026)	(0.023)	(0.032)
Chaebol*Mid-invest*Low-Q	-0.083***	-0.049**	0.032	-0.100***
	(0.016)	(0.024)	(0.025)	(0.030)
Chaebol*Low-invest*Hi-Q	0.101***	-0.068	0.126**	0.158*
	(0.034)	(0.059)	(0.062)	(0.086)
Chaebol*Low-invest*Mid-Q	-0.029*	-0.047	0.067*	-0.016
	(0.016)	(0.036)	(0.037)	(0.038)
Chaebol*Low-invest*Low-Q	-0.026	0.001	-0.026	-0.051
	(0.024)	(0.041)	(0.035)	(0.032)
Beta	0.027***	-0.189***	0.182***	0.024
	(0.009)	(0.015)	(0.014)	(0.017)
Log(MV)	-0.013***	0.022***	-0.035***	-0.025***
	(0.003)	(0.005)	(0.005)	(0.006)
Momentum	0.024*	-0.041**	0.019	-0.009
	(0.012)	(0.019)	(0.017)	(0.024)
ROA	0.319***	-0.072	0.250***	0.525***
	(0.048)	(0.084)	(0.073)	(0.105)
Supersector indicators	YES	YES	YES	YES
KOSPI indicator	YES	YES	YES	YES
Observations	1870	1865	1841	1841
Adj. R-sq.	0.103	0.167	0.167	0.104

*The table presents results from cross-sectional regressions of cumulative excess returns on affiliation indicators and firm characteristics. To capture between-affiliate heterogeneity, affiliates are sorted independently based on investment intensity ratio and Tobin's q. Affiliates are classified in "high" ("low") ratio group, if their ratio is in the top (bottom) quartile, and "middle" if they are in the two middle quartiles. Chaebol affiliation is based on the 2019 KFTC classification. Firm characteristics are computed at the end of 2019. Appendix 10 defines variables in detail. All regressions include market and industry indicators. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses. p-value * < 10% ** < 5% *** < 1%*

Chapter 3

Business group heterogeneity and firm outcomes

Evidence from Korean chaebols[♣]

Abstract

This paper examines the impact of business group affiliation on the performance, and on the policies of Korean listed firms for the period 2007–2019. Based on a novel approach, the empirical results show that the heterogeneity in business group characteristics is reflected in the firm outcomes. Affiliation with a chaebol is associated with a higher firm value and a lower firm profitability. However, the intensity of the performance effect of affiliation varies across groups depending on group-level characteristics. The analysis of corporate policies shows that a number of chaebols conduct group-level strategy and apply homogeneous policy to their affiliates. This observation confirms the high level of control centralization of chaebols

[♣] I thank Dušan Isakov for his helpful comments and suggestions. I am responsible for all remaining errors.

1. Introduction

This paper examines the effect of business group affiliation on firm outcomes and the variation of this effect across groups. Numerous scholars investigate whether the affiliation with a business group affects the performance and the decisions of firms. The results of this literature remain mixed and do not identify a universal effect. Hence, some studies highlight the bright sides, whereas others document the dark sides of business groups. Finally, some other studies do not identify any impact of business group affiliation on firm outcomes. The cross-country and longitudinal studies also show that the results differ between countries and evolve over time. In this paper, I examine to which extent the effect of affiliation on firm outcomes varies across business groups. The heterogeneity of the affiliation effect might potentially explain the variability of results observed in the literature.

South Korea (Korea hereafter) offers an ideal field for business group research. The local business groups, commonly called chaebols, play the role of the spearhead of the Korean economy. Chaebols emerged after the Korean War and contributed to the rapid industrialization of the country during the second half of the twentieth century (Eichengreen et al., 2015). Prevalent in many Asian, European and Latin American countries, the literature often questions the ambivalent role of business groups hesitating between "parasites or paragons" (Khanna and Yafeh, 2007). A similar ambivalence is observed in Korea. On the one hand, chaebols play a key role in the economy in terms of international visibility, innovation, and value creation. On the other hand, chaebols are often criticized for their economic power that harms market competition at the expense of SMEs (OECD, 2018). The recent bribery or misbehavior scandals involving owner families increase public criticisms.

Based on a sample of Korean listed firms covering the period from 2007 to 2019, this paper examines the association between business group affiliation and a large range of firm outcomes including performance, financial, and investment policies. [53] First, the effect of affiliation is estimated at a market-level with a simple model assuming that business groups are homogeneous entities. To complement this market-level analysis and account for the heterogeneity in chaebol attributes, I use an identification strategy inspired by Cronqvist and Fahlenbrach (2008). [54] First, chaebols are pooled in categories of groups sharing similar observable characteristics including group size, diversification, indebtedness, profitability, and

[53] The firm performance measures are ROA and Tobin's q. Cash holding, debt leverage, and dividend payout are the proxies for financial policies, and the investment measures are capital investments and R&D expenditure.
[54] In their paper, Cronqvist and Fahlenbrach (2008) examine the effect of heterogeneity across blockholders and its impact on firm performance and policies.

sales growth. Second, a group fixed effect model is used to estimate the effect associated with each single chaebol.

The empirical results show that business group affiliation is associated with a valuation premium and a lower profitability. The category-level and group-level analyses confirm these market-level average effects, but show variations in their intensity across categories and groups. The valuation premium suggests that investors perceive business group membership as a value-enhancing factor. The lower profitability is consistent with the profit smoothing behavior described by Lincoln et al. (1996). The homogeneity of the performance effect of affiliation contrasts with the heterogeneous results observed in terms of firm policies. Unlike the operating and market performance, the financial and investment policies are subject to discretionary decisions of the firm or group managers. In terms of financial policies, the market-level analysis shows that the affiliation with a business group is associated with a lower cash holding, lower debt, and lower dividend payout relative to unaffiliated firms. No significant association between affiliation and investment policy is observed. However, the analyses at a higher level of granularity show that these results are not generalizable to all chaebols. Indeed, the group specific effects tend to diverge substantially from the market-level effect. For instance, a number of business groups are associated with a higher use of debt contrasting with the negative average effect. Investment policy offers a more salient example. Indeed, the market-level results does not identify significant effect of affiliation on investments, but the group-level analysis reveals that a substantial part of business groups are associated with a significant effect on affiliate investments.

Overall, the analysis reveals that the differences in business group characteristics reflect in the affiliation effect. This evidence highlights the importance to account for the business group heterogeneity in the estimation of the affiliation effect. These results also put in light the limitations of an identification strategy based on a single dummy variable for affiliation. First, the effect estimated by such model is not generalizable to all business groups. Indeed, the empirical results shows that the group specific effects diverge qualitatively and quantitatively from the market-level average effect. Second, when the association between affiliation and firm outcomes varies substantially in terms of sign across groups, group effects of opposite sign tend to cancel each other. Consequently, a model using a single dummy variable would not identify any significant effect at a market-level. Based on this result, one could conclude to the absence of affiliation effect on a given firm outcome, even though such association exists in reality but varies across business groups. In this paper, the case of the investment policy illustrates empirically this limitation. Indeed, no significant association between business group affiliation

and capital investment is observed at a market-level. However, the group-level analysis reveals that most groups in the sample are associated with significant group fixed effect in terms of investment. This association is positive for a number of chaebols and negative for others. The empirical evidence provided by this paper also call for the reinterpretation of some prior works that ignore the potential effect of the heterogeneity. Indeed, the heterogeneity between groups might explain the lack of consensus in the literature and differences observed in the cross-country studies (e. g. Khanna and Rivkin (2001) and Carney et al. (2011)).

In addition to this methodological contribution, the paper also extends the business group literature and contributes to a better understanding of the impact of business group membership on firm outcomes. First, this paper addresses the lack of comparability between studies in the business group literature (Yiu et al., 2007) by documenting the effect of business group affiliation on a large range of firm outcomes for a single sample. It contrasts with most prior studies that focus only on one specific topic such as performance (e. g. Khanna and Palepu (2000b)) or financing (e. g. Byun et al. (2013)). Second, the empirical results also indicate that the differences in business group features impact more the estimation of the effect of affiliation on firm policies than the performance effect. The discretionary power of controlling shareholder on affiliate investment and financial decisions might explain this observation. The evidence of significant group fixed effects also indicates that a number of business groups follow group-level policies and tend to apply homogeneously these policies to their affiliates. Finally, this paper extends the literature on the Korean market and chaebols. Indeed, a substantial part of the existing literature focuses on the 1997 Asian financial crisis period. Since this event, the Korean institutional framework and corporate sector have experienced substantial changes calling for a reconsideration of the effect of chaebol affiliation.

The remainder of the paper is organized as follows. Section 2 introduces business groups and implications of affiliation. Section 3 presents the identification strategy and different models used in the empirical analysis. The firms and business groups datasets are described in section 4. Section 5 presents the empirical results and discusses the main outcomes and limitations of the paper. Section 6 provides the conclusion of the paper.

2. Business groups and affiliation effect

2.1 Business groups and Korean chaebols

Defining business groups is not a trivial task given their considerable diversity. However, we usually define business groups as clusters of legally independent firms under the control of an individual, family, or corporation, that exercises control through formal and informal mechanisms (Kandel et al., 2019). The ties and coordination between affiliates appear as two key characteristics shared by business groups (Khanna and Rivkin, 2001). Khanna and Rivkin (2001) insist on the multiplicity and combination of ties binding affiliates together. The economists often focus on the equity links and ownership structure (e. g. cross-ownership and pyramidal structure), whereas the scholars from other social sciences emphasize the importance of social and interpersonal ties (e. g. family, school or interlocking directorates) (Khanna and Palepu, 2000a). This combination of formal and informal ties is used by the controlling shareholder to control affiliated firms with a minimum of equity investment (Yiu et al., 2007). Prior works document how such mechanisms are used to conduct group-level strategies aiming at sharing resources (Chang and Hong, 2000), reducing risk (Lincoln et al., 1996), supporting weak affiliates (Gopalan et al., 2007) or conducting political lobbying (Fisman, 2001). The diversification is another characteristic of business groups documented in the literature. The group diversification plays different roles such as risk reduction through diversification of cashflow sources and ensuring supply in inputs when external markets are deficient (Leff, 1978).

The dominance of business groups is a characteristic of the Korean economy. Chaebols emerged in the aftermath of the Korean War and contributed to the industrialization by collaborating with the government to implement development policies. The support and protection from the government allowed chaebols to grow and diversify their activities. The 1997 Asian financial crisis strongly hit Korea and led to the collapse of several chaebols. After this crisis, the Korean government undertook substantial reforms that aimed at curbing the chaebol power, and improving the transparency and financial resilience of chaebols. Despite these reforms, chaebols are still prevalent and play a key role in the Korean economy (Eichengreen et al., 2015).

Chaebols are similar on some aspects, but differ on others. Hence, chaebols of different size co-exist. During decades, Hyundai Group was the largest business group in Korea but, Samsung Group became the largest one after the split off of Hyundai Group in the early 2000s, (Kim et al., 2004a). During the industrialization of the country, many chaebols diversified their

activities to either follow the government incentives or remediate to the lack of suppliers. However, a number of chaebols refocused on their core business more recently. Hence, some chaebols are still highly diversified (e. g. Samsung Group), whereas others are more focused (e. g. Hyundai Motors) (Kim et al., 2004a). Chaebols also differ in terms of ownership. Even though some widely held business groups exist in Korea (e. g. POSCO), the majority of chaebols are family controlled. For instance, Samsung Group is still controlled by the founder Lee Byung-chul's descendants. The ownership structure of chaebols evolves over time. In 1987, the authorities forbad holding structure to avoid the development of pyramidal structure. However, holding structure prohibition was removed and this type of ownership structure was promoted in order to improve transparency after the 1997 Asian financial crisis (KFTC, 2017). Consequently, LG Group and a number of chaebols operated restructuring into holding structure, but others as Samsung Group still exhibit complex ownership scheme (Kim et al., 2004a).

2.2 Effect of business group affiliation on firm outcomes

The resource-based and agency theories are commonly used in the finance literature to describe and predict the effect of business group affiliation on firm performance and decisions. The resource-based theories focus on whether and how group-level resources influence affiliated firms. The ability of business groups to pool and reallocate resources among the affiliates is often cited as a competitive advantage of business group membership. Indeed, internal factor markets can substitute to external markets by providing the access to scarce resources and reducing transaction costs (Chang and Choi, 1988). Larger benefits are expected in emerging countries where external markets are less efficient and underdeveloped. Internal markets for factors can be used to share workforce (internal labor markets), input (intragroup trades) or capital (internal capital markets) (Khanna and Rivkin, 2001).

Internal capital markets raise a special interest among finance scholars. According to the literature, internal capital markets affect directly or indirectly financial and investment policies of business group affiliates. Hence, several studies provide the empirical evidence that business group affiliation and access to internal capital markets lower financial constraints. This effect is documented for different countries such as Japan (Hoshi et al., 1991), Korea (Shin and Park, 1999), Russia (Perotti and Gelfer, 2001), India (Lensink et al., 2003), and China (He et al., 2013). Consequently, Pinkowitz and Williamson (2001) and Locorotondo et al. (2014) observe that business group affiliation is associated with a lower cash holding in Japan and

Belgium respectively. The better access to external financing (e.g. Byun et al. (2013) and Gormley et al. (2015)) contributes to explain the lower financial constraints. The reallocation of funds between affiliates serves different purposes namely propping and tunneling. The former refers to the transfer of resources to affiliates in need of financing, whereas the latter is associated with minority shareholder expropriations (Bae et al., 2008). Empirical evidences show that intragroup loans (Gopalan et al., 2007) and dividends (Gopalan et al., 2014) are used to transfer capitals within business groups. The lower financial constraints and the access to internal capital markets might also reflect in investment policy. For instance, Hoshi et al. (1991) observe a lower cashflow sensitivity of investments for affiliated firms in Japan. Similar results are observed in Korea by Shin and Park (1999). Almeida et al. (2015) find that during crisis periods the access to internal capital markets allows business group affiliates with high growth opportunities to maintain their investments.

Whereas the resource-based theories describe business group affiliation as mostly beneficial, the agency theories argue that business group affiliation is associated with some costs. The presence of a controlling shareholder prevents against principal-agent conflicts. Nevertheless, it increases the risk of principal-principal conflicts. The controlling shareholders might take advantage of their control over affiliates to extract private benefits at the expense of non-controlling shareholders (Young et al., 2008). This risk is even higher in the case of business groups since the controlling shareholder might prioritize group-level interests rather than firm-level interests (Bae et al., 2002). Intragroup subsidizations (propping) might also benefit to some affiliates at the expense of others (Chang and Hong, 2000). A number of scholars provide evidence of minority shareholder expropriations by chaebol controlling shareholders. For instance, Bae et al. (2002) find that the acquisitions conducted by chaebol affiliates benefit to controlling shareholders at the expense of minority shareholders and Baek et al. (2006) document tunneling activities through private security offerings. Some authors also observe minority shareholder expropriations during the family succession. Hence, Hwang and Kim (2016) find that controlling shareholders use related party transactions to ease family successions and Shin (2020) shows that inheritance tax avoidance is a motive for intragroup mergers at the expense of minority shareholders.

Overall, the effect of affiliation on firm performance results in the sum of the benefits and costs associated with business group membership. The empirical literature provides mixed results regarding the association between business group affiliation and firm performance. Carney et al. (2011) conduct a meta-analysis based on 141 studies covering 28 countries. The authors find a negative effect of affiliation on firm performance. However, they observe that

results differ substantially from a study to another depending on the methodology or country. The cross-country analysis covering 14 emerging countries during the early 1990s conducted by Khanna and Rivkin (2001) also highlights the variability of the performance effect of business group affiliation across countries. The authors identify a significant association between affiliation and accounting profitability in nine countries. The effect is positive in six countries and negative in three others. Holmes Jr et al. (2018) observe the difficulty to assess the benefits of group membership on performance given the different group strategies and roles of affiliates. For instance, Lincoln et al. (1996) find a negative effect of business group affiliation on firm profitability in Japan. The authors explain this negative relation by the reallocation aiming at smoothing profitability across affiliates and ensuring group viability rather than maximizing profit. The results in terms of performance effect for Korean chaebols are also mixed. For instance, Lee et al. (2010) use a 21-years long sample and observe variations in value of chaebol affiliation over time. During the both 1980s and 2000s, chaebol affiliation is associated with a higher firm value but, chaebol affiliates are traded at a discount during the period preceding the 1997 crisis. The underperformance of chaebol affiliates in the years prior to this crisis are supported by other studies as Ferris et al. (2003) and Lee et al. (2008).

2.3 Between-group heterogeneity and effect of affiliation

Most studies estimate the impact of affiliation on firm outcomes at a market-level. The market-level estimation of the affiliation effect assumes implicitly that business groups are homogeneous entities and the effect of affiliation is the same for all business groups. In this paper, I argue that the heterogeneity in business group features might reflect in the affiliate outcomes. Indeed, both resource-based and agency theories associate the effect of business group membership with business group features and we observe substantial differences in business group characteristics. Therefore, we can expect to see the effect of affiliation varies across business groups.

The firms belonging to a business group access the same resources such as the capital, workforce, knowhow or brands through internal factor markets (Khanna and Rivkin, 2001). Consequently, the affiliates of a same business group are likely to share similar benefits and costs, whereas the affiliates of another business group benefit from other advantages and face other costs. A number of studies examine the association between group size and firm outcomes. Overall, the meta-analysis conducted by Carney et al. (2011) highlights a positive association between the group size and affiliate performance. Some authors document other

benefits associated with the large business group affiliation such as the access to government (Khanna and Palepu, 2000b), reputation (Morck et al., 2005) and lower entry barriers (Pattnaik et al., 2018). Those benefits are likely to translate into firm performance. Gormley et al. (2015) and Minetti and Yun (2015) observe that the advantage of business group affiliation in terms of debt financing is even higher for the affiliates of the five largest chaebols. The investigations on the interaction between the group diversification and affiliate outcomes yield mixed results. Hence, a U-shaped relationship between the group diversification and firm profitability is observed in Chile (Khanna and Palepu, 2000a) and India (Khanna and Palepu (2000b) and Elango et al. (2016)), while the reverse is found in South American countries (Borda et al., 2017). However, Khanna and Rivkin (2001) do not find evidence of a diversification discount in their cross-country analysis contrasting with the results for US conglomerates. During the period prior the 1997 Asian finance crisis, Chang and Hong (2000) investigate the relation between shared resources and chaebol affiliate profitability. The authors observe a significant effect of group resources on affiliate performance. The group size and leverage have a negative effect, whereas the diversification has a positive effect.

The management style and preferences of the group controlling shareholder are also likely to differ between business groups and reflect in affiliates outcomes and decisions. Cuervo-Cazurra (2006) suggests that the preference and education of controlling shareholder might influence the strategy of family business groups. Such association is especially likely to be observed in highly centralized business groups as Korean chaebols in which strategic decisions are taken at a group-level (Shin and Park, 1999). For instance, Kwon and Han (2020) find evidence of a group-level payout tendency affecting all affiliates belonging to a same family business group. Outside the business group literature, Bertrand and Schoar (2003) and Cronqvist and Fahlenbrach (2008) document how firm policies are impacted by the preferences of managers and blockholders respectively.

Finally, a number of empirical works show how the ties between affiliates reflect in firm performance or decisions. For instance, Khanna and Rivkin (2001) observe a significant higher correlation in the profitability between firms belonging to a same business group. Some works show that between affiliate ties reflect in stock prices. For instance, Kim et al. (2015) document stock return comovements within Korean business groups and other authors find a group-level spillover effect at credit rating announcement (Kwon et al. (2016), Joe and Oh (2018)), earnings announcement (Bae et al., 2008) or stock price crash risk (Kwon et al., 2019).

3. Identification strategy

This section presents and discusses the models used to examine the variations in the affiliation effects associated with the heterogeneity in group characteristics. The identification strategy is inspired by Cronqvist and Fahlenbrach (2008) and adapted to the specificities of the business group framework. The section starts with a simple model using a single dummy variable to capture the average association between the business group membership and the firm outcome. Then, this model is developed to account for the business group heterogeneity and the variations in the effect of affiliation across groups.

3.1 Baseline model

The baseline model of this paper estimates the market-level average association between affiliation with a business group and firm outcomes. Therefore, the effect of affiliation is supposed to be the same for all business groups that are considered as homogenous entities. To capture the association between a given firm outcome and business group affiliation, the explained variable is regressed on a dummy variable for affiliation. The baseline model is given by Equation (1).

$$y_{it} = \alpha + \delta BG_{it} + \beta \boldsymbol{X_{it}} + Ind_i + Year_t + \varepsilon_{it} \quad (1)$$

where, i and t index firms and years respectively. The firm outcome y is regressed on the dummy variable BG taking the value 1 for firms affiliated with a business group and 0 otherwise. To capture the effect of the affiliation on firm outcome net of other firm characteristics, Equation (1) includes a set of firm control variables denoted by the vector ***X,*** and fixed effects for industries and years. The coefficient δ captures the average difference in the variable *y* between affiliated and unaffiliated firms after accounting for firm characteristics. Consequently, the affiliation effect estimated by Equation (1) is the same for all business groups.

3.2 Model modified for categories

The assumption of the business group homogeneity imposed by the baseline model (1) is unrealistic given the differences in business group characteristics observed in the reality. As discussed in Section 2.3, we can expect that the effect of affiliation varies depending on group

characteristics. To examine to which extent the differences in group characteristics causes heterogeneity in the affiliation effect, business groups are pooled in homogeneous categories and the baseline model (1) is modified as follows

$$y_{it} = \alpha + \boldsymbol{\gamma D_{it}} + \beta \boldsymbol{X_{it}} + Ind_i + Year_t + \varepsilon_{it} \quad (2)$$

where, a $K \times 1$ vector $\boldsymbol{D}$ of business group category indicators replaces the dummy variable BG of the model (1). $\boldsymbol{\gamma}$ is a vector of category coefficients. The coefficient γ_k captures the difference in the variable y between unaffiliated firms and firms affiliated with a business group belonging to category k. In order to capture the effect net of firm characteristics, the model (2) includes the same controls and fixed effects as the baseline model (1). The model modified for categories (2) differs from the baseline model (1) by averaging the effect of affiliation on firm outcomes across categories of homogeneous business groups instead of averaging the effects across all (and heterogeneous) business groups. Hence, the model assumes the homogeneity of the affiliation effect only across business groups sharing similar characteristics, but accounts for the variations induced by the heterogeneity in group characteristics.

3.3 Group fixed effect model

The assumption of the between-group homogeneity is only partially relaxed by the model (2). Indeed, this model assumes that the association between group affiliation and firm outcomes is homogenous between similar business groups. In addition, the model modified for categories (2) captures only the effect related to observable group characteristics. To fully capture the variations in the effect of affiliation due to both observable and unobservable group characteristics, the single affiliation dummy variable of the baseline model (1) is replaced by a vector of individual business group indicators as depicted in Equation (3).

$$y_{it} = \alpha + \boldsymbol{\Gamma Z_{it}} + \beta \boldsymbol{X_{it}} + Ind_i + Year_t + \varepsilon_{it} \quad (3)$$

where, $\mathbf{Z}$ is a vector of individual business group indicators of size $G \times 1$, where G is the number of business groups. $\boldsymbol{\Gamma}$ is a vector of business group fixed effects. The coefficient Γ_g captures the specific effect associated with the affiliation with the business group g. Equation (3) includes the same control variables and fixed effects as the baseline model (1) to estimate the business group fixed effects net of firm characteristics. The group fixed effect model (3)

allows to fully relax the assumption of the between-group homogeneity imposed by models (1) and (2). Unlike the model modified for categories (2) that captures only the variation associated with the differences in observable characteristics such as the group size or diversification, the group fixed effect model (3) is able to capture the variations in the effect of affiliation due to group-specific and unobservable features such as the controlling shareholder preference.

The estimation of the group fixed effect model (3) imposes some specific constraints. To ensure an estimation based on the both time and cross-section differences, each business group needs to be in the sample for at least two years with a minimum of two affiliated firms. If a business group is present during only a single year, the group fixed effect would be collinear with the year fixed effect. If a business group has only one affiliate in the sample, the group fixed effect would be captured by the firm fixed effect rather than the group effect.

3.4 Discussion of the identification strategy

The three above-mentioned models use unaffiliated firms as control group but differ in how they consider business groups. The baseline model (1) assumes that business groups are homogenous entities. In the model modified for categories (2), business groups are pooled into homogeneous categories based on observable characteristics and the group fixed effect model (3) considers each business group individually.

These differences have some implications in terms of identification. Hence, the baseline model (1) is set to identify the market-level average effect of business group affiliation on firm outcomes. Estimating the market-level average effect raises some concerns if we consider the differences in business group characteristics. Indeed, the average effect might hide variations in the affiliation effect across groups. For instance, the model might identify a significant and positive average effect of affiliation on a given firm outcome at a market-level, whereas this effect is actually negative for some specific business groups. It is also possible that the model fails to identify any systematic and significant relation if group effects of opposite sign cancel each other. In both cases, the baseline model leads to a wrong conclusion. In the first example, one can conclude that the business group affiliation is associated with a positive effect on the firm outcome, whereas it is true only for some specific business groups. In the second case, one can infer that the firm outcome is not significantly affected by the business group membership, whereas the affiliation has a significant but heterogeneous effect across business groups. Hence, the baseline model (1) draws only a general and partial picture of the relation between firm outcomes and business group affiliation.

The model modified for categories (2) and the group fixed effect model (3) allow an analysis at a higher granularity level to observe the variations in the affiliation effect across business groups. The model modified for categories (2) relaxes partially the assumption of homogeneity imposed by the baseline model (1). Instead of averaging affiliation effects across all (and potentially heterogeneous) business groups, the effects of affiliation are averaged across similar business groups. Therefore, this model assumes that the effect of affiliation on firm outcomes is homogenous between similar business groups, but heterogeneous between groups with different characteristics. Such differences are consistent with the resource-based and agency theories discussed earlier. One limitation of this model is to be unable to capture the heterogeneity due to unobservable group features such as the controlling shareholder preference or management style. The group fixed effect model (3) allows addressing this issue by estimating the effect specific to each single business group. Depending on the significance of the group fixed effects, this model also indicates to which extent affiliates of a given business group follows homogeneous policy and strategy.

4. Sample and data

The empirical analysis is based on a single country sample as it provides more reliable results than a multi-country analysis (Khanna, 2000). Indeed, results of multi-country analyses might be affected by the differences in legal framework or macroeconomic factors. In addition, a single country analysis also ensures a consistency in the definition of business group and the identification of affiliated firms. Korea offers an ideal framework for business group analysis. First, business groups play a prominent role in the Korean economy. A second advantage is the data provided by the Korea Fair Trade Commission (KFTC) that eases the identification of business groups and their affiliates (Kim et al., 2022). Additionally, it provides a common definition of business groups to researchers ensuring the result comparability.

4.1 Firm sample

The sample consists of firms listed on the two main market divisions (KOSPI and KOSDAQ) of the Korean stock market (KRX) from 2007 to 2019. Consistent with a common practice in the literature, financial firms (ICB 3010-3030) and utilities firms are excluded (ICB 6510) from the sample. Accounting and financial data are retrieved from Refinitiv Datastream and Worldscope. After deleting observations with missing variables, the final sample includes 14183 firm-year observations (1785 unique firms).

Table 21 Firm summary statistics

	All firms (Obs.=14183)			Non-chaebol firms (Obs.=12473)			Chaebol firms (Obs.=1710)			Non-chaebol vs chaebol firms
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	t-stat
Tobin's q	1.318	1.037	0.854	1.33	1.044	0.869	1.23	0.997	0.728	4.534***
Market-to-book	1.608	1.08	1.598	1.629	1.095	1.617	1.456	0.992	1.439	4.205***
ROA	0.063	0.073	0.105	0.06	0.072	0.107	0.088	0.085	0.077	-10.275***
Leverage	0.229	0.219	0.172	0.226	0.212	0.173	0.254	0.264	0.164	-6.322***
Cash holding	0.171	0.124	0.148	0.177	0.132	0.151	0.124	0.09	0.115	14.099***
Dividend payout	0.092	0.03	0.237	0.09	0.012	0.239	0.109	0.076	0.218	-3.077***
Capital investment	0.178	0.121	0.179	0.181	0.121	0.184	0.158	0.124	0.134	4.790***
R&D investment	0.021	0.011	0.028	0.022	0.012	0.029	0.013	0.005	0.023	12.669***
Tangibility	0.319	0.313	0.178	0.315	0.309	0.177	0.347	0.354	0.184	-7.004***
ln(Size)	19.177	18.86	1.523	18.848	18.695	1.123	21.573	21.758	1.873	-85.339***
Age	28.072	24	16.676	27.259	23	16.244	34.005	35	18.489	-15.827***
Sales growth	0.11	0.052	0.379	0.113	0.052	0.39	0.09	0.052	0.29	2.422**

The table presents summary statistics for the full sample and subsample of non-chaebol and chaebols firms. The last column reports t-stat for test of mean between non-chaebol and chaebol firms. Variables construction is described in Appendix 12. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream and Worldscope. Chaebol affiliation is based on KFTC disclosure.

Whereas the majority of research works usually focus only on firm performance (e.g. Khanna and Palepu (2000b)) or specific decisions (e. g. Gopalan et al. (2014)), this paper examines the effect of affiliation on a wide range of firm outcomes including firm performance, financial, and investment policies. Return on assets (ROA) and Tobin's q are two proxies for firm performance. ROA reflects operating performance and is based on past accounting data, whereas Tobin's q is a forward-looking proxy for firm value (Isakov and Weisskopf, 2014). ROA is EBITDA scaled by total assets. Tobin's q is measured as total assets minus total common equity plus market value of equity divided by total assets. Cash holding, leverage, and dividend payout are used as proxies for financial policy. Cash holding is cash and equivalent divided by total assets. Leverage is the sum of long term debt, short term debt and current portion of long term debt in current liabilities divided by total assets. Dividend payout is the total cash dividend divided by EBIT. Investment policy are proxied by capital investment and R&D investment. Capital investment is capital expenditure scaled by net property, plant, and equipment (PPE). R&D investment is R&D expense divided by total assets. Size, market-to-book ratio, sales growth, and firm age are additional control variables. Firm size is the natural logarithm of firm total assets, market-to-book ratio is market value of equity divided by total common equity, sales growth is the one-year change in sales, and firm age is the number of years since firm incorporation. Except firm age, all variables are winsorized at the 1 percent level in each tail. The firm variables construction is detailed in Appendix 12.

Table 21 reports some summary statistics for all sample firms and compares statistics of non-chaebol and chaebol firms. [55] Overall, we observe that business group affiliates differ significantly from other Korean listed firms. This observation raises concerns regarding the choice of unaffiliated firms as control group and endogeneity issues. These concerns are discussed in Section 5.4.

4.2 Business group sample

Data about chaebols and affiliation status are based on the KFTC disclosures. Following a common practice in the literature dedicated to Korean chaebols, state owned business groups are not considered as chaebols. [56] In order to keep consistency in the chaebol definition across the full sample, business groups whose the value of total assets is below 5 trillion KRW are not

[55] The detailed summary statistics are showed in Appendix 13.
[56] Only 18 firm-year observations are due to affiliates of state owned chaebols. Appendix 14 presents the estimation of the baseline model excluding those observations. Results are not affected.

considered as chaebols. [57] The sample includes a total of 63 chaebols for 528 group-year observations and 1710 affiliate-year observations (257 unique firms). [58]

All chaebol characteristics are computed including both listed and unlisted domestic affiliates based on data disclosed by the KFTC. Group size is defined as the sum of total assets of all affiliates. Group diversification is given by the number of industries in which chaebol affiliates operate. Group size, number of industries and affiliates are attributes directly linked with the resources available at a group-level and associated with the resource-based theories. As discussed earlier, the size and diversification play a significant role in internal factor markets. Group leverage is computed as the ratio of the sum of liabilities of all affiliates divided by group total assets. Different interpretations are possible for group leverage. As the above-mentioned characteristics, it might be linked with a resource-based perspective. However, the group leverage can be also associated with the controlling shareholder preference who might have preference for debt financing or avoid control dilution (Chang and Hong, 2000). Finally, it can be interpreted as an indicator for financial vulnerability. Indeed, the excessive indebtedness was a cause of chaebols collapse during the 1997 Asian financial crisis (Eichengreen et al., 2015). Group profitability is the sum of net income of all affiliates divided by group total assets. Growth sales is the one-year change in the sum of sales of all affiliates (set to zero if missing). Both group profitability and group sales growth are two proxies for group-level performance. Group summary statistics are reported in Table 22.

In Panel B, the correlation matrix shows strong relation between the different measures of group size and diversification. Indeed, we observe a significant correlation between the value of group assets and the number of industries. These two variables are also significantly correlated with the number of affiliated firms that can be interpreted as a measure of both diversification and size. The two measures of group performance, profitability and sales-growth, are also significantly correlated, whereas correlation between leverage and profitability is negative and significant. We also observe that the correlation between leverage and number of affiliates is slightly significant.

[57] In 2009, the total assets threshold for chaebol designation increased from 2 to 5 trillion KRW.
[58] A limitation of the KFTC classification is to be restricted to largest business groups and does not consider business groups below the threshold. This limitation is discussed in Section 5.4.

Table 22 Group summary characteristics

	Size (tr KRW)	Nbr of affiliates	Nbr of industries	Leverage	Profitability	Sales growth
Panel A: Summary statistics (Obs. 528)						
Mean	45.992	34.2	14.8	0.551	0.028	0.067
p25	8.335	16.5	9.0	0.456	0.008	-0.019
Median	15.243	26.5	14.0	0.557	0.024	0.041
p75	39.881	48.0	20.0	0.667	0.048	0.136
SD	90.341	22.1	7.1	0.182	0.058	0.175
Panel B: Correlation matrix						
Size	1.00					
Nbr of affiliates	0.50***	1.00				
	(0.000)					
Nbr of industries	0.45***	0.88***	1.00			
	(0.000)	(0.000)				
Leverage	0.06	0.08*	0.03	1.00		
	(0.194)	(0.059)	(0.561)			
Profitability	0.05	-0.00	0.01	-0.50***	1.00	
	(0.238)	(0.975)	(0.896)	(0.000)		
Sales growth	0.01	0.05	0.05	-0.04	0.16***	1.00
	(0.735)	(0.296)	(0.296)	(0.408)	(0.000)	

*The table presents summary statistics and correlations between group characteristics. Group size is the sum of total assets of all affiliates. Number of affiliates is the number of domestic listed and unlisted affiliated firms as designated by the KFTC. Number of industries is the number of industries in which chaebol affiliates operate. Group leverage is the ratio of the sum of liabilities of all affiliates divided by group total assets. Group profitability is the sum of net income of all affiliates divided by group total assets. Growth sales is the one-year change in the sum of sales of all affiliates (set to zero if missing). Group characteristics are computed based on affiliate data and include both listed and unlisted affiliates. The sample covers the period from 2007 to 2019 and 63 business groups. Data are retrieve from KTFC. P-value are in parentheses * < 10% ** < 5% *** < 1%*

Table 23 Group category summary statistics

		Observations	Size (tr. KRW)	Nbr of affiliates	Nbr of industries	Leverage	Profitability	Sales growth
All groups		528	45.992	34.2	14.8	0.551	0.028	0.067
Group size	Small	180	7.308	23.4	11.3	0.481	0.033	0.067
	Middle	175	17.109	28.9	13.0	0.587	0.021	0.062
	Large	173	115.458	51.0	20.3	0.586	0.029	0.072
Diversification	Low	197	17.968	16.7	8.0	0.523	0.033	0.054
	Middle	168	21.511	29.5	14.3	0.578	0.019	0.07
	High	163	105.092	60.4	23.7	0.555	0.031	0.079
Leverage	Low	180	35.061	34.7	14.2	0.36	0.058	0.077
	Middle	175	58.173	36.6	15.6	0.558	0.024	0.07
	High	173	45.043	31.4	14.7	0.74	0	0.053
Profitability	Low	180	28.045	30.8	13.8	0.665	-0.014	0.025
	Middle	175	44.841	37.8	15.8	0.563	0.026	0.08
	High	173	65.829	34.2	14.9	0.419	0.073	0.097
Sales growth	Low	180	37.939	29.1	13.2	0.553	0.018	-0.068
	Middle	175	52.830	38.3	16.5	0.564	0.026	0.057
	High	173	47.454	35.4	14.8	0.534	0.04	0.217

The table presents summary statistics for group categories. First row provides the mean characteristics for all groups. Further rows provide statistics for different group categories. Categories are based on yearly tercile sorting. Categories are based on size (group total assets), diversification (number of industries), leverage (group total liabilities divided by total assets), profitability (group total net income divided by total assets), and sales growth (one-year change in group total sales, zero if missing). First column provides the number of group-year observations. Next columns provide mean group size, number of affiliated firms (listed and unlisted), number of industries, group leverage, group profitability, and group sales growth. All measures include listed and unlisted affiliates. The sample covers the period from 2007 to 2019 and 63 business groups. Data are retrieve from KTFC.

In Section 5, the group size, group diversification, group leverage, group profitability, and group sales growth are used to categorize business groups in the model modified for categories (2). The number of affiliated firms is not used given its mixed interpretation. Chaebols are sorted on yearly basis in tercile groups (low, middle, high) for each above-mentioned characteristics. Table 23 reports average characteristics for each category.

The largest chaebols are more diversified and have more affiliated firms than smaller ones. The smallest chaebols have lower debt and are slightly more profitable than larger groups. The highly diversified chaebols are larger in terms of asset value and number of affiliates. They also exhibit higher sales growth than less diversified chaebols. The chaebols with a low level of debt exhibit higher sales growth and profitability than heavily indebted chaebols. Chaebols of different indebtedness categories appear as homogenous in terms of size and diversification. The highly profitable chaebols have also higher sales growth than poor performing chaebols. On average, they are also larger and have lower debt. Finally, in comparison with sorting based on profitability, the categorization according to one-year change in sales results into homogeneous categories in terms of size and debt.

5. Empirical results

5.1 Average affiliation effect

The empirical analysis starts by examining the average association between affiliation with a business group and firm outcomes using the baseline model (1). To control for firm differences, the regression model includes a set of firm control variables commonly used in the literature (Mitton, 2022), and fixed effects for year and industry.

Table 24 reports the regression results using the baseline model (1). The variable of interest is the affiliation dummy variable *Chaebol* taking value 1 for firms affiliated with a chaebol and 0 otherwise. A positive (negative) coefficient means that the affiliation with a chaebol is associated with a higher (lower) dependent variable than non-chaebol firms after controlling for effects of other firm characteristics, industry, and year. In columns (1) and (2), we observe that the coefficients on affiliation have opposite signs for performance proxies. Hence, chaebol affiliation is associated with a 2.4 percentage points lower ROA, but a 18.6 percent higher Tobin's q relative to unaffiliated firms. The negative effect on profitability is consistent with the priority put on profit smoothing rather than profit maximization described by Lincoln et al. (1996). Columns (3) to (5) report significant coefficients on affiliation dummy for all financial policy proxies. On average, chaebol affiliation is associated with a debt leverage

lower by 3.2 percentage points. Consistent with Pinkowitz and Williamson (2001) who argue that business group affiliates have lower liquidity needs, we observe a 1.8 percentage point lower cash holding associated with chaebol affiliation. The results in column (5) indicate a 1.9 percentage point lower payout ratio associated with chaebol affiliation. The lower payout is consistent with the findings of Hwang et al. (2013) and Kwon and Han (2020). The results in the last set of columns do not indicate a systematic and significant association between business group membership and investment policy at a market-level.

Despite the presence of control variables in the specification above, the omitted variable bias and unobserved firm heterogeneity can affect the estimations presented in Table 24. To mitigate this risk, I test an alternative model. Since the firm fixed effect model is not applicable due to the risk of multicolinearity between the affiliation dummy and the firm fixed effect, I apply a two steps approach. The first step consists in estimating a model in which firm fixed effects replace the affiliation dummy (and industry indicator). [59] In the second step, the firm fixed effects are regressed on an affiliation dummy. Except for dividend payout and capital investment, the results of the second step showed in Appendix 15 are qualitatively consistent with the results of the baseline model (1) and suggest that the omitted variable bias has a limited impact on the results.

The baseline model (1) assumes that the association between affiliation and firm outcomes is the same for all business groups. Consequently, it ignores potential differences between groups. This model allows drawing only a general picture of the relation between firm outcomes and business group membership at a market-level. For instance, the results show a positive value effect of affiliation. However, this result might not apply to all chaebols or its intensity might vary across chaebols. It is also possible that the affiliation with some chaebols is associated with a significant effect on investment, even though a general association is not identified at the market-level. Hence, the results obtained with the baseline model (1) might not to be generalizable to all chaebols.

[59] The firm fixed effect model is

$$y_{it} = \alpha + \beta \boldsymbol{X_{it}} + \gamma_i + Year_t + \varepsilon_{it}$$

where, γ_i is firm fixed effect for firm i.

Table 24 Baseline model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Constant	-0.261***	1.401***	-0.312***	0.371***	-0.120***	0.383***	0.060***
	(0.026)	(0.123)	(0.051)	(0.040)	(0.046)	(0.035)	(0.009)
Chaebol	-0.024***	0.186***	-0.032***	-0.018**	-0.019**	0.008	0.001
	(0.005)	(0.030)	(0.011)	(0.009)	(0.010)	(0.008)	(0.002)
ln(Size)	0.022***	-0.059***	0.024***	-0.004*	0.011***	-0.004*	-0.001**
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.177***	0.129***		-0.389***	-0.195***	-0.062***	-0.020***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.460***	0.010	0.069***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.069	-0.556***	-0.033	0.205***	0.100***	-0.014***
		(0.079)	(0.021)	(0.021)	(0.020)	(0.027)	(0.005)
Tangibility			0.370***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.212	0.267	0.276	0.308	0.050	0.121	0.232

*The table presents results for the baseline model (1). In columns (1) and (2), dependent variables are performance measures. ROA is the EBITDA scaled by total assets. Tobin's q is measured as total assets minus total common equity plus market value of equity divided by total assets. In columns (3) to (5), dependent variables are proxies for financial policies. Cash holding is cash and equivalent divided by total assets. Leverage is the sum of long term debt, short term debt and current portion of long term debt in current liabilities divided by total assets. Dividend payout is total cash dividend divided by EBIT. In column (6) and (7), dependent variables are proxies for investment policies. Investment is capital expenditure scaled by net property, plant, and equipment. R&D investment is R&D expenditures divided by total assets. Chaebol is an dummy variable taking value 1 for firms affiliated to a business groups as defined by the KFTC and 0 otherwise. Other control variables are: firm size computed as the natural logarithm of total assets, leverage computed as the sum of long term debt, short term debt and current portion of long term debt in current liabilities divided by total assets, market-to-book ratio computed as market value of equity divided by total common equity, sales growth computed as the one-year change in sales, age is the natural logarithm of time since incorporation, capital investment computed as EBITDA scaled by total assets, tangibility computed as net property, plant, and equipment divided by total assets, and dividend payout computed as total cash dividend divided by EBIT. Computation of variables is described in Appendix 12. All regressions include year and industry indicators. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

5.2 Between-category heterogeneity

As discussed in Section 4, Korean chaebols exhibit a wide diversity in terms of size, diversification and financing. According to the resource-based and agency theories, we can expect that the effect of affiliation on firm outcomes varies depending on group features. To account for the heterogeneity in group characteristics and implement the model modified for categories (2), chaebols are categorized (one-way sorting) according to group characteristics

(see Section 4.2). The model (2) assumes that the affiliation effect is homogeneous across chaebols belonging to a same category (e. g. the largest chaebol), but heterogeneous between different categories (e. g. between the largest and the smallest chaebols).

Table 25 reports the coefficients on category indicators based on the estimation of Equation (2). [60] The regression model includes the same firm control variables as in Table 24. Chaebols are sorted in terciles by group size (Panel A), group diversification (Panel B), group leverage (Panel C), group profitability (Panel D), and group growth (Panel E). Columns (1) and (2) report the results for the performance proxies. The results of the model modified for categories (2) are qualitatively similar and consistent with the baseline model (1). Hence, chaebol affiliation is associated with a significantly lower profitability and higher firm value relative to non-chaebol firms. These results are valid for all categories irrespective with the sorting characteristic. However, the magnitude of the association varies across categories and diverges from the average association estimated by the baseline model (1). For instance, the baseline model (1) identifies that chaebol affiliation is associated with a 2.4 percentage point lower ROA relative to non-chaebol firms. In Panel A of Table 25, we note that the lower profitability associated with affiliation ranges between 1.5 percentage point for the smallest chaebols and 2.8 percentage points for the largest chaebols. The results of Panel C indicate that the group leverage alters affiliate profitability. This observation is consistent with Kim (2016) who find a negative association between chaebol leverage and firm sales growth. The affiliation with a highly indebted chaebol is associated with a 3.6 percentage points lower ROA relative to non-chaebol firms, while the decrease in profitability associated with the affiliation with a low indebted chaebol is only 1.2 point of percentage. It is also interesting to note that the association is only marginally significant. Panel D shows a positive relation between the group and affiliate profitability. This observation suggests that in highly (poorly) performing chaebols both listed and unlisted affiliates tend to exhibit a higher (lower) profitability. [61] In terms of the value effect of chaebol membership, the results show that investors value more affiliation with the largest chaebols. This result is consistent with the benefits associated with large business groups such as visibility (Morck et al., 2005) and higher market and political power (Khanna and Yafeh, 2007). The results of Panels D and E show that the group-level performance is associated with higher firm value. Hence, investors are willing to pay a higher premium for the affiliates of highly profitable and growing chaebols. However, in Panel C, we observe that the

[60] Full tables are available in Appendix 16.

[61] The group-level profitability is computed included both listed and unlisted affiliates (sorting characteristic), whereas the firm-level profitability (dependent variable) includes only listed affiliates.

group leverage alters the valuation premium associated with chaebol affiliation. The negative effect of group leverage on affiliate value is likely to be explained by the risks associated with group financial vulnerability and lower product market performance (Kim, 2016). Consistent with Khanna and Palepu (2000b), the results based on the diversification sorting (Panel B) indicate a U-shaped relation between group diversification and both measures of firm performance.

Columns (3) to (5) report the estimation results for firm financial policies. The baseline model (1) identifies significant associations between affiliation and financial policy. However, the estimation results using the model (2) indicate substantial variation of the significance, magnitude, and sign across different chaebol categories. Hence, we observe that the association is significant only for some categories of chaebols. For instance, the association between a lower cash reserve and chaebol membership is significant for the small and medium size chaebols, but not for the largest chaebols. In the case of firm leverage and sorting by group leverage, we also note that the sign of the association varies between categories. Hence, the results show that affiliation with a highly indebted chaebol is associated with a higher use of debt relative to non-chaebol firms. This result contrasts with the overall effect estimated by the baseline model (1). Indeed, chaebol affiliation is associated with a firm leverage lower by 3.2 percentage points at a market-level, but the affiliation with a highly indebted chaebol is associated with a firm leverage higher by 2.8 percentage points relative to non-chaebol firms. The positive relation between the group-level and firm-level indebtedness suggests that some chaebols apply homogeneous group-level strategy regarding the use of debt. [62] The results of Panels D and E indicate that the affiliation with a well performing chaebol is associated with a lower use of debt. In terms of cash holding, the results of Panels C to E indicate that the association with a lower cash reserve is significant only for the affiliation with chaebols characterized by a low debt, high profitability and high sales growth. These results are consistent with Pinkowitz and Williamson (2001) who argue that business group affiliates are less liquidity constrained. Interpreting the results for dividend payout is more difficult given the heterogeneity of the coefficients across categories. Unobservable characteristics such as the controlling shareholder preference might explain these results as documented by Kwon and Han (2020).

[62] The group-level leverage is computed included both listed and unlisted affiliates (sorting characteristic), whereas the firm-level leverage (dependent variable) includes only listed affiliates.

Table 25 Model modified for categories

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel A: Group size							
Small	-0.015**	0.141***	-0.031**	-0.031***	-0.019	-0.009	-0.000
	(0.006)	(0.039)	(0.015)	(0.010)	(0.016)	(0.009)	(0.002)
Middle	-0.027***	0.092***	-0.005	-0.025**	-0.009	0.001	-0.003*
	(0.007)	(0.035)	(0.015)	(0.010)	(0.015)	(0.009)	(0.002)
Large	-0.028***	0.279***	-0.050***	-0.006	-0.026**	0.023**	0.004
	(0.008)	(0.042)	(0.015)	(0.012)	(0.012)	(0.011)	(0.002)
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.212	0.270	0.278	0.309	0.050	0.122	0.234
Panel B: Group diversification							
Low	-0.021***	0.222***	-0.057***	-0.023*	-0.000	-0.008	0.000
	(0.008)	(0.053)	(0.017)	(0.013)	(0.019)	(0.010)	(0.002)
Middle	-0.026***	0.080***	-0.022	-0.020*	-0.027**	-0.006	-0.004*
	(0.007)	(0.031)	(0.015)	(0.011)	(0.013)	(0.009)	(0.002)
High	-0.024***	0.241***	-0.026*	-0.015	-0.023*	0.026**	0.004*
	(0.008)	(0.039)	(0.014)	(0.011)	(0.012)	(0.010)	(0.002)
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.212	0.269	0.277	0.308	0.050	0.122	0.234
Panel C: Group leverage							
Low	-0.012*	0.240***	-0.067***	-0.037***	-0.024**	0.014	-0.001
	(0.007)	(0.040)	(0.014)	(0.011)	(0.012)	(0.010)	(0.002)
Middle	-0.028***	0.176***	-0.036***	-0.003	-0.007	0.006	0.000
	(0.006)	(0.038)	(0.013)	(0.010)	(0.014)	(0.009)	(0.002)
High	-0.036***	0.122***	0.028*	-0.014	-0.031**	0.001	0.004
	(0.009)	(0.036)	(0.016)	(0.010)	(0.015)	(0.011)	(0.003)
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.213	0.268	0.281	0.309	0.050	0.121	0.233

Table 25 *(ctd)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel D: Group profitability							
Low	-0.035***	0.068**	0.021	-0.007	-0.010	-0.012	0.001
	(0.006)	(0.030)	(0.013)	(0.008)	(0.016)	(0.009)	(0.002)
Middle	-0.023***	0.193***	-0.029**	-0.018*	-0.018	0.014	-0.001
	(0.006)	(0.034)	(0.012)	(0.010)	(0.012)	(0.009)	(0.002)
High	-0.017**	0.268***	-0.074***	-0.027**	-0.027**	0.017	0.002
	(0.007)	(0.037)	(0.013)	(0.011)	(0.012)	(0.010)	(0.002)
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.212	0.270	0.282	0.309	0.050	0.121	0.232
Panel E: Sales growth							
Low	-0.022***	0.154***	-0.024*	-0.013	-0.021*	-0.005	-0.000
	(0.006)	(0.033)	(0.012)	(0.009)	(0.012)	(0.008)	(0.002)
Middle	-0.026***	0.184***	-0.028**	-0.018**	-0.021*	0.017*	0.003
	(0.006)	(0.032)	(0.012)	(0.009)	(0.012)	(0.010)	(0.002)
High	-0.025***	0.224***	-0.045***	-0.025***	-0.015	0.009	-0.001
	(0.007)	(0.034)	(0.013)	(0.010)	(0.011)	(0.009)	(0.002)
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.212	0.267	0.276	0.308	0.050	0.121	0.233

*The table presents results for the model modified for categories (2). In columns (1) and (2), dependent variables are performance variables. In columns (3) to (5), dependent variables are proxies for financial policies. In column (6) and (7), dependent variables are proxies for investment policies. In Panel A, chaebols are sorted by group value of assets. In Panel B, chaebols are sorted by group level of diversification proxied as the number of industries. In Panel C, chaebols are sorted by group debt level computed as the ratio of group debt to group assets. In Panel D, chaebols are sorted by group profitability computed as the ratio of group net income divided by group assets. In Panel E, chaebols are sorted by one-year group sales growth (zero if missing). Dependent variables and control variables are the same as in Table 24. Computation of variables is described in Appendix 12. All regressions include year and industry indicators. Chaebol metrics include both listed and unlisted domestic affiliates. Firm variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

The baseline model (1) does not identify a significant association between chaebol affiliation and investment decisions at a market-level. This non-result might be explained by either an absence of effect or a high heterogeneity in affiliation effects across groups. The results of the category analysis reported in columns (6) and (7) support the second explanation. Indeed, the association between affiliation and investment is significant only for some categories of chaebols. We also observe differences in terms of sign for some outcomes and sortings (e. g. effect on R&D investment and sorting by group diversification).

The interpretation of the model modified for categories (2) requires some caution because categories are based on a one-way sorting. Therefore, inferring a direct and causal link between a specific group characteristic and its effect on firm outcome is not possible. However, the model modified for categories (2) brings evidence that the heterogeneity in business group characteristics reflects in the affiliation effect. Consistent with the resource-based and agency theories, Table 25 shows that the association between firm outcomes and business group affiliation varies in magnitude and significance depending on group characteristics. This observation is especially salient for the financial and investment decisions. The differences between the market-level and the category-level effects also highlight the limitation of the baseline model (1) assuming the homogeneity in affiliation effect across groups.

5.3 Between-group heterogeneity

The model modified for categories (2) relaxes only partially the assumption of the between-group homogeneity. First, the effect of affiliation on firm outcomes is assumed to be the same across chaebols sharing similar characteristics. Second, the sorting based on characteristics does not allow to capture effect associated with unobservable features such as the controlling shareholder preference. By estimating the effect of affiliation associated with each single chaebol, the group fixed effect model (3) remediates to these limitations.

Table 26 Chaebol fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel A: All chaebol fixed effects							
Total	25	25	25	25	25	25	25
>0	10	23	10	6	7	15	11
<0	15	2	15	19	18	10	14
Mean	-0.016	0.264	-0.031	-0.029	-0.028	0.007	-0.001
Max	0.054	1.060	0.098	0.107	0.041	0.076	0.021
Min	-0.117	-0.057	-0.294	-0.129	-0.147	-0.141	-0.018
Panel B: Significant chaebol fixed effects (p-value<10%)							
Total	8	14	13	11	9	15	10
>0	1	14	4	2	1	9	3
<0	7	0	9	9	8	6	7
Mean	-0.052	0.436	-0.061	-0.052	-0.071	0.008	-0.003
Max	0.036	1.060	0.098	0.107	0.015	0.076	0.021
Min	-0.117	0.126	-0.294	-0.129	-0.147	-0.141	-0.018
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-squared	0.219	0.278	0.302	0.312	0.055	0.114	0.235

*This table reports statistics for group fixed effects estimated with group fixed effect model (3). In columns (1) and (2), dependent variables are performance variables. In columns (3) to (5), dependent variables are proxies for financial policies. In column (6) and (7), dependent variables are proxies for investment policies. First row reports the number of group fixed effects. Second and third rows report the number of positive and negative group fixed effects respectively. The fourth, fifth, and sixth rows report the mean, maximum, and minimum value of group fixed effects. Panel A reports statistics of all group fixed effects of chaebols that have a minimum of two listed affiliates and that are in the sample during at least two years. Panel B reports statistics only for significant fixed effects (p-value<10%). Group fixed effects are estimated based on Equation (3) and regressions include same control variables as in Table 24. Computation of variables is described in Appendix 12. All regressions include year and industry indicators. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

Table 26 presents statistics of the chaebol fixed effects. The chaebol fixed effects are estimated based on Equation (3). The regression model includes the same firm control variables as in Table 24 and Table 25. As discussed in Section 3.3, to ensure that the fixed effect estimation comes from cross-section and time-series, Table 26 reports only the fixed effects of chaebols that have a minimum of two listed affiliates and that are in the sample during at least two years. [63] Among the 63 chaebols of the sample, 25 chaebols (for 1,216 affiliate-year observations) fulfill these criteria. [64] A positive (negative) fixed effect means that the affiliation with a specific chaebol is associated with a higher (lower) dependent variable than non-chaebol firms after controlling for the effects of firm characteristics, industry, and year.

Panel A reports statistics of the 25 chaebol fixed effects. The first rows show the total number, the number of positive and negative fixed effects. We observe a higher heterogeneity in terms of coefficient sign for some firm outcomes than for others. For instance, we observe that affiliation with 15 chaebols is related to a lower profitability and a higher profitability for the 10 others. On the other hand, 23 over the 25 chaebol fixed effects are positive for firm value. The leverage and investment policies are other firm outcomes for which signs of group fixed effect vary substantially between chaebols. To ensure the strength of the association between firm outcome and the affiliation with a specific chaebol, Panel B reports statistics only for the chaebol fixed effects that are significant at a 10% level. We note that the number of significant fixed effects varies between different firm outcomes. The number of significant fixed effects is especially meaningful in the case of proxies for financial and investment policies. Indeed, a significant chaebol fixed effect indicates a strong within-group homogeneity in the firm policy. In other words, it suggests that the affiliates of a same group behave in a similar manner. On the other side, a non-significant group fixed effect might reflect a high heterogeneity in policy across the group affiliates. The results in Panel B indicate that a majority of chaebols conduct specific and uniform policies in terms of use of debt and capital investment, whereas only nine chaebols over the 25 are associated with a specific payout policy.

The sign of group fixed effects inform on the heterogeneity in the effect of affiliation across groups. In terms of valuation, the significant fixed effects are homogeneously positive. A similar homogeneity is observed for profitability with seven over eight negative significant fixed effects. The homogeneity of the performance effect is consistent with the results of the

[63] Fixed effects of chaebols that do not meet requirements are ignored in Table 26.
[64] 13 chaebols are excluded because they have only one listed affiliates (without missing data) during the sample period. 21 chaebols are excluded because they appear during at least one year with a single listed affiliate. 4 chaebols are excluded because they appear in the sample during only one year.

model (2). Also consistent with the results of the models (1) and (2), we observe that the association between affiliation and both cash holding and dividend payout are mostly negative. By contrast, the results indicate heterogeneous group policies regarding leverage and investments. Hence, among the 13 chaebols associated with specific debt policy, nine lead their affiliates to maintain a low debt leverage, whereas four others foster an intensive use of debt relative to non-chaebol firms. The evidence of group-level debt policies supports the results of Panel C of Table 25 that show a positive association between the group-level and firm-level indebtedness. The results for investment decisions tend to support results of the model modified for categories (2). Indeed, whereas the baseline model (1) does not identify any significant association between chaebol affiliation and investment, the group fixed effect model (3) reveals that such association exists but varies substantially in terms of sign across groups. Indeed, among the 15 (10) significant fixed effect for capital investment (R&D investment), nine (three) are positive and six (seven) are negative.

The results of the group fixed effect model (3) support and complement the results obtained with the two other models. This model allows to estimate the effect specific to each group. Overall, the results confirm that the affiliation with a chaebol is homogeneously associated with a lower profitability and higher value. The model also identifies significant group fixed effects in firm policies indicating that a number of chaebols apply homogeneous financial and investment policies at a group-level.

5.4 Discussion and limitations

The baseline model (1) identifies the average association between chaebol membership and firm outcomes at a market-level with the implicit assumption that the effect of affiliation is the same for all business groups. The results reveal significant associations for firm performance and financial policy, but no significant relation is observed in terms of investment policy. The model modified for categories (2) solves some limitations of the baseline model by accounting for the heterogeneity in chaebol characteristics. In this model, the chaebols are categorized according to observable characteristics. Consistent with the resource-based theories, the magnitude and significance of the association between chaebol affiliation and firm outcomes varies depending on group characteristics. Finally, the group fixed effect model (3) accounts for the between-group differences in observable and unobservable characteristics. This model estimates the relation between firm outcomes and the affiliation with each single chaebol. The results put in light some substantial differences across chaebols.

Overall, the results reveal that the heterogeneity in chaebol characteristics has a stronger impact on affiliate policies than performance. Indeed, all models provide qualitatively similar results in terms of the performance effect of affiliation. As a market-based measure, the effect of affiliation on Tobin's q reflects the perception and expectations of investors. The results indicate that investors perceive business group affiliation as a value-enhancing factor and value some group attributes such as the size, financial resilience, and performance. The negative association between affiliation and profitability is consistent with the profit smoothing observed by Lincoln et al. (1996) in Japan and Ferris et al. (2003) in Korea. Unlike the firm value and accounting profitability, the firm policies rely on discretionary decisions of the firm or group managers. Therefore, the effects of affiliation on firm policies are more likely to vary across groups depending on group features or controlling shareholder preferences. The results of models (2) and (3) support this prediction. The category-level and group-level analyses suggest that the differences in financial policy are driven by the heterogeneity in both observable and unobservable group characteristics, whereas the heterogeneity in unobservable characteristics explains differences in investment policy. The identification of significant group fixed effects also reveals group-level strategies and indicates that some business groups apply similar strategy to all group affiliates. For instance, the results show that four chaebols are associated with a significant higher use of debt, whereas nine others are related to a lower use of debt relative to non-chaebol firms.

By providing results at a higher level of granularity, the models (2) and (3) highlight some limitations of the baseline model (1). First, an identification strategy based on a single dummy variable for affiliation fails to identify significant affiliation effect in the presence of a wide heterogeneity in affiliation effects across groups. Indeed, the effects of opposite sign tend to cancel each other and result in a non-significant average effect. Therefore, the baseline model results conclude in the absence of relation between business group affiliation and investment policy. However, both model modified for categories and group fixed effect model provide the evidence that such association exists but varies substantially across business groups. Second, the effect estimated at a market-level is not generalizable to all business groups. Indeed, the empirical analysis shows variations of the affiliation effects in terms of significance and magnitude across business groups. For instance, the baseline model identifies a significant and negative association between the affiliation and dividend payout. However, the analysis at a group-level reveals that such relation is significant only for a minority of groups. In conclusion, the heterogeneity in the effect of affiliation on firm outcome might lead to wrong conclusions if the effect estimation is based on a single dummy variable for affiliation.

As one of the first attempt to document the heterogeneity in the affiliation effect across business groups, this analysis has some limitations. The low number of business groups in the sample limits the analysis potential. For this reason, the category analysis is limited to a one-way sorting to obtain categories with a sufficient number of chaebols and affiliated firms. In the group fixed effect analysis, the low number of chaebols fulfilling requirements does not allow deeper investigations such as the identification of the source of group fixed effects. [65] Commonly used in the literature dedicated to chaebols, the KFTC classification has the advantage to provide a uniform business group definition and scope to all researchers. However, the KFTC reporting is limited to the largest business groups. Therefore, the data and composition of the business groups below the total assets threshold of 5 trillion KRW are not available. This scope of implementation is consistent with the competition supervision purpose of the KFTC but imposes to interpret results as the effect of affiliation with a *large* business group. Indeed, among unaffiliated firms some are possibly affiliated with a small business group. [66] To mitigate the limitations due to the low number of chaebols, one might including smaller business groups. However, such extension is difficult to implement. Indeed, the data required to extend the KFTC classification are not available. The KFTC considers the both equity ties and *de facto* control to identify the boundaries of business groups. The detailed ownership is not available for firms that are not constrained to strict disclosure as chaebol affiliates. In addition, the notion of *de facto* control is based on the KFTC assessment. Consequently, extending the list of chaebols might affect the analysis reliability by generating a distortion in the definition and identification between the "KFTC classified" and "additional" chaebols. Holmes Jr et al. (2018) highlight the importance of using a homogeneous definition to obtain reliable results. In addition, it would go against the literature common practice. Finally, the low number of business groups is also associated with a limited number of changes in the affiliation status during the sample period. Several authors report this phenomenon. For example, Byun et al. (2013) note that changes in the chaebol composition are rarely observed in the short-term. Khanna and Rivkin (2001) explain that the social ties and competition between groups contribute to maintain stable the composition of groups. Consequently, the implementation of different methods aiming at establishing causality or remedy endogeneity issues is not possible (e. g. firm fixed effect model, difference-in-difference, etc).

[65] For instance, Bertrand and Schoar (2003) and Cronqvist and Fahlenbrach (2008) analyze sources of manager and blockholder fixed effects.

[66] For this reason, I use the term of "unaffiliated" or "non-chaebol" firms rather than "independent firm" to designated firms that are not affiliated with a chaebol.

Reverse causality and endogeneity are common issues in the empirical corporate finance. In this paper, some concerns about the endogeneity might emerge from the significant differences observed between chaebol and non-chaebol firms (see Table 21). Using a matching sample is usually a suitable method to tackle such issue. However, in this specific framework, a matching sample would alter the estimation of group effects by deleting affiliated firms without matching firms. [67] In addition, it would reduce the number of chaebols available for the analysis based on the group fixed effect model (3). Khanna (2000) also notes the difficulty to find a suitable instrument for business group affiliation. As discussed, the implementation of other methods commonly used in the corporate finance literature are difficult or even impossible given the sample specificities. However, Khanna and Yafeh (2007) argue that the issue of group formation endogeneity is mitigated by the fact that the group structure is mainly historically determined. Since the causality is not empirically established, I discuss the results in terms of association between affiliation and firm outcomes rather than affiliation effect. The sample restricted to listed firms only is another limitation of the empirical framework. Such practice is common in research estimating the affiliation effect by comparing affiliated with unaffiliated firms. The data availability and selection of relevant control group are two obstacles to include unlisted firms in the sample. However, ignoring unlisted firms might bias the results as many chaebols have unlisted affiliates (Khanna, 2000).

Future research might remedy some of these limitations by focusing on the comparison between affiliated firms rather than using unaffiliated firms as control group. This empirical framework alleviates the concern regarding the endogeneity of affiliation status and allows the inclusion of unlisted affiliates. However, such analysis would not allow to identify the effect of business group affiliation relative to unaffiliated firms. Another possible extension is to include the between-affiliate differences in the analysis. Indeed, this paper focuses exclusively on the differences in affiliation effects across groups with the assumption that the effect is homogeneous within each group.

6. Conclusion

This paper examines the impact of business group affiliation on the performance and on the financial and investment policies. Based on a sample of Korean listed firms covering the

[67] Among the 30 largest listed firms in 2019 (2007), 29 (24) are affiliated with a chaebol. Therefore, exact matching between chaebol and non-chaebol firms would lead to the deletion of important chaebol firms. Non-chaebol nearest neighbors are also likely to differ substantially from those chaebol firms in case of nearest neighbor matching.

period 2007-2019, the empirical analysis shows that the heterogeneity in business group features results in variations in the effect of affiliation across groups. The performance effect of affiliation appears qualitatively homogenous with a reduction in firm profitability and a gain in firm valuation. However, the intensity of the profitability reduction and valuation premium varies and is related to group characteristics. The effect of affiliation on the financial and investment policies exhibits a large heterogeneity across groups. Indeed, the analysis reveals that the group-level effects tend to differ qualitatively and quantitatively from the effect estimated at a market-level.

Identifying the variation in the association between affiliation and firm outcomes has both methodological and empirical implications. This evidence shows that considering business groups as homogeneous entities might lead to wrong conclusions. The empirical analysis reveals the limitations of an identification strategy based on a single dummy variable to estimate the effect of business group affiliation. Indeed, the results show that such model fails to identify the effect of affiliation in the presence of heterogeneous business groups. This paper also contributes to the business group literature by providing a better understanding of the impact of business group affiliation on firm behavior. The group-level analysis identifies significant group specific effects in terms of firm policies. This observation indicates that some chaebols tend to conduct homogenous group-level financial and investment policies.

Overall, this paper highlights the complexity of business groups and the importance to account for their heterogeneity for a better understanding of their effect on firm policies and performance.

Appendices

Appendix 12 Firm variables

Variable name	Definition
Return on assets (ROA)*	Earnings before interest, taxes, depreciation, and amortization (WC18198) divided by total assets (WC02999)
Tobin's q*	Total assets minus total common equity plus market value of equity (WC08001) divided by total assets.
Cash holding*	Cash and equivalent (WC02001) divided by total assets
Leverage*	Sum of LT debt (WC03251) and ST debt and current portion of LT in current liabilities (WC03051) divided by total assets
Dividend payout*	Cash dividend paid total (WC04551) divided by EBIT (WC18191)
Capital investment*	Capital expenditures divided by net property, plant, and equipment (WC02501).
R&D investment*	Research and development expenses (WC01201) divided by total assets. (R&D is set to zero if missing)
Size*	Total assets (in thousands KRW)
Asset tangibility*	Net property, plant, and equipment divided by total assets
Market-to-book*	Market value of equity divided by total common equity (WC03501)
Age	Years since incorporation (WC18273)
Sales growth*	One year change in total sales (WC01001)
Industry indicators	Set of dummy variables for ICB super sectors
Chaebol affiliation	Dummy variable taking value 1 for firms affiliated to a business group in the KFTC list, 0 otherwise

This appendix contains the definitions of all firm variables. Variables with (*) are winsorized at the 1 percent level in each tail. Data are retrieved from Refinitiv Datastream and Worldscope. Chaebol affiliation is based on KFTC disclosure.

Appendix 13 Detailed firm summary statistics

	Mean	p25	Median	p75	SD
Panel A: All firms (Obs.=14183)					
Tobin's q	1.318	0.847	1.037	1.451	0.854
Market-to-book	1.608	0.674	1.08	1.891	1.598
ROA	0.063	0.03	0.073	0.119	0.105
Leverage	0.229	0.074	0.219	0.357	0.172
Cash holding	0.171	0.06	0.124	0.239	0.148
Dividend payout	0.092	0	0.03	0.14	0.237
Capital investment	0.178	0.056	0.121	0.234	0.179
R&D investment	0.021	0.003	0.011	0.028	0.028
Tangibility	0.319	0.184	0.313	0.444	0.178
ln(Size)	19.177	18.139	18.86	19.905	1.523
Age	28.072	15	24	39	16.676
Sales growth	0.11	-0.057	0.052	0.184	0.379
Panel B: Non-chaebol firms (Obs.=12473)					
Tobin's q	1.33	0.843	1.044	1.475	0.869
Market-to-book	1.629	0.68	1.095	1.928	1.617
ROA	0.06	0.027	0.072	0.118	0.107
Leverage	0.226	0.068	0.212	0.354	0.173
Cash holding	0.177	0.062	0.132	0.251	0.151
Dividend payout	0.09	0	0.012	0.136	0.239
Capital investment	0.181	0.055	0.121	0.239	0.184
R&D investment	0.022	0.003	0.012	0.03	0.029
Tangibility	0.315	0.182	0.309	0.44	0.177
ln(Size)	18.848	18.048	18.695	19.531	1.123
Age	27.259	15	23	38	16.244
Sales growth	0.113	-0.062	0.052	0.188	0.39
Panel C: Chaebol firms (Obs.=1710)					
Tobin's q	1.23	0.869	0.997	1.294	0.728
Market-to-book	1.456	0.639	0.992	1.68	1.439
ROA	0.088	0.048	0.085	0.128	0.077
Leverage	0.254	0.118	0.264	0.378	0.164
Cash holding	0.124	0.046	0.09	0.161	0.115
Dividend payout	0.109	0	0.076	0.163	0.218
Capital investment	0.158	0.066	0.124	0.21	0.134
R&D investment	0.013	0.001	0.005	0.013	0.023
Tangibility	0.347	0.202	0.354	0.474	0.184
ln(Size)	21.573	20.093	21.758	22.955	1.873
Age	34.005	18	35	48	18.489
Sales growth	0.09	-0.033	0.052	0.153	0.29

The table presents summary statistics for the full sample (Panel A) and subsample of non-chaebol firms (Panel B) and chaebols firms (Panel C). Variables construction is described in Appendix 12. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers period from 2007 to 2019. The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream and Worldscope. Chaebol affiliation is based on KFTC disclosure.

Appendix 14 Baseline model without state owned group affiliates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Constant	-0.260***	1.398***	-0.312***	0.372***	-0.121***	0.384***	0.060***
	(0.026)	(0.124)	(0.051)	(0.040)	(0.046)	(0.035)	(0.009)
Chaebol	-0.024***	0.183***	-0.031***	-0.018**	-0.021**	0.008	0.000
	(0.005)	(0.030)	(0.011)	(0.009)	(0.010)	(0.008)	(0.002)
ln(Size)	0.022***	-0.059***	0.024***	-0.004*	0.011***	-0.004*	-0.001**
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.177***	0.135***		-0.389***	-0.193***	-0.062***	-0.019***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.007***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.136***	0.023***	-0.009***	-0.029***	0.012**	-0.001**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.456***	0.010	0.069***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.080	-0.554***	-0.034*	0.203***	0.100***	-0.014***
		(0.079)	(0.021)	(0.021)	(0.020)	(0.027)	(0.005)
Tangibility			0.370***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14165	14165	14165	14165	14165	14165	14165
Adj. R-sq.	0.212	0.269	0.276	0.308	0.050	0.121	0.233

*The table presents results for the baseline model (1) without firms affiliated with a state owned group. In columns (1) and (2), dependent variables are performance measures. ROA is the EBITDA scaled by total assets. Tobin's q is measured as total assets minus total common equity plus market value of equity divided by total assets. In columns (3) to (5), dependent variables are proxies for financial policies. Cash holding is cash and equivalent divided by total assets. Leverage is the sum of long term debt, short term debt and current portion of long term debt in current liabilities divided by total assets. Dividend payout is total cash dividend divided by EBIT. In column (6) and (7), dependent variables are proxies for investment policies. Investment is capital expenditure scaled by net property, plant, and equipment. R&D investment is R&D expenditures divided by total assets. Chaebol is an dummy variable taking value 1 for firms affiliated to a business groups as defined by the KFTC and 0 otherwise. Other control variables are: firm size computed as the natural logarithm of total assets, leverage computed as the sum of long term debt, short term debt and current portion of long term debt in current liabilities divided by total assets, market-to-book ratio computed as market value of equity divided by total common equity, sales growth computed as the one-year change in sales, age is the natural logarithm of time since incorporation, capital investment computed as EBITDA scaled by total assets, tangibility computed as net property, plant, and equipment divided by total assets, and dividend payout computed as total cash dividend divided by EBIT. Computation of variables is described in Appendix 12. All regressions include year and industry indicators. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

Appendix 15 Firm fixed effect approach

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Chaebol	-0.048***	0.134***	-0.112***	-0.053***	0.002	-0.073***	0.002
	(0.005)	(0.025)	(0.010)	(0.007)	(0.008)	(0.008)	(0.001)
Observations	1784	1784	1784	1784	1784	1784	1784
Adj. R-squared	0.043	0.013	0.074	0.021	-0.001	0.037	-0.000

The table presents results of cross-section regression of firm fixed effect on a constant and a dummy variable for affiliation as:

$$\hat{\gamma}_i = \alpha + \delta Chaebol_i + \varepsilon_i$$

where $\hat{\gamma}_i$ is estimated fixed effect for firm i, $Chaebol$ is a dummy variable taking value 1 if firm i is affiliated to a chaebol during at least one year. Firm fixed effects are estimated based on the following equation:

$$y_{it} = \alpha + \beta \boldsymbol{X_{it}} + \gamma_i + Year_t + \varepsilon_{it}$$

*where y is the dependent variable (performance measures or proxy for firm policy), $\boldsymbol{X}$ is a vector of control variables, γ is firm fixed effect, $Year$ is time fixed effect. Control variables are the same as in Table 24. Computation of variables is described in Appendix 12. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

Appendix 16 Model modified for categories (detailed tables)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel A: Group size							
Constant	-0.265***	1.469***	-0.325***	0.381***	-0.125***	0.396***	0.062***
	(0.026)	(0.128)	(0.052)	(0.041)	(0.046)	(0.036)	(0.009)
Small	-0.015**	0.141***	-0.031**	-0.031***	-0.019	-0.009	-0.000
	(0.006)	(0.039)	(0.015)	(0.010)	(0.016)	(0.009)	(0.002)
Middle	-0.027***	0.092***	-0.005	-0.025**	-0.009	0.001	-0.003*
	(0.007)	(0.035)	(0.015)	(0.010)	(0.015)	(0.009)	(0.002)
Large	-0.028***	0.279***	-0.050***	-0.006	-0.026**	0.023**	0.004
	(0.008)	(0.042)	(0.015)	(0.012)	(0.012)	(0.011)	(0.002)
ln(Size)	0.022***	-0.063***	0.025***	-0.005**	0.012***	-0.004**	-0.001***
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.178***	0.138***		-0.388***	-0.196***	-0.060***	-0.019***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.083***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.455***	0.011	0.068***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.065	-0.555***	-0.032	0.205***	0.101***	-0.014***
		(0.079)	(0.021)	(0.020)	(0.020)	(0.027)	(0.005)
Tangibility			0.369***				
			(0.017)				
Dividend				-0.001			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.212	0.270	0.278	0.309	0.050	0.122	0.234

Appendix 16 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel B: Group diversification							
Constant	-0.261***	1.436***	-0.309***	0.373***	-0.122***	0.395***	0.062***
	(0.026)	(0.125)	(0.052)	(0.041)	(0.046)	(0.035)	(0.008)
Low	-0.021***	0.222***	-0.057***	-0.023*	-0.000	-0.008	0.000
	(0.008)	(0.053)	(0.017)	(0.013)	(0.019)	(0.010)	(0.002)
Middle	-0.026***	0.080***	-0.022	-0.020*	-0.027**	-0.006	-0.004*
	(0.007)	(0.031)	(0.015)	(0.011)	(0.013)	(0.009)	(0.002)
High	-0.024***	0.241***	-0.026*	-0.015	-0.023*	0.026**	0.004*
	(0.008)	(0.039)	(0.014)	(0.011)	(0.012)	(0.010)	(0.002)
ln(Size)	0.022***	-0.061***	0.024***	-0.004*	0.011***	-0.004**	-0.001***
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.177***	0.130***		-0.389***	-0.194***	-0.062***	-0.020***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.456***	0.010	0.068***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.069	-0.556***	-0.033	0.205***	0.100***	-0.014***
		(0.079)	(0.021)	(0.021)	(0.020)	(0.027)	(0.005)
Tangibility			0.371***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.212	0.269	0.277	0.308	0.050	0.122	0.234

Appendix 16 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel C: Group leverage							
Constant	-0.260***	1.404***	-0.317***	0.371***	-0.118***	0.384***	0.059***
	(0.026)	(0.124)	(0.051)	(0.040)	(0.046)	(0.035)	(0.009)
Low	-0.012*	0.240***	-0.067***	-0.037***	-0.024**	0.014	-0.001
	(0.007)	(0.040)	(0.014)	(0.011)	(0.012)	(0.010)	(0.002)
Middle	-0.028***	0.176***	-0.036***	-0.003	-0.007	0.006	0.000
	(0.006)	(0.038)	(0.013)	(0.010)	(0.014)	(0.009)	(0.002)
High	-0.036***	0.122***	0.028*	-0.014	-0.031**	0.001	0.004
	(0.009)	(0.036)	(0.016)	(0.010)	(0.015)	(0.011)	(0.003)
ln(Size)	0.022***	-0.059***	0.025***	-0.004*	0.011***	-0.004*	-0.001**
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.176***	0.135***		-0.390***	-0.194***	-0.061***	-0.020***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.459***	0.011	0.069***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.074	-0.550***	-0.031	0.205***	0.099***	-0.014***
		(0.079)	(0.021)	(0.020)	(0.020)	(0.027)	(0.005)
Tangibility			0.373***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.213	0.268	0.281	0.309	0.050	0.121	0.233

Appendix 16 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel D: Group profitability							
Constant	-0.258***	1.429***	-0.326***	0.367***	-0.123***	0.388***	0.060***
	(0.026)	(0.123)	(0.050)	(0.040)	(0.046)	(0.035)	(0.009)
Low	-0.035***	0.068**	0.021	-0.007	-0.010	-0.012	0.001
	(0.006)	(0.030)	(0.013)	(0.008)	(0.016)	(0.009)	(0.002)
Middle	-0.023***	0.193***	-0.029**	-0.018*	-0.018	0.014	-0.001
	(0.006)	(0.034)	(0.012)	(0.010)	(0.012)	(0.009)	(0.002)
High	-0.017**	0.268***	-0.074***	-0.027**	-0.027**	0.017	0.002
	(0.007)	(0.037)	(0.013)	(0.011)	(0.012)	(0.010)	(0.002)
ln(Size)	0.022***	-0.061***	0.025***	-0.004*	0.011***	-0.004**	-0.001**
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.176***	0.143***		-0.390***	-0.196***	-0.060***	-0.020***
	(0.008)	(0.043)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.009**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.455***	0.012	0.069***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.075	-0.549***	-0.032	0.206***	0.099***	-0.014***
		(0.079)	(0.021)	(0.020)	(0.020)	(0.027)	(0.005)
Tangibility			0.370***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.212	0.270	0.282	0.309	0.050	0.121	0.232

Appendix 16 (ctd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROA	ln(Q)	Leverage	Cash holding	Dividend payout	Capital investment	R&D investment
Panel E: Sales growth							
Constant	-0.261***	1.402***	-0.313***	0.371***	-0.120***	0.384***	0.060***
	(0.026)	(0.123)	(0.051)	(0.040)	(0.046)	(0.035)	(0.009)
Low	-0.022***	0.154***	-0.024*	-0.013	-0.021*	-0.005	-0.000
	(0.006)	(0.033)	(0.012)	(0.009)	(0.012)	(0.008)	(0.002)
Middle	-0.026***	0.184***	-0.028**	-0.018**	-0.021*	0.017*	0.003
	(0.006)	(0.032)	(0.012)	(0.009)	(0.012)	(0.010)	(0.002)
High	-0.025***	0.224***	-0.045***	-0.025***	-0.015	0.009	-0.001
	(0.007)	(0.034)	(0.013)	(0.010)	(0.011)	(0.009)	(0.002)
ln(Size)	0.022***	-0.059***	0.024***	-0.004*	0.011***	-0.004*	-0.001**
	(0.001)	(0.007)	(0.003)	(0.002)	(0.002)	(0.002)	(0.000)
Leverage	-0.177***	0.130***		-0.389***	-0.195***	-0.062***	-0.020***
	(0.008)	(0.044)		(0.014)	(0.017)	(0.014)	(0.003)
MtB	-0.007***		0.011***	0.012***	-0.006***	0.020***	0.003***
	(0.001)		(0.002)	(0.001)	(0.001)	(0.002)	(0.000)
Sales growth	0.043***	0.135***	0.023***	-0.009***	-0.029***	0.012**	-0.002**
	(0.003)	(0.011)	(0.003)	(0.003)	(0.004)	(0.005)	(0.001)
ln(Age)	-0.008***	-0.082***	-0.007	-0.018***	0.008**	-0.028***	-0.005***
	(0.002)	(0.011)	(0.005)	(0.003)	(0.004)	(0.003)	(0.001)
Investment		0.459***	0.010	0.069***			
		(0.034)	(0.011)	(0.011)			
ROA		-0.069	-0.556***	-0.033	0.205***	0.100***	-0.014***
		(0.079)	(0.021)	(0.021)	(0.020)	(0.027)	(0.005)
Tangibility			0.370***				
			(0.017)				
Dividend				-0.002			
				(0.007)			
Observations	14183	14183	14183	14183	14183	14183	14183
Adj. R-sq.	0.212	0.267	0.276	0.308	0.050	0.121	0.233

*The table presents detailed results for the model modified for categories (2). In columns (1) and (2), dependent variables are performance variables. In columns (3) to (5), dependent variables are proxies for financial policies. In column (6) and (7), dependent variables are proxies for investment policies. In Panel A, chaebols are sorted by group value of assets. In Panel B, chaebols are sorted by group level of diversification proxied as the number of industries. In Panel C, chaebols are sorted by group debt level computed as the ratio of group debt to group assets. In Panel D, chaebols are sorted by group profitability computed as the ratio of group net income divided by group assets. In Panel E, chaebols are sorted by one-year group sales growth (zero if missing). Dependent variables and control variables are the same as in Table 24. Computation of variables is described in Appendix 12. All regressions include year and industry indicators. Chaebol metrics include both listed and unlisted domestic affiliates. Variables are winsorized at the 1 percent level in each tail (except Age). The sample covers the period from 2007 to 2019. Financial and utility firms are excluded from the sample. Data are retrieved from Refinitiv Datastream, Worldscope, and KFTC. Robust standard errors are in parentheses and clustered at firm level. p-value * < 10% ** < 5% *** < 1%*

Conclusion

Business groups contrast with the model of independent and widely held firms that dominates the finance literature. Scholars document the presence of business groups in many countries around the world. In Korea, large business groups called chaebols have played and continue to play an important role in the economy. After the Korean War, chaebols contributed to the rapid industrialization of the country as partners of the government in the implementation of development policies. Benefiting from state support, chaebols expanded their activities and accumulated a substantial economic and political power over time. In 1997, the Asian financial crisis hit severely the Korean economy and stopped decades of a rapid growth. This crisis triggered the collapse of the most vulnerable chaebols. The alleged role of chaebols in the contagion of the crisis in Korea raised strong public criticisms. Pressure from foreign creditors and civil society led the government to take action to tackle the "chaebol issue." A number of reforms were undertaken to promote fairer wealth distribution and free market competition. After a hiatus of two years, the Korean economy pursued its development and globalization. During the first decades of the twenty-first century, the public sector deployed efforts to reach international standards and increase the competitiveness of the country. While Korean culture and products have been popularized around the world, Korean firms have emerged as world leaders in industries such as electronic components, consumer electronics, and automotive.

Korea offers an ideal framework to study business groups. The list of large business groups published by the KFTC eases the identification of business groups and their affiliates. This classification offers several advantages for researchers. First, the identification of business groups does not rely on researcher own criteria. Therefore, all researchers use the same definition improving the comparability between studies. Second, the KFTC classification offers an exhaustive identification of business groups as it accounts for both quantitative and qualitative criteria to identify affiliated firms. Indeed, Khanna and Rivkin (2006) observe that social ties play a significant role in business group structure but are often difficult to be identified by researchers. Most of the existing literature on the Korean market and chaebols focuses on the period surrounding the 1997 Asian financial crisis. Scholars exploit the shock triggered by the crisis and the subsequent legal changes to examine different topics such as the performance effect of affiliation, internal capital markets, and corporate governance. Since this event, Korean institutions and the corporate

sector have experienced substantial changes, opening up a gap in the literature. This dissertation aims to fill this gap and exploit new research opportunities.

Investor interest in the Korean stock market increased after the lifting of restrictions on foreign investments following the 1997 Asian financial crisis. Market observers rapidly reported the lower valuation of the Korean stocks relative to their foreign peers (OECD, 2018, p. 75). This phenomenon, called the "Korea discount," has been often discussed among practitioners but not addressed in the literature. This first article fills this gap and provides the first rigorous and empirical investigation of the Korea discount. The analysis based on an extensive international sample confirms the lower valuation of the Korean stocks. Furthermore, the phenomenon persists despite the post-crisis reforms and the efforts deployed by authorities to reach international standards. The article contributes to a better understanding of the Korea discount by examining the role of chaebols. Indeed, chaebols are often cited as one of a root of the undervaluation exhibited by the Korean market. However, this study shows that the Korea discount is a pervasive phenomenon that affects affiliated as well as unaffiliated firms. Unaffiliated firms even suffer from a stronger discount than the chaebol affiliates. This analysis has policy implications as it highlights the market-wide dimension of the phenomenon. Overcoming the Korea discount requires market-wide reforms, rather than chaebol focused interventions.

The second essay contributes to the growing COVID-19 literature by documenting the effect of this crisis on the Korean stock market. It also extends the well-developed literature on chaebols and crisis mostly based on the 1997 Asian financial crisis. The study exploits the unique framework offered by the COVID-19 pandemic to examine the value of chaebol affiliation and the value of financial flexibility, from the perspective of investors. During the first months of the pandemic characterized by a high level of uncertainty, investors perceived affiliation as a value-destroying factor due to the financial and governance risks. However, their perception changed when financial markets began to recover. During this period, state intervention and market stabilization seem to have dissipated the concerns of investors, who were willing to pay a premium for affiliation. Fahlenbrach et al. (2021) and others report that investors in the US valued financial flexibility during the COVID-19 crisis. This paper finds a similar result for the Korean market. During the pandemic, investors valued the role of buffer played by cash holding but discounted the risks associated with debt. However, further analyses show that financial flexibility is a significant pricing factor only for firms that are not affiliated with a chaebol. This observation suggests that

investors perceive chaebol internal capital markets as a substitute to internal liquidity and as insurance against bankruptcy. The paper contributes to understanding how investors value business group membership. Financial vulnerability, risks of expropriation, and access to internal capital markets appear to be important components of the value of affiliation. The empirical framework distinguishes this study from prior works. Both the Asian financial crisis and the COVID-19 pandemic were sources of high uncertainty. However, the second crisis differs from the first one by its worldwide and unexpected dimension. In few weeks, a break in supply chains, local lockdowns, and the closure factories paralyzed the world economy and triggered a sudden revenue shock for firms. Korea was one of the first countries to be affected by the pandemic, outside of China, ensuring the exogeneity of the shock. The empirical approach also distinguishes this study from prior works using accounting-based measure of firm value. Indeed, rather than comparing value of affiliation before and after the crisis, the stock price analysis used in this study allows documenting the changes in affiliation value during the crisis period.

The third essay examines the impact of business group membership on firm performance and on firm policies. The empirical analysis uses a novel identification strategy to account for the heterogeneity in business group features. The study provides several contributions to the chaebol literature. Lee et al. (2010) observe fluctuations in the effect of chaebol affiliation on firm value during the period from 1984 to 2005. The present essay extends this work and the literature on the performance effect of chaebol affiliation by documenting the subsequent period. The results show that chaebol affiliation is associated with a higher Tobin's q and a lower ROA during the period from 2007 to 2019. The analysis contributes to a better understanding of the performance effect of affiliation. Indeed, the results show that the intensity of the performance effect varies across groups depending on group characteristics such as size, diversification, or leverage. Finally, the analysis of the impact of affiliation on corporate policies contributes to the organizational literature by providing an empirical evidence of the high level of control centralization of chaebols. Indeed, the identification of significant group specific effects on financial and investment policies indicates that a number of chaebols conduct group-level strategies and apply homogeneous policies to their affiliates. The results also show that group-level strategies vary across groups.

The contributions of this dissertation are not limited to the literature on the Korean market and chaebols. Internal capital markets are an important topic in the business groups and corporate finance literature. Existing works document their benefits, functioning, and effects on firm

behavior. The second essay extends this literature by examining the investors' perception of group internal capital markets. The results indicate that investors believe in the ability of internal capital markets to offset lack of internal liquidity and provide an additional source of funding in case of sudden revenue drop. This dissertation also makes empirical and methodological contributions to the business group literature. The effect of business group affiliation on firm value remains an unresolved question. The theoretical literature describes both benefits and costs associated with business group membership, and the empirical literature concludes to mixed results. This dissertation does not resolve the question of whether business groups are "paragons or parasites" but provides some explanations for the differences in the performance effect. Hence, the second essay shows that the value of affiliation might fluctuate within a short period of time depending on the economic environment and investor expectations. This observation suggests that the estimation of affiliation value is time sensitive. Consequently, long term conclusions are hazardous, and the value of affiliation should be reassessed in case of changes in the economic context. The third paper provides an additional explanation, highlighting variations in the affiliation effect across groups. More specifically, the analysis shows that heterogeneity in group features tends to be reflected in firm outcomes. Consequently, researchers should not consider business groups as homogeneous entities and should account for group specificities. Indeed, models using a single dummy variable for affiliation fail to estimate accurately the affiliation effect in the presence of heterogeneous groups. The third essay proposes a simple and easily applicable identification strategy to account for group heterogeneity.

The empirical analyses presented in this dissertation have a number of limitations. Some specificities of the Korean framework imply that the results might not be generalizable to other countries. Indeed, prior literature indicates that the affiliation effect tends to differ from one country to another due to differences in institutional frameworks (Carney et al., 2011). The persistence of the puzzling Korea discount is an illustration of the specificities of the Korean market. Following a common practice in the literature, the identification of chaebols is based on the KFTC classification. This classification provides an ideal framework for research but comes with some limitations. Indeed, this classification focuses on the largest business groups only. The threshold used to designate chaebols is partially arbitrary and determined by regulatory rather than scientific purpose. Therefore, the estimations of affiliation effect presented in this dissertation should be interpreted as the effect of affiliation with a *large* business group. Hence, the terms "unaffiliated

firms" or "non-chaebol firms" are more appropriate for the firms not designated as chaebol affiliates by the KFTC, as these firms are potentially associated with smaller business groups. This dissertation uses samples of listed firms and ignores unlisted firms. This restriction is common in the business group literature and is explained by data availability. This omission might bias the results, as most of business groups have a substantial number of unlisted affiliates (Khanna, 2000). However, this risk is limited for the two first essays, as these focus on stock markets. The inclusion of unlisted affiliates would allow a deeper analysis of group-level strategies in the third essay. Data limitations also affect the selection of group-level characteristics used in the different essays. Common in the corporate finance literature, endogeneity and reverse causality also affect the business group literature (Holmes Jr et al., 2018). The main risk is the endogeneity of the affiliation status that makes causal inference difficult. According to Khanna and Yafeh (2007), the fact that group structure is mainly historically determined limits the issue of group formation endogeneity. The second paper exploits the exogeneity of the COVID-19 crisis to mitigate the endogeneity issue. Indeed, it is unlikely that chaebols had time to adapt their structures to face this sudden and unexpected shock. In the third paper, the results are discussed in terms of "association" rather than "effect" as causality is not clearly established.

The 1997 Asian financial crisis stopped decades of the rapid growth of the Korean economy. This event shed light on the vulnerability of chaebols and the Korean economy more generally. However, the beginning of the twenty-first century saw the recovery and rise of Korea as a global player. The nation branding strategy contributed to improving the image of Korea across the world, and Korean firms have emerged as leaders in a number of key industries. This dissertation fills the literature gap opened up by this evolution. While the future of chaebols appeared compromised in the aftermath of the Asian financial crisis, the evidence provided by this dissertation suggests that chaebols have successfully adapted themselves to the new legal and economic environment. Despite the controversies, they have maintained their attractiveness among investors, who expect the benefits of chaebol membership to outweigh the costs. The COVID-19 outbreak briefly revived the memories of the 1997 Asian financial crisis and raised doubts of investors. However, the history did not repeat itself and chaebols quickly recovered from this shock. The break in supply chains and the geopolitical changes in the Asia-Pacific area even emphasized the role of chaebols and Korea in the global supply chain opening up opportunities for future research.

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