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Investment and Cash Flows in Internal Capital Markets: Evidence from Korean Business Groups

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We examine the extent of expropriation by controlling owners of business groups. Specifically, we investigate the investment behavior of Korean business groups' (chaebols') member firms with respect to cash flows of their own operations as well as other affiliated firms. We also explore the role of corporate governance in curtailing expropriation by investigating the impact of audit committees on investment/cash flow sensitivities.

We find that high cash flow rights are associated with reducing overinvestment, while the investment sensitivity of chaebol firms to their own cash flows remains unaffected. By contrast, investments are significantly sensitive to cash flows of other affiliated firms in the business group with high cash flow rights. Furthermore, investment decisions appear to be more efficient among firms with audit committees than among those without. The results suggest that internal capital markets of chaebol firms are active and at least partly efficient in the post-Asian financial crisis period. (JEL: G32, G34)

Keywords: investment; cash-flows; corporate governance; business groups

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I. Introduction

To date, evidence on the efficiency of internal capital markets of Korean business groups (chaebols) has been mixed. For example, Shin and Park (1999) and Lee et al. (2009) provide evidence that chaebol firms allocated internal resources efficiently within internal capital markets during the pre-financial crisis period (1993–1996). Similarly, Almeida et al. (2015) show that chaebol firms efficiently allocated cash from low-growth firms to high-growth firms in business groups during the post-crisis period (1998–1999) through cross-firm equity investment. On the other hand, some scholars argue that the efficiency of chaebols' internal capital markets deteriorated as a result of the financial crisis. For example, Bae et al. (2008) argue that intragroup propping among affiliated member firms in chaebols weakened during and after the crisis. Furthermore, Lee et al. (2009) conclude that the efficiency of internal capital markets substantially decreased in the period after the crisis (1999–2005).

This study examines the extent to which chaebols exploited their internal capital markets during the period of 2001 to 2013, after the Asian financial crisis. One of the main features of Korean business groups is that a large shareholder (controlling owner) controls internal resources through pyramidal ownership structures. The major shareholders may use their positions of power to protect their own benefits at the expense of the interests of minority shareholders. Expropriation in a firm may lead to overinvestment and/or tunneling of internal funds to other member firms, which affects the firm's investment/cash flow sensitivity. A unique ownership structure and corporate governance data allows an examination of the investment behavior of chaebol firms as a function of their ownership structure and its interaction with resources in internal capital markets. Specifically, the extent to which controlling owners' incentives to expropriate minority shareholders differs under different governance structures is examined. The establishment of audit committees is used as a proxy for an important element of corporate governance.

There are several advantages of using Korean data. First, legal environments may have different effects on corporate governance, as has been argued by Claessens et al. (2000) and La Porta et al. (2002).

Thus, focusing on one country has the advantage of controlling the effect of legal environments when studying the relation between corporate governance and investment decisions. Moreover, Korea experienced sweeping corporate governance reforms in 1998 and 1999, mainly targeted at large firms such as chaebols.[1] The literature has recognized (see Black et al., 2006; Black and Kim, 2012; and Black et al., 2015) that this exogenously imposed board structure (in particular, audit committees) of chaebols helps explain the allocation of internal funds for investment as a function of board strength, minimizing potential endogeneity issues.

Second, the data are instrumental in minimizing potential problems in empirical work regarding the role of internal capital markets in diversified organizations such as cross-subsidization or tunneling.[2] One of the major problems using U.S. segment data in estimating the investment/cash flow sensitivity is measurement errors in investment opportunity.[3] Chevalier (2004) argues that cash flows of a division may at least partially reflect the investment opportunity of the division, and thus due to measurement error in the investment opportunity, the cash flow and error in the regression would be correlated (i.e., an endogeneity issue), leading to a biased estimate of the investment/cash flow sensitivity. The problem becomes worse when a division's Q cannot be calculated, and an industry Q is used instead as a proxy for the division's investment opportunity. This measurement problem can be reduced with chaebol data because Tobin's Q can be calculated for individual firms within the internal capital market. This is possible because all chaebol-affiliated firms (U.S. segment counterparts) used in the study are public firms that have their own market values.

Furthermore, the study's focus is on the effect of other cash flows on investment, after controlling for the investment opportunity, to assess the role of internal capital markets of Korean business groups. The estimated investment/other cash flow relation is less likely to be subject to the endogeneity issue arising from the potential measurement error

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1. A series of reforms began in late 1998. Some intermediate years (1999 through 2000) were omitted from the sample to have cleaner post-reform data because according to Black and Kim (2012), some regulations delineated in the governance reforms were not in effect until 2000 or 2001.

2. For instance, refer to Lamont (1997), Bolton and Scharfstein (1998), Shin and Stulz (1998), Meyer et al. (1992), and Scharfstein and Stein (2000).

3. For detailed measurement problems of Tobin's Q, refer to Chevalier (2004) and Erickson and Whited (2002). Refer to Almeida et al. (2015) for the benefits of using chaebol data in studying corporate governance.

in Tobin's Q because other cash flows are unlikely to be correlated with the firm's investment opportunities. Note that other cash flows are the sum of cash flows in other affiliated firms in the business group. The chaebols in the sample are well-diversified business groups, typically consisting of approximately 30 different independent firms operating in about 20 different industries. Therefore, the potential impact of measurement errors in Tobin's Q on the coefficient estimate of other cash flows may be small in comparison to its impact on the coefficient estimate of the firm's own cash flow. Lee et al. (2009) advance similar arguments in estimating the relation between cash flows and investment in multinational or diversified organizations.[4]

Finally, even if there is some correlation between cash flows and Tobin's Q, we can minimize the estimation bias by examining the impact of the interaction of governance variables (cash flow rights or ownership disparity) with cash flows on investments in a regression model.[5] That is, any potential estimation bias of the effect of cash flows on investments would be cancelled out in the estimated coefficient on the interaction terms (i.e., cash flows*cash flow rights or cash flows*ownership disparity) because the bias is likely to be the same under different governance structures among firms.[6] Almeida and Campello (2007) make a similar argument in examining the impact of asset tangibility on the investment/cash flows decision. They have an interaction term that captures the effect of asset tangibility on investment/cash flow sensitivities. Similarly, we use an interaction term that reflects the effect of ownership/control variables on the investment/cash flow relation in this study.[7]

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4. Lee et al. (2009) argued that cash flows may be correlated with investment opportunities regardless of any financial constraints. To avoid any potential econometric problem, they identified a situation in which a cash flow variation is independent of the firm's investment opportunity. For example, foreign cash flows are expected to be uncorrelated with domestic U.S. advertising investment opportunities. They found that U.S. advertising investments are affected by foreign cash flows when the firm is financially constrained, indicating an active internal capital market.

5. Chevalier (2004) supports a correlation between cash flows and investment opportunity. Black et al. (2015) use cash flows as a measure of profitability, which induces profitable investment, suggesting a positive relation between cash flows and investment.

6. Unlike data from U.S. conglomerates, chaebol firm data allows better measurement of the potential agency problem in each affiliated firm by ownership disparity (or cash flow rights) and board strength since each firm has publicly traded stocks and its own board of directors.

7. Blanchard et al. (1994), Lamont (1997), and Rauh (2006) use a "natural experiment"

This study extends the findings of Almeida et al. (2015) in two major ways. First, they only investigated three years following the crisis (1997–2000), focusing on the short-term investment behavior of chaebol firms. This study extends the examination from 2001 to 2013 to see if chaebols' internal capital markets are utilized in the same way as in a crisis period. Second, Almeida et al. (2015) did not consider the effect of the controlling owners' ownership structure on investment and internal fund allocations. Furthermore, although this paper has specifically focused on business groups in Korea, our results have significant implications for the efficiency of internal capital markets in a global context. First, business groups are prevalent all over the world (Carney and Dieleman, 2011; Nam and Nam, 2004) such as in Japan, India, Chile, Indonesia, Korea, Philippines, and Thailand, and business groups have internal capital markets similar to those of multidivisional conglomerates that are common in many advanced countries. Also, the efficiency of internal capital markets is very important in less developed financial markets (Khanna and Yafeh, 2007) especially after the 1997 Asian financial crisis when internal capital allocation became critical in firm survival. Second, after experiencing the 1997 Asian financial crisis, Korea implemented corporate governance reform in early 2000s, and the main purpose of the reform was to improve the poor corporate governance systems of business groups (Lee et al., 2009). Nam and Nam (2004) argue that Korea had the most sweeping changes in the corporate governance system by adopting Anglo-American models of independent directorship and audit committee systems (Black and Kim, 2012). Therefore, this study contributes to the literature by studying the impact of corporate governance and ownership structure on capital investment decisions, focusing on business groups (chaebols) in Korea.

The rest of this paper proceeds as follows. Section II reviews the existing literature and develops relevant hypotheses. Section III describes the data and methodology used in this study. Section IV presents our empirical results and additional tests. Section V presents the conclusions of the study.

II. Internal capital markets of Korean business groups (Chaebols)

According to the Korea Fair Trade Commission (hereafter KFTC), a

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to bypass the need to control for investment opportunity.

chaebol business group can be defined as a group of firms that are controlled by the group's major shareholders and its affiliated firms who own more than 30% of shares. Baek et al. (2004) note, "chaebol firms operate in many different industries, are bound together by a nexus of explicit and implicit contracts, and maintain substantial business ties with other firms in their group. They are also characterized by an extensive arrangement of pyramidal or multi-layered shareholding agreements and the existence of cross-debt guarantees among member firms." These various intra-group arrangements have enabled a chaebol's owner-managers to control the entire group-affiliated firms even though they hold only a small portion of total ownership in the group.

Chaebols have grown through the support of the government in the 1970s when the Korean economy was experiencing rapid expansion. Along with economic development, chaebols also expanded their size and diversified their groups to various industries by forming pyramidal ownership structures through cross-shareholdings. Through these pyramid structures, chaebol-affiliated firms cross-subsidized each other within the internal capital markets they created. The internal capital markets were efficiently orchestrated through headquarters controlled by individual/family owner(s), which is the bright side of internal capital markets consistent with Stein (1997). For example, Khanna and Yafeh (2007) show the case of the Hyundai group's efficient human resource management through a human resource training center controlled by headquarters. Thus, the efficient control of internal capital markets by headquarters of chaebol groups has contributed not only to the growth of chaebol firms but also the development of the Korean economy. However, despite the contribution to economic growth, the dark side of internal capital markets has caused the expropriation of minority shareholders resulting from a weak corporate governance system in Korea. The weak corporate governance system was struck by the negative shock of the Asian financial crisis in 1997, causing the severe financial crisis in Korea (Joh, 2003; Baek et al., 2004). To receive the financial crisis bailout funds from the IMF and World Bank, the Korean government enacted corporate governance reforms based on the Anglo-American model of corporate governance systems (Han et al., 2018).

Corporate governance reform in Korea implemented some regulations that restricted internal capital markets for chaebol firms by prohibiting the direct cross-subsidizations or tunneling through

cross-loan guarantees or cross-shareholdings. In reality, however, despite these reforms, cross-subsidizations may continue to occur among the member firms of chaebols in various forms, particularly through the indirect cross-subsidizations of cross-selling products or services within member firms, or the equity transfer between member firms (e.g., Almeida et al., 2015).[8] For example, a chaebol firm can purchase products or services exclusively from other member firms within the same business group or sell its properties or shares at cheaper prices to other member firms.[9] Internal transactions prevail in Korea. For instance, the Korea Fair Trade Commission (hereafter KFTC) has announced that 64% (83%) of the total sales of chaebol-affiliated firms in the system integration (logistics) industry come from intragroup transactions.[10] In 2012, the KFTC also announced that 13.2% of the total sales of the top 46 chaebols (186.3 trillion Korean won) in 2010 involved intragroup transactions.[11] Almeida et al. (2015) also show that equity transfers increased substantially for chaebol firms with high growth opportunities, suggesting an active internal capital market for chaebol firms.

Furthermore, the data show that chaebol firms generated more cash, spent more on capital investments, and maintained higher levels of market capitalization than non-chaebol firms in the post-crisis period. This apparently strong operational performance of chaebols begs for a re-examination of their internal capital markets in the post-crisis period, which was characterized by a series of corporate governance reforms. According to the Korean Citizens' Coalition for Economic Justice's report on the top 30 chaebols (March 2012), chaebols held 55% of the total assets, 67% of the total sales, and 75% of the net incomes of all listed firms in Korea in 2011. Most recently, Choi et al. (2014) report that recent corporate governance reforms carried out from 1997 to 1999 have been at least partially successful in improving the efficiency of

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8. We use "cross-subsidization" and "tunneling" interchangeably here. Basically, it involves the transfer of direct cash and other indirect assets among affiliated group member firms. Refer to Claessens et al. (2000), Johnson et al. (2000), Bae et al. (2002), and Bertrand et al. (2002).

9. Shleifer and Vishny (1989) report in a survey that management's manipulation of transfer pricing is one of many mechanisms used to expropriate internal funds in many countries. They discuss other important governance issues around the world.

10. KFTC report (November 9, 2011)

11. KFTC report (August 30, 2012)

business operations and the wealth of minority shareholders in Korea.[12] As Black and Kim (2012) argue that independent board structure and an audit committee system are the main components of good corporate governance systems, Korean corporate governance reform has tightened regulations on board structure and audit committee systems. Han et al. (2018) argue that Korean firms adopted an outside director system for monitoring the board and an audit committee system for monitoring financial statement reports, but they adapted the outside director system for advising the board (rather than monitoring) and audit committee system for monitoring not only the financial statements but also the general operation of firms.

Therefore, it is worthwhile to note a unique feature of the function that audit committees play in Korea. Kim (2007) emphasizes the role of operational audits of audit committees in Korea and argues that operational audits play an important monitoring role in corporate governance, unlike financial and accounting audits, which primarily focus on financial report quality. Choi et al. (2014) and Han et al. (2014) find that Korean audit committees have a positive impact on firm value, seemingly due to the operational audit function. Finally, the 2001 Securities and Exchanges Act (SEA) in Korea mandated an audit committee for firms with assets of more than two trillion Korean won (approximately two billion U.S. dollars). This helps the analysis of the impact of the audit committee as an exogenous governance device on the investment behavior of chaebols, which mitigates a potential endogeneity problem.

Finally, we note that this study has significant contributions to the literature on the efficiency of internal capital markets in a global context. The main purpose of the governance reform in Korea was to improve the poor corporate governance system of business groups by adopting the Anglo-American models of outside directorship and audit committee systems (Lee et al., 2009). Furthermore, Nam and Nam (2004) show that Korea had the most extensive changes in corporate governance systems among Asian countries. Therefore, this study provides a global perspective on the effectiveness of the corporate governance reform, especially of Anglo-American models of directorship and audit committee system (Han et al., 2018) in emerging

12. Also, see Choi et al. (2007) and Black and Kim (2012) for more information on the detailed process of corporate governance reformation in Korea after the East Asian financial crisis.

markets. It also has implications for the internal capital market of more developed markets since the corporate structure of chaebols is very similar to that of diversified conglomerates in developed markets.

III. Literature review and hypothesis development

A. Literature review

Many scholars have accused chaebol firms of causing severe stock price declines during the 1997 Asian financial crisis because of their poor corporate governance. This expropriation hypothesis about chaebol firms is prevalent in the literature. For example, Joh (2003), using pre-crisis Korean samples, finds that Korean chaebols expropriate corporate resources to benefit controlling shareholders. Baek et al. (2004) suggest that the poor corporate governance of Korean chaebols was one of the primary causes of the massive stock price declines during the financial crisis. They find that chaebol firms lost more stock value than non-chaebol firms, and that firms with poor corporate governance suffered more during the financial crisis. Shin and Park (1999) investigated the internal capital markets of Korean chaebols by testing the effects of cash flows of other member firms on a firm's capital investments, using a methodology similar to that of Shin and Stulz (1998). They argue that the internal capital markets of chaebols reduce the financial constraints of member firms, despite the fact that many of these firms have relatively poor investment opportunities. Meanwhile, by examining Korean acquisition samples, Bae et al. (2002) find evidence of tunneling behavior in chaebols, and find that minority shareholders lose their wealth, while controlling owners benefit from acquisitions through other affiliated firms with increased values. Similarly, Wei and Zhang (2008) document the entrenchment effect of controlling shareholders; using eight East Asian countries' firm data before the financial crisis in 1997, they show that as the disparity between large shareholders' cash flow rights and control rights increases, investment/cash flow sensitivity increases.

After drastic corporate governance reforms in the early 2000s, the values of Korean firms generally recovered and significantly improved in comparison with the pre-crisis period. However, chaebols still dominate the Korean market, as mentioned in the introduction. Given this, we attempt to relate the post-reform dominance of chaebols to the

major corporate governance reforms carried out after the Asian financial crisis in 1997. A large body of literature argues that the reforms strengthened corporate governance in chaebols (e.g., Choi et al., 2007; Park and Kim, 2008; Kim and Kim, 2008; Han et al., 2014; Kim et al., 2010), enabling chaebols to benefit from the bright side of internal capital markets. Of course, a more realistic perspective is that chaebols may exploit both sides of internal capital markets. Regardless of the approach taken, the issue of whether chaebols benefit from the bright or dark sides of the internal capital markets presents an important empirical question. Finally, this study also focuses on the interaction between cash flows (particularly cash flows from other affiliated firms in the same business group) and an ownership/control variable (e.g., cash flow rights or ownership disparity) that affects investment.

B. Hypothesis development

The first aspects examined are chaebols' investment behaviors and cash flow patterns. In particular, we test whether internal capital markets play a significant role in the corporate investment behaviors of chaebol-affiliated firms. It is well documented that chaebols maintained active internal capital markets, at least before the 1997 financial crisis. This examination provides information about the effects of the governance reforms targeting chaebol firms, which prohibit the common practices of cross-loan guarantees and cross-shareholding among chaebol member firms. If the prohibition prevents chaebols from utilizing (efficiently or not) resources available within the internal capital market, there should be no significant differential investment activities using internal cash flows between chaebols and non-chaebol firms, controlling for size, industry, and investment opportunities. In contrast, if chaebols still exploit the internal capital market, then there should be evidence of different investment behavior utilizing internal funds available in the internal capital market by chaebols, given size and investment opportunities.

In this study, we interpret the investment/cash flow relation from the agency perspective within internal capital markets. There may be two major channels through which chaebols' expropriation (i.e., tunneling) occurs with own cash flows from each firm's internal operation and from other cash flows from the internal capital market (other firms' internal funds within the business group). For example, the own investment/cash flow sensitivity may be reduced due to limited internal

funds when cash is transferred to other affiliated firms. On the other hand, when cash can be transferred from other firms, asset diversion can occur in the form of overinvestment, resulting in increased other investment/cash flow sensitivity. Bertrand et al. (2002) show evidence of tunneling in Indian business groups by examining how group firms perform according to the controlling owners' cash flow rights.[13] We will explore whether ownership and control structures may dictate the direction of tunneling (i.e., cash transfers) and influence the cash flows/investment sensitivity.

We assume that the external financing is more costly than internal financing by both own and other cash flows. This would be particularly true in the emerging market, as argued in Moshirian and Vadilyev (2013). They claim that the cost of external financing critically depends on financial development and investor protection and that investment/cash flow sensitivity analysis is more appropriate for emerging markets.[14] Furthermore, as mentioned before, this sample period (2001 through 2013) allows examination of the investment behavior and role of internal capital markets in "normal" periods, not just during the crisis.[15] In fact, Choi et al. (2007) argue that some significant reforms were not completed until 1999 or 2000. Furthermore, when the controlling owners in chaebol firms can allocate internal resources freely at their discretion, their own cash flows should not affect investments in a significant way because they can transfer the resources from other affiliated firms for their investments if necessary.[16] The expropriation hypothesis suggests that the direction of cash transfers will depend on the controlling owner's incentive to expropriate

13. There are two major forms of expropriation by controlling owners: one is well-known as overinvestment (Richardson, 2006; Jensen, 1986; Stulz, 1990) and the other is tunneling (Bertrand, 2002; Bae et al., 2012). Tunneling involves asset diversions, including downright thefts, and cash transfers between member firms within a business group.

14. Recent developments in this area show the validity of investment/cash flow sensitivity as a sign of financial constraints, especially in the emerging market. Refer to Moshirian and Vadilyev (2013) and Cull et al. (2015)

15. Almeida et al. (2015) address this concern because they only examine three years around the 1998 financial crisis. The analysis based on the sample period from 2001 to 2013 will provide information regarding the investment activities in their internal capital markets in normal periods.

16. Note that this prediction is consistent with Ağca and Mozumdar (2008), who find that investment/cash flow sensitivity decreases with capital market frictions, since chaebol firms can mitigate frictions through internal capital markets.

minority shareholders in an individual chaebol firm.

Therefore, this study explores whether ownership and control structures are related to resource allocation decisions within internal capital markets, based on the expropriation hypothesis. First, the ownership concentration of chaebol owners may determine the destinations of resources in internal capital markets.[17] With concentrated ownership, controlling owners have incentives and the power to transfer resources from firms with lower cash flow rights to firms with higher cash flow rights for their private benefit (Bertrand et al., 2002). Therefore, the investments of affiliated firms with high cash flow rights are likely to be sensitive to other cash flows than those of firms with low cash flow rights. As discussed before, the use of the interaction between cash flows and cash flow rights would reduce the potential bias in estimating the effect of cash flows on investment. Thus, we test the following hypothesis:

> Hypothesis 1. Chaebol firms' investment-other cash flow sensitivity is increasing in controlling owners' cash flow rights, all else equal.

Another aspect of ownership structure that may affect internal capital allocation decisions of a controlling owner is the ownership wedge, that is, the disparity between the owner's control rights and cash flow rights (i.e., control rights–cash flow rights). A large body of literature related to tunneling behavior, (e.g., Claessens et al., 2000; Bae et al., 2002), suggests that wider wedges provide more incentives for controlling owners to expropriate minority shareholders.[18] Baek et al. (2004) and Bae et al. (2012) show a negative relation between ownership disparity and firm value in Korea during the Asian financial crisis in 1997 when firms had strong incentives to expropriate minority shareholders. Therefore, it is expected that chaebol firms with larger ownership wedges are more likely to expropriate minority shareholders to increase their private benefits. This naturally leads to an important question as to the effect of ownership disparity on investment/cash flow

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17. There is ample evidence of entrenchment by chaebol owners with high ownership concentration providing almost full control of internal funds. Baek et al. (2004) show that during the 1997 Asian financial crisis, Korean firms with higher ownership concentration by chaebols experience greater decreases in stock prices due to greater expropriation of minority shareholders.

18. Claessens et al. (2000) employ the ratio of cash-flow rights to control rights as the ownership wedge.

sensitivity. The expropriation hypothesis predicts that minority shareholders in firms with higher disparity wedges are expropriated with cash flows being siphoned off to other affiliated firms with smaller ownership wedges. This may reduce the investment/own cash flow sensitivity (Hypothesis 2).

> Hypothesis 2. The sensitivity of investment with respect to own cash flows decreases in ownership disparity, all else equal.

Obviously, the minority-expropriation problem mentioned above is a function of corporate governance (monitoring) devices. We examine whether the tunneling behavior reflected in the cash flows/investment sensitivity is related to the strength of corporate boards. Byun et al. (2013) examine the interaction between ownership disparity and board monitoring in determining firm value. A large part of corporate governance reform in Korea has focused on the corporate board and committee system (Choi et al., 2007). The regulation package includes improvement of the quality and authority of outside directors, the monitoring power of corporate boards, and the establishment of committees on boards (e.g., audit committees). Black and Kim (2012) argue that independent directors and audit committees are the most important elements of good corporate governance in Korea. Also, Gillan et al. (2003) argue that there are interactions among different governance devices. Finally, Black et al. (2015) provide evidence that strong governance leads to improved firm value in Korea. Therefore, if a board of director works properly as a monitor, its strength might affect investment decisions and prevent opportunistic tunneling behavior by controlling owners. Consistent with this argument, Richardson (2006) and Chen et al. (2016) show that corporate governance structures such as the presence of activist shareholders or board size of supervisors mitigate overinvestment.

We explore different investment/cash flow relations under different corporate governance structures such as audit committees (exogenously initiated by the corporate governance reforms in the 2001 Securities and Exchanges Act). This establishes two well-balanced samples of chaebol firms with an exogenously imposed audit committee and those without audit committee systems. Therefore, we can examine the investment sensitivity and its implications as a function of the establishment of audit committees without much concern regarding endogeneity issues. In sum, we hypothesize that the existence of audit committees is

associated with the controlling manager's opportunistic behavior reflected in investment/cash flow sensitivities as follows.

> Hypothesis 3. The relationship between investment/cash flow sensitivity and ownership/control variables (cash flow rights or disparity) is weaker for firms with audit committees than for those without audit committees.

Hypotheses 1 and 2 suggest that in an active internal capital market, cash may be transferred from firms with low cash flow rights (or high disparity) to firms with high cash flow rights (or low disparity) for investment. A critically important question is whether cash flows from other affiliated firms may be efficiently invested to improve firm value, especially when the controlling owners' interests are well-aligned with those of minority shareholders. In efficient internal capital markets, more resources are likely to be transferred from other affiliated firms when a firm faces better investment opportunities.[19] This implies that the effect of cash flow rights on investment/other cash flow sensitivity is expected to be greater (smaller) when the firms face better (worse) investment opportunity. We propose the following hypothesis:

> Hypothesis 4. The association between cash flow rights and investment/other cash flows sensitivity is stronger with the firm's investment opportunities.

IV. Data and methods

A. Data and descriptive statistics

This study investigates firms listed on the Korea Composite Stock Price Index (KOSPI) firms in Korea Exchange (KRX), whose data are available in the DataGuide database of FN DataGuide, one of the leading data service providers in Korea. The sample period covers the years 2001 to 2013. This period is robust for possible regulation

19. Hovakimian (2009) shows that investment opportunities are a determinant of investment/cash flow sensitivity by showing that firms with negative cash flow sensitivity have high growth opportunities and cash intensive firms have low growth opportunities, consistent with the corporate life cycle hypothesis.

changes, because many of the corporate governance reforms in Korea followed the East Asian financial crisis of 1997 and were instituted in the early 2000s. We use firm-level data to study the investment behaviors of internal capital markets, which are free from potential problems due to the restrictions on segment information availability and reliability that have been discussed in previous studies (Lamont, 1999; Shin and Stulz, 1998; Rajan et al., 2000). Furthermore, the ownership structure data are based on government-provided data that thoroughly cover the complex ownership structure of the business group. We also obtain the ownership and control characteristics of the chaebol firms. The Korea Fair Trade Commission (KFTC) provides a unique set of data that presents each firm's cash flow rights and control rights directly held by the chaebol group owner, instead of the largest shareholders, which might not fully reflect the interests of the chaebol owner as the ultimate controller of the business group.

The final sample includes 1,906 chaebol firms and 7,246 non-chaebol firms whose capital expenditures, cash flows, total assets, and market valuation data are available. Cash flows are defined as the sum of operating income, depreciation, and amortization. All variables are defined in the appendix. Panel A of table 1 presents the descriptive statistics for the sample.

Chaebol firms in the sample outperform non-chaebol firms for every measure, as can be seen in table 1. More specifically, chaebol firms generate more cash, spend more on capital investments, and maintain higher market valuations than non-chaebol firms do, generally consistent with Lee et al. (2009). These comparisons suggest that chaebol firms continue to command a significant portion of the Korean economy, even after the Asian financial crisis and corporate governance reforms. Panel B of table 1 presents the descriptive statistics of two subgroups of chaebol firms, those with audit committees (ACs) and those without. Chaebol firms with ACs seem to perform better in terms of size, investment, and cash flows than firms without ACs. However, the simple mean differences should not be over-interpreted, as they do not control for firm characteristics or firm and year fixed effects. Rigorous multivariate panel analyses are performed in the following sections.

An advantage of employing the control rights data provided by KFTC is that they incorporate the control rights through other non-listed affiliated firms. Following Kim et al. (2007), we measure the cash flow right by the sum of not only the direct ownership of controlling

TABLE 1. Descriptive Statistics

A. Descriptive Statistics by Chaebol Affiliation

	NONCHB (A)	CHB (B)	DIFF(A-B)
Capital expenditures/total assets	0.035	0.043	–0.00864***
	(0.067)	(0.057)	[–5.12]
Cash flows/total assets	0.080	0.095	–0.0153***
	(0.095)	(0.076)	[–6.46]
Market to book	1.029	1.247	–0.218***
	(0.698)	(0.681)	[–12.15]
Logarithm of total assets	18.930	21.121	–2.191***
	(1.135)	(1.531)	[–69.01]
Cash flow rights		0.203	
		(0.188)	
Control rights		0.408	
		(0.192)	
Disparity		0.206	
		(0.169)	
Observations	7,246	1,906	9,152

B. Descriptive Statistics by Audit Committee Establishment in Chaebols

	No AC (A)	AC (B)	DIFF (A-B)
Capital expenditures/total assets	0.039	0.046	–0.00697**
	(0.054)	(0.058)	(–2.62)
Cash flows/total assets	0.088	0.098	–0.00941**
	(0.073)	(0.077)	(–2.64)
Market to book	1.154	1.316	–0.162***
	(0.723)	(0.648)	(–5.06)
Logarithm of total assets	20.065	21.927	–1.862***
	(1.032)	(1.292)	(–33.06)
Cash flow rights	0.228	0.187	0.0408***
	(0.211)	(0.171)	(4.55)
Control rights	0.467	0.366	0.101***
	(0.200)	(0.179)	(11.36)
Disparity	0.239	0.179	0.0606***
	(0.183)	(0.155)	(7.67)
Observations	763	1,095	1,858

(*Continued*)

TABLE 1. (Continued)

Note: The sample comprises nonfinancial KRX-listed firms retrieved from the Data Guide database and covers the period between 2001 and 2013. Capital expenditures/total assets is capital expenditures divided by total assets, and cash flows/total assets is cash flows normalized by total assets. Market to book is the firm's market capitalization divided by total assets and the logarithm of total assets is the natural logarithm of total assets. Cash flow rights and control rights are calculated following Kim et al. (2007). Disparity is the difference between cash flow rights and control rights. An audit committee establishment is indicated by one if a firm has an audit committee and zero otherwise. Mean and standard deviation (in parentheses) for the variable are reported for non-chaebol firms (A) and for chaebol firms (B). The numbers in the square brackets for the difference estimates are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

shareholders and family holdings but also the indirect ownership through the entire affiliated firms' cross-holdings, which is a more comprehensive measure of cash flow rights than the direct ownership that KFTC provides. Ownership wedge is calculated by subtracting the chaebol owner's cash flow rights from control rights. This measure reflects actual ownership disparity and therefore, is more accurate than measures used in previous studies such as Claessens et al. (2000) or Baek et al. (2004), which are of limited scope with regard to indirect ownership. The average controlling owner directly holds 20.3% of the affiliated firms' cash flow rights but exercises 40.08% of the control rights.

Cash flow rights are calculated following Kim et al. (2007). Specifically, cash flow rights ($CFR_{i,t}$) for firm i at year t are calculated as

$$CFR_{i,t} = Direct_{i,t} + \sum_{j=1}^{J} s_{ij,t} Direct_{i,t} + \sum_{j=1}^{J} s_{ij,t} \sum_{j=1}^{J} s_{ij,t} Direct_{i,t} + \cdots \quad (1)$$

where $Direct_{i,t}$ is the direct shareholdings of the chaebol owner and his/her relatives, s_{ij} is the direct share ownership in firm i held by other affiliated firms j ($j \in [1,\ldots,J]$), and J is the total number of affiliated firms within the chaebol group. The equation can be written in matrix form by defining CFR_t ($Direct_t$) as a ($J \times 1$) vector of cash flow rights (direct ownership of the controlling owner and his/her relatives) in the affiliated firms and S_t as a ($J \times J$) matrix of $s_{ij,t}$ ($i = 1,\ldots,J$; $j = 1,\ldots,J$), as

$$CFR_t = Direct_t + S_t Direct_t + S_t^2 Direct_t + \cdots \tag{2}$$

Then,

$$CFR_t = (I - S_t)^{-1} Direct_t \tag{3}$$

where I is a $(J \times J)$ identity matrix and $(.)^{-1}$ indicates the inverse matrix, which can be calculated directly from data. Note that this cash flow rights measure incorporates all possible channels of cash flow rights in the complicated pyramid ownership structure of chaebol groups and hence serves as a better and clearer measure of cash flow rights than those of Claessens et al. (2000) and Baek et al. (2004), which consider only top-level layers of the ownership structure.

B. Methods

The models included in this study are ordinary least squares (OLS) corrected for heteroskedasticity. The baseline regression model that investigates the investment behavior of the KOSPI-listed firms is:

$$\begin{aligned} \text{Capital Expenditures}\,(CAPX) = {} & \alpha + \beta_1 * \text{Cash Flows}\,(CF) \\ & + \beta_2 * \text{Chaebol Dummy}\,(CHB) \\ & + \beta_3 * \text{Market to Book}\,(MTB) \\ & + Controls + \varepsilon \end{aligned} \tag{4}$$

Capital expenditures and cash flows are normalized by the firm's beginning-of-the-year total assets. The chaebol dummy has a value of one for chaebol firms and zero otherwise. We use the chaebol classification of the KFTC to distinguish chaebol firms from others. The market-to-book variable is a firm's market valuation normalized by the firm's total assets. We also add control variables for the natural logarithm of the total assets and year dummies. For further investigation of the investment behavior of the chaebol firms, we collect data regarding the corporate governance environments of the firms. As mentioned before, the data on each chaebol firm's ownership structure have been retrieved from the KFTC Online Provision of Enterprises Information (OPENI) Database, while other corporate governance data,

including board characteristics (e.g., existence of audit committees), have been hand-collected from the Data Analysis, Retrieval, and Transfer System (DART) database provided by the Korea Financial Supervisory Service (FSS).

To investigate the roles of internal capital markets in corporate investments, we focus on chaebol data and introduce an "other cash flows" (OCF) variable. A firm's OCF is calculated by the sum of the cash flows in other affiliated firms within the same business group, divided by the total assets of the other member firms in the business group to which the firm belongs, following the method of Shin and Park (1999) and Lee et al. (2009). We examine how the resources of the internal capital market are related to the investments of the chaebol firms by considering the following regression model:

$$CAPX = \alpha + \beta_1 * CF + \beta_2 * OCF + \beta_3 * MTB + Controls + \varepsilon \quad (5)$$

The coefficient β_2 of equation (5) represents investment sensitivity with respect to other cash flows, which indicates potential activities of internal capital markets. Furthermore, we add interaction terms between the cash flow and beginning-of-the-year ownership concentration variables, such as the cash flow rights of the controlling owners or ownership disparity, to test the effects of the ownership structure on the relationship between corporate investment and internal funds available in internal capital markets as follows:

$$\begin{aligned} CAPX = {} & \alpha + \beta_1 * CF + \beta_2 * OCF + \beta_3 \\ & * \text{Ownership Variable}(OWN) \\ & + \beta_4 * CF * OWN + \beta_5 * OCF * OWN \\ & + \beta_6 * MTB + Controls + \varepsilon \end{aligned} \quad (6)$$

The coefficient β_4 of equation (6) represents the effects of ownership structures on the dependence of the chaebol firm's investment on own cash flows, and β_5 indicates the role of ownership structures in the use of other cash flows from the internal capital market for the firm's capital investments. To the extent that a firm's investment behavior is

motivated by controlling owners' expropriation, we expect a significant coefficient, β_3 which measures the direct impact of the expropriation variable (e.g., cash flow rights or ownership disparity) on investment. The model specification based on the expropriation hypothesis implicitly assumes the possibility that some investment can be affected by the agency problem in addition to investment opportunities. For example, firms with higher disparity (or lower cash flow rights) may divert internal resources to more opportunistic investments (overinvestment) such as empire building.

Furthermore, investments can be changed indirectly through the effect of agency problems on investment/cash flow sensitivity. For example, in a firm with high ownership disparity, the controlling owners have a strong incentive to expropriate the resources in the firm, lessening own cash flows/investment sensitivity. Also, the investment can be sensitive to other cash flows because the controlling owners have greater incentive to transfer cash for investment from firms with low cash flow rights to firms with high cash flow rights. It is important to point out that chaebol-fixed and industry-fixed effect regressions are employed instead of firm-fixed effect regressions as in Almeida et al. (2015) to utilize within-chaebol variations in cash flows and expropriation variables (i.e., cash flow rights and disparity) over time. We believe that the chaebol-fixed effect approach is appropriate in the analysis because we examine the interaction among firms within the same business group as supported in Almeida et al. (2015). This may be because each business group has its unique culture or environment, which affects internal capital markets differently. We want to control for this potential effect since we are interested in the internal capital market activities within the same business group over time. Also, Zhou (2001) recognizes that using firm-fixed effect regressions can be inappropriate, especially when ownership variables such as cash flow rights do not change much over time.

V. Empirical results

A. Baseline regression results

Whether the investment behaviors of chaebol firms are different from those of non-chaebol firms is investigated in this subsection using

baseline regression models as in equation (4). The chaebol's investment behavior can be different, because chaebol firms may benefit from their control over internal resources in their internal capital markets. Table 2 presents the results.

In general, the investment behaviors of both chaebols and non-chaebols are similar with respect to investment opportunity and own cash flow sensitivity. However, the investments of chaebols turn out to be sensitive to other cash flows at the 10% significance level as shown in model (3).[20] The positive investment/other cash flow sensitivity for chaebol firms indicates an active internal capital market in the chaebol business groups. According to Almeida et al. (2015), the chaebols indeed transferred cash through equity-transfer among affiliated firms within the business groups, even after the governance reforms. As previously discussed, the magnitude of investment/cash flow sensitivity critically depends on the direction of cash transfers within the internal capital market. This brings forth the main research hypotheses that the investment/cash flow sensitivity of chaebol firms may reflect the controlling owners' expropriation incentive to allocate internal funds within the business groups for their own private benefit.

B. Investments, internal capital markets, and expropriation by chaebol firms

Most chaebol firms were required to introduce or strengthen corporate governance devices after the financial crisis in 1997 through the corporate governance reform (Choi et al., 2007). Thus, it would be interesting to assess whether the opportunistic behavior of a controlling owner can be mitigated by strong governance devices. To do this, we need to first establish a pattern of the controlling owner's opportunistic behavior (e.g., tunneling or empire building), reflected in both investment activities and investment/cash sensitivities. This is accomplished by examining how the control/ownership structure is

20. In contrast with Lee et al. (2009), the results suggest that chaebol firms have maintained active internal capital markets after the Asian financial crisis of 1997. This discrepancy may arise because the sample period covers the post-crisis reformation period from 2001 to 2013, while Lee et al.'s (2009) sample covers the period from 1999 to 2005, much of which overlaps with the period during which the Korean government reformed corporate governance regulations. Their sample period from 1999 to 2005 is used to confirm their results, which is not reported. Indeed, the results in this study are similar to theirs for the sample period of 1999–2005 in that the coefficient estimate on other cash flows is insignificant.

TABLE 2. Capital investments and internal cash flows

	(1) CHB	(2) CHB	(3) CHB	(4) NON-CHB	(5) NON-CHB	(6) POOLED
Market to book	0.024***	0.013***	0.013***	0.023***	0.015***	0.015***
	(8.15)	(3.88)	(3.86)	(12.00)	(7.96)	(7.86)
ln(Total assets)	0.001	0.001	0.001	0.001	–0.000	0.000
	(1.08)	(0.63)	(0.86)	(1.53)	(–0.60)	(0.05)
Own cash flows		0.201***	0.208***		0.228***	0.230***
		(7.27)	(7.50)		(17.89)	(18.28)
Other cash flows			0.053*			
			(1.78)			
Chaebol						0.000
						(0.00)
Chaebol*Market to book						–0.000
						(–0.11)
Chaebol*Own cash flows						–0.027
						(–0.98)
Constant	0.086***	0.099***	0.093***	–0.034**	0.001	–0.005
	(4.10)	(4.95)	(4.75)	(–2.00)	(0.09)	(–0.42)
Chaebol FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-sq	0.327	0.363	0.365	0.101	0.187	0.214
F	34.87	35.19	34.00	16.81	31.19	39.62
Prob > F	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
N	1,875	1,875	1,875	6,434	6,434	8,309

(*Continued*)

TABLE 2. (Continued)

Note: The sample comprises nonfinancial KRX-listed firms retrieved from the Data Guide database and covers the period between 2001 and 2013. The dependent variable is capital expenditures divided by total assets. Market to book is the firm's market capitalization divided by total assets and the ln(total assets) is the natural logarithm of total assets. Own cash flows is total cash flows divided by total assets of the sample firms. Other cash flows is calculated by the sum of the cash flows in other member firms within the same business group, divided by total assets of the other member firms. The Chaebol variable is a dummy variable that equals to one for chaebol firms and zero otherwise. *a* * *b* indicates the interaction terms between the variables *a* and *b*. The numbers in parentheses are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

related to the investment itself and to the investment/cash flow sensitivity. Then we test whether the investment activities of chaebol-affiliated firms, reflected in the investment/cash flow relation, show different patterns under different corporate governance devices (e.g., audit committees). We examine two ownership/control variables including ownership (or cash flow rights) and ownership wedge (control rights–cash flow rights), as previously explained. Table 3 presents the test results.

Model (1) examines the direct relation between investments and cash flows (and cash flow rights) without the interaction between cash flows and cash flow rights. Model (2) considers the direct and indirect effects of the cash flow rights of controlling owners on their investment activities. The direct impact of cash flow rights on investment is statistically significant and negative at the 5% significance level. Its estimated coefficient is –0.038 with a t-value of –2.26. This is consistent with the argument that as controlling owners' cash flow rights increase, their incentive to expropriate minority shareholders diminishes and leads to fewer opportunistic investments like empire building. Black et al. (2015) also report a similar pattern: that investment decreases as corporate governance becomes stronger (measured by their governance index). Furthermore, cash flow rights may indirectly affect investments through their impact on investment/cash flow sensitivity. A positive indirect impact of the cash flow rights is observed, with a significant coefficient (0.338 with a t-value of 2.60) on the interaction between other cash flows and cash flow rights. This is consistent with Hypothesis 1 that chaebol-affiliated firms' investments react more positively to other cash flows for firms with high cash flow rights. This is possibly because the controlling owners seek to transfer other cash flows from member firms with smaller cash flow rights to firms with higher cash flow rights, which is consistent with Bertrand et al. (2002).

Similarly, we find a significant and positive relation between investment and ownership disparity in model (4) of table 3. We argue that as chaebol firms' ownership disparity increases, they are more likely to make opportunistic investments to maximize their private benefits (e.g., empire-building). This interpretation is also consistent with a strong negative coefficient estimate for cash flow rights in model (2). Regarding the internal capital market activity, we also observe a negative and significant coefficient on the interaction between own cash flows and disparity in model (4) of table 3, which supports Hypothesis 2. That is, high ownership disparity in a chaebol firm will encourage the controlling owners to tunnel its cash flows to other member firms with

TABLE 3. Capital investments, internal cash flows, cash flows from internal capital markets, and ownership structure of chaebol firms

	(1)	(2)	(3)	(4)
Own cash flows	0.204***	0.225***	0.206***	0.259***
	(7.31)	(7.56)	(7.39)	(6.20)
Other cash flows	0.060**	–0.023	0.058*	0.073*
	(1.98)	(–0.71)	(1.91)	(1.85)
Cash flow rights	–0.015*	–0.038**		
	(–1.65)	(–2.26)		
Market to book	0.014***	0.014***	0.013***	0.013***
	(3.95)	(4.03)	(3.90)	(3.70)
ln(Total assets)	0.001	0.001	0.001	0.001
	(0.95)	(0.59)	(1.41)	(1.29)
Own cash flows*Cash flow rights		–0.107		
		(–1.16)		
Other cash flows*Cash flow rights		0.338***		
		(2.60)		
Disparity			0.011	0.034**
			(1.28)	(2.19)
Own cash flows*Disparity				–0.239*
				(–1.84)
Other cash flows*Disparity				–0.045
				(–0.33)
Constant	0.091***	0.102***	0.076***	0.074***
	(4.60)	(5.11)	(3.45)	(3.32)
Chaebol FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes
R-sq	0.365	0.369	0.364	0.367
F	33.04	31.46	33.09	31.69
Prob > F	<0.01%	<0.01%	<0.01%	<0.01%
N	1,859	1,859	1,859	1,859

Note: The sample comprises nonfinancial KRX-listed chaebol firms retrieved from the Data Guide database and covers the period between 2001 and 2013. The dependent variable is capital expenditure divided by the firm's total assets. Cash flow rights and control rights are calculated following Kim et al. (2007). Disparity is control rights minus cash flow rights. Market to book is the firm's market capitalization divided by total assets and the ln(total assets) is the natural logarithm of total assets. The numbers in the parentheses are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

low disparity for their investment, which implies a low investment/own cash flow sensitivity. Suppose that firm L has a disparity of zero, while another firm H has a very high disparity of 0.60. Then, firm L(H)'s cash

flow sensitivity is 0.259 (0.116 = 0.259 – 0.239*0.6). That is, L invests $0.26 per $1 of cash flows, while H invests only $0.12 per $1 of cash flows, possibly because part of the cash flow from firm H is tunneled to firms with low disparity like L.

C. Impact of audit committees on expropriation by chaebol firms

Finally, we test whether corporate governance structures may mitigate the evidence of expropriation reflected in the investment/cash flow sensitivity. We divide the full sample into two separate samples, based on the establishment of audit committees. Table 4 shows the investment/cash flow relation in chaebol firms with an audit committee vs. firms without an audit committee and reflects mixed results. With cash flow rights, no significant coefficients are observed on either the interaction terms of own or other cash flows. However, we find a significant and negative coefficient on the interaction between own cash flows and disparity for firms with no audit committee in model (4), while no significant relation is observed between investment/own cash flows sensitivity and disparity for firms with an audit committee in model (3). This suggests that strong governance plays a significant role in discouraging expropriation, consistent with Hypothesis 3. That is, we argue that strong governance limits cash being siphoned off to other member firms when the controlling owners' expropriation incentive (measured by disparity) is high.

D. Efficiency of internal capital markets and ownership concentration

In the previous sections, we find evidence that chaebol owners seem to actively use their internal capital markets for their tunneling or cross-subsidization motives. However, these findings do not necessarily suggest that internal capital markets of chaebol firms are inefficient. Although they could be used as a method of tunneling, internal capital markets of chaebol firms still can be at least partly efficient. This is because the Korean government's efforts made after the Asian financial crisis, such as the establishment of audit committees, may have improved the efficiency of the business group structure. To investigate the efficiency of internal capital markets of chaebol firms more fully, we conduct analyses on subsamples categorized by firm's investment opportunities relative to those of the group-year median firms.

If an internal capital market works efficiently, internal resources should be transferred from firms with weaker investment opportunities

TABLE 4. Capital investments, cash flows and ownership structure of chaebol firms with and without audit committees

	(1) AC	(2) No AC	(3) AC	(4) No AC
Own cash flows	0.220***	0.201***	0.263***	0.272***
	(5.76)	(3.92)	(5.53)	(4.28)
Other cash flows	–0.091**	0.025	–0.024	0.119
	(–2.20)	(0.40)	(–0.53)	(1.55)
Cash flow rights	–0.040	–0.047**		
	(–1.42)	(–1.97)		
Own cash flows*Cash flow rights	–0.055	–0.077		
	(–0.29)	(–0.62)		
Other cash flows*Cash flow rights	0.352	0.276		
	(1.47)	(1.53)		
Market to book	0.009**	0.019***	0.009**	0.017***
	(2.18)	(4.62)	(2.26)	(3.99)
ln(Total assets)	0.003	–0.002	0.004**	–0.002
	(1.41)	(–0.93)	(2.10)	(–0.64)
Disparity			0.049*	0.025
			(1.93)	(1.24)
Own cash flows*Disparity			–0.242	–0.404*
			(–1.53)	(–1.83)
Other cash flows*Disparity			0.005	–0.057
			(0.03)	(–0.24)
Constant	–0.030	0.150***	–0.077*	0.130**
	(–0.73)	(3.02)	(–1.83)	(2.42)
Chaebol FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes
R-sq	0.456	0.372	0.458	0.371
F	13.64	6.82	14.83	6.94
Prob > F	<0.01%	<0.01%	<0.01%	<0.01%
N	1,076	742	1,076	742

Note: The sample comprises nonfinancial KRX-listed chaebol firms retrieved from the Data Guide database and covers the period between 2001 and 2013. The dependent variable is capital expenditure normalized by total assets. Own cash flows is total cash flows divided by total assets of the sample firms. Other cash flows is calculated by the sum of the cash flows in other member firms within the same business group, divided by total assets of the other member firms. AC indicates the samples with audit committees in the firms and No AC indicates otherwise. The numbers in parentheses are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

to firms with stronger investment opportunities.[21] This subsection reports the analysis of whether a firm's investment opportunities relative to other member firms affect a chaebol's resource allocation decisions, interacting with ownership structure (i.e., cash flow rights). Table 5 presents the results. Models (1) and (2) show the subgroup regression results categorized by the firm's relative investment opportunities in the business group. Specifically, model (1) comprises affiliated firms with market-to-book ratios greater than the group's median, and model (2) contains the others.

In general, the results show that investment opportunities significantly affect the use of cash flows on capital investments. Models (1) and (2) show significant coefficients on *OCF**cash flow rights, suggesting that internal capital markets subsidize firms with high cash flow rights in general. Moreover, such subsidization (or tunneling) behavior is more pronounced when the firms' investment opportunities are relatively high, supporting Hypothesis 4.[22] This result suggests that internal capital markets of chaebol firms seem to be efficient, at least partly, since the transferred resources are used for investment in firms with greater investment opportunities. In sum, chaebol firms as a group seem to utilize both the bright and dark sides of internal capital markets.

E. Efficiency of internal capital markets and audit committees

This section considers whether the establishment of audit committees affects the efficiency of internal capital markets.

First, with favorable investment opportunities (i.e., a high market-to-book ratio), as in model (1) of table 6, the AC dummy does not have any influence over investments, directly or indirectly through cash flows. Meanwhile, investments are very sensitive to their own cash flows. Interestingly, there is a significant interaction between cash flows (both own and other) and AC dummy in affecting investment under unfavorable investment opportunity conditions (i.e., low market-to-book ratio), as shown in model (2). For example, when there is no audit committee, investment-own cash flows sensitivity under unfavorable

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21. Many studies suggest that internal capital markets are efficient if resources are transferred from the divisions with low investment opportunities to the divisions with high investment opportunities. See, for example, Rajan et al. (2000) and Almeida et al. (2015).

22. The difference in the coefficients on *OCF**cash flow rights between two samples is statistically significant, using Z-score (=1.80) at the 10 % significance level. $Z = (\hat{\beta}_1 - \hat{\beta}_2) \Big/ \sqrt{SE_{\beta_1}^2 + SE_{\beta_2}^2}$, where *SE* is the standard error of the coefficient estimate.

TABLE 5. Capital investments, cash flows, and ownership structure of chaebol firms by investment opportunity

	(1) High MTB	(2) Low MTB
Own cash flows	0.256***	0.218***
	(6.05)	(4.83)
Other cash flows	–0.104	–0.027
	(–1.53)	(–0.73)
Cash flow rights	–0.045	–0.033*
	(–1.38)	(–1.79)
Own cash flows*Cash flow rights	–0.407**	–0.125
	(–2.05)	(–0.97)
Other cash flows*Cash flow rights	0.914***	0.310**
	(3.01)	(2.18)
Market to book	0.011**	0.020***
	(2.16)	(4.30)
ln(Total assets)	0.002	–0.000
	(1.05)	(–0.12)
Constant	0.078*	0.027
	(1.77)	(1.01)
Chaebol FE	Yes	Yes
Industry FE	Yes	Yes
Year Effects	Yes	Yes
R-sq	0.428	0.392
F	15.81	10.48
Prob > F	<0.01%	<0.01%
N	777	1082

Note: The sample comprises nonfinancial KRX-listed chaebol firms retrieved from the Data Guide database and covers the period between 2001 and 2013. The dependent variable is capital expenditure normalized by total assets. Own cash flows is total cash flows divided by total assets of the sample firms. Other cash flows is calculated by the sum of the cash flows in other member firms within the same business group, divided by total assets of the other member firms. High (low) MTB stands for chaebol firms whose market-to-book ratio, used as a proxy for investment opportunity, is higher (lower) than the group median. The numbers in parentheses are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

investment conditions (i.e., 0.041) is very small in comparison to 0.238 under favorable conditions in model (1). However, the sensitivity increases to 0.279 (= 0.041 + 0.238) with the existence of audit committees.

On the other hand, without audit committees, the coefficient on other cash flows (i.e., 0.110) is significant in model (2), hinting at the possibility of inefficient internal capital markets, allocating funds from

TABLE 6. Capital investments, cash flows, and audit committees under different investment opportunity

	(1) High MTB	(2) Low MTB
Own cash flows	0.238***	0.041
	(3.77)	(0.90)
Other cash flows	0.069	0.110**
	(0.78)	(2.45)
AC Dummy	0.007	–0.010
	(0.60)	(–1.48)
Own cash flows*AC Dummy	–0.061	0.254***
	(–0.91)	(4.45)
Other cash flows*AC Dummy	–0.013	–0.132***
	(–0.13)	(–2.93)
Market to book	0.011**	0.020***
	(2.19)	(4.35)
ln(Total assets)	0.002	0.001
	(0.67)	(0.71)
Constant	0.067	0.002
	(1.18)	(0.05)
Chaebol fixed	Yes	Yes
Industry fixed	Yes	Yes
Year Effects	Yes	Yes
R-sq	0.319	0.346
F	14.89	10.63
Prob > F	<0.01%	<0.01%
N	771	1,078

Note: The sample comprises nonfinancial KRX-listed chaebol firms retrieved from the Data Guide database and covers the period between 2001 and 2013. The dependent variable is capital expenditure divided by the firm's total assets. High (low) MTB stands for chaebol firms whose market-to-book ratio, used as a proxy for investment opportunity, is higher (lower) than the group median. The AC dummy is one if a firm has an audit committee and zero otherwise. The numbers in parentheses are heteroskedasticity-corrected t-statistics of the estimated coefficients. The asterisks denote significance at 1% (***), 5% (**), and 10% (*) levels.

other member firms to overinvestment. However, the same coefficient becomes trivially close to zero with audit committees in place, which seems to discourage the inefficient allocation of internal funds. This result implies that audit committees are, as a monitoring device, more effective in unfavorable investment environments.[23] In sum, there is

23. Almeida et al. (2015) also show that chaebols efficiently exploited internal capital markets (e.g., transferring cash from low growth to high growth member firms) to improve their firm performance after the crisis.

some evidence suggesting that the audit committee system contributes to the improvement in the investment and internal capital market efficiency of chaebol firms.

VI. Conclusions

Many scholars have reported that chaebol firms benefit from the expropriation of minority shareholders. However, they do not fully explain why such inefficient chaebol structures have remained and even succeeded in the Korean economy after the late 1990s corporate governance reforms. This study suggests that chaebol groups' use of their internal capital markets, through which member firms transact resources with each other, may enable chaebol firms to outperform non-chaebol firms. The evidence suggests that the internal capital markets of chaebol firms function well, and that this continues to be the case even after the corporate governance reforms. Specifically, the behavior of cash flow/investment sensitivity in the business groups seems to be determined by two forces: one force originates from the controlling owners' incentive to maximize their private benefits (e.g., tunneling and subsidization) and the other force comes from the owners' ability to allocate internal funds to winners (i.e., winner-picking).

This study provides evidence that corporate governance may have a positive impact on the efficiency of internal capital markets even in the presence of strong controlling owner(s). This will provide practical implications for policymakers/regulators in assessing the benefits of introducing/strengthening corporate governance devices. Moreover, the results may contribute to the debate on whether corporate governance improves efficiency in investment decisions versus the "stewardship hypothesis" that excessive governance devices may reduce investment efficiency by restricting managers' discretion in making investment decisions.

In terms of the global context, this study provides implications for the efficiency of internal capital markets in both emerging and advanced countries, because business groups are prevalent around the world, and their corporate structures are similar to multidivisional conglomerates in advanced countries. Finally, we examine the bright and dark sides of the internal capital markets of chaebols by focusing on their investment as a function of cash flows and internal governance structure. However, whether these business groups produce a net benefit to the overall Korean economy remains to be further explored.

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Appendix. Definitions of Variables

Variable	Definition
Chaebol	a dummy variable that equals one for chaebol firms and zero otherwise
Audit committee establishment	a dummy variable that equals one for the firms with audit committees and zero otherwise
Market to book	the firm's market capitalization divided by total assets
ln(Total assets)	the natural logarithm of total assets
Own cash flows	total cash flows divided by total assets
Other cash flows	the sum of the cash flows in other member firms within the same business group, divided by total assets of the other member firms
Cash flow rights	calculated following Kim et al. (2007). See Section III. *A*. for details
Control rights	KFTC-provided control rights
Disparity	control rights minus cash flow rights

Note: The sample comprises nonfinancial KRX-listed firms retrieved from the Data Guide database and covers the period between 2001 and 2013.

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