Governance Transparency and Firm Value: Evidence from Korean Chaebols

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Abstract

We examine Korean business groups' transition from circular-shareholding structures to (relatively simple) pyramidal-shareholding structures between 2011 and 2018. When firms were removed from ownership loops, chaebol families' control or incentive conflicts in them were unaffected; yet their values declined in accordance with families' incentive conflicts. Non-loop group firms' values increased (declined) when little (significant) agency issues that were difficult to identify under circular-shareholding structures existed. As families' incentive conflicts become clearer ("governance transparency"), earnings responsiveness increases but, by enabling investors to update priors about the relative severity of agency issues across group firms, firm values can increase or decrease.

Keywords: Business group; Cross shareholding; Circular shareholding; Pyramidal ownership; Governance transparency; Ownership transparency; Valuation; Earnings response coefficient

JEL: G18, G34, G38, G41, L51, M14, M52

1.   Introduction

Throughout the world, most companies are controlled by a dominant group of shareholders, typically such companies' founders and their family members (Burkart, Panunzi, and Shleifer, 2003).[1] Various mechanisms facilitate and maintain the dominant shareholder's control, such as establishing voting trusts or share classes with differential voting rights. In the context of business groups—also pervasive around the world—stock pyramids and cross (or circular) shareholdings are commonplace ways to enhance families' control (Masulis et al., 2011).

The empirical literature on business groups has typically treated group structures as exogenously given and simply studied their consequences. Traditionally, these studies focused on the discrepancy or "wedge" between the controlling family's voting and cash-flow rights and on how those rights influence operating performance and market valuation (Claessens, Djankov, and Lang, 2000; Faccio and Lang, 2002). Researchers have more recently begun to explore why specific business-group structures arise, how they evolve, and the consequences of changes in group structure. As an important step in this direction, Almeida, Park, Subrahmanyam, and Wolfenzon (2011) developed empirical measures to describe the attributes and complexity of business groups (see Section 2. for a description) and documented novel empirical facts about the evolution of Korean *chaebols* (business groups). Among its main findings, Almeida et al. (2011) shows *how* corporate pyramids are formed and documents the prevalence of circular shareholdings in chaebol firms.

Scant attention has been paid to the implications of circular shareholdings, despite their prevalence as a control-enhancing mechanism around the world. A circular shareholding structure results from cross-ownership of group firms that creates ownership "loops." In its simplest form, an ownership loop can be created via reciprocal ownership between two firms: firm A owns shares in firm B and vice-versa. Ownership loops can also embody more complex arrangements, such as when firm A has an ownership interest in B, B in C, and C in A.[2]

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[1]Using a sample of public firms in 45 countries, Masulis, Pham, and Zein (2011) estimate that 19% belong to family-controlled business groups; in emerging-market economies, they estimate the corresponding number to be 40%.

[2]Masulis et al. (2011) estimates that 10% of business groups around the world employ reciprocal ownership

Compared to other control-enhancing mechanisms, such as pyramidal or dual-class share structures, circular shareholdings make ownership (thus controlling families' incentives) substantially more opaque (Bebchuk, Kraakman, and Triantis, 2000). Unlike a pyramidal structure, where capital flows through the business group in a linear way, in a circular-shareholding structure capital flows through a complex circular web of intercorporate linkages. The presence of ownership loops could therefore obscure the family's ultimate voting and cash-flow rights in each firm, making it difficult for minority shareholders to distinguish the relative intensity of agency issues (e.g., the wedge between the controller's cash-flow and voting rights in a firm) *across* business-group firms and to assess valuations.

Thus, increasing the transparency of ownership structure, such as by removing ownership loops, could portend significant valuation consequences. However, the direction of valuation effects are ex ante ambiguous. On the one hand, transparency may increase valuations by intensifying earnings responsiveness (ERC) or the multiple that the market applies to a firm's long-term earnings (Fischer and Verrecchia, 2000). On the other hand, it may depress valuations by revealing to investors that controllers' and managers' incentives in a particular firm were worse than investors originally anticipated. The value implications of ownership-structure transparency remains an open empirical question.

This paper studies the value effects of "governance transparency," or the ease with which agency problems can be observed by investors. The South Korean setting offers a unique opportunity to study this question. In the aftermath of the 1997 Asian Financial Crisis, the governance of South Korean corporations became a matter of significant priority and policy debate (Lee, 2017). The Korean Fair Trade Commission (KFTC) identified a business group's circular-shareholding structure as problematic, leading to "excessive control of the controlling shareholder and lowering

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structures. Claessens et al. (2000) obtains a similar estimate by analyzing business groups in East Asian countries. Because circular shareholdings tend to embody a greater variety of ownership structures than reciprocal ownership, they are likely to encompass significantly more firms in total than the 10% estimate. For example, at the beginning of our study, nearly 30% of listed Korean business-group firms were parts of circular ownership loops, but only 2% of listed group firms were in reciprocal ownership arrangements.

the transparency of the governance structure."[3] Subsequently, through a series of amendments to South Korean law, the KFTC incentivized chaebols' transitions from (relatively opaque) circular-shareholding structures to (relatively simple) pyramidal holding-company structures. Transparency in ownership structure (thus chaebol families' conflicts of interest) was one of the main goals of the shift to the holding-company structure, which is relatively simple to scrutinize.

We study the changes in firms values associated with the changes in shareholding structures using a comprehensive sample of public firms belonging to Korean chaebols between 2011 and 2018. Our sample begins in 2011, when the adoption of the International Financial Reporting Standards (IFRS) was completed, to ensure the comparability and consistency of accounting information. A focus on the 2011-2018 period is also appropriate because most transitions to a pyramidal structure took place after the 2008-2009 financial crisis. We leverage the business-group shareholding data published by the KFTC to compute an array of metrics that characterize the structure of a business group. (As Almeida et al. (2011) notes, such detailed and comprehensive data about business groups' ownership structures are rare in other countries and is another unique feature of the South Korean setting.) A main feature of the business group structure we focus on is whether a given firm is part of a circular shareholding ("loop"). To study the consequences of ownership-structure opacity, we merge in financial-statement and stock-price data from Worldscope and Datastream. The final sample consists of approximately 1,800 group-firm-year observations.

We begin by verifying that the regulatory push for ownership structure transparency was largely successful: whereas 28% of chaebol firms had been part of a circular shareholding structure in 2011, only 5% remained in ownership loops in 2018 (a 82% proportional decline). However, chaebol families' controls of group firms remained similar throughout our sample period: about 60% of group firms were controlled by chaebol families both in 2011 and 2018. These empirical patterns are consistent with changes in the transparency of chaebol families' ownership but not in their conflicts of interest vis-à-vis minority shareholders.

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[3]See, e.g., https://www.ftc.go.kr/www/selectReportUserView.do?key=11&rpttype=2&report_data_no=7852.

We then examine how firm value evolved when firms that had been part of a circular shareholding structure no longer belonged to any ownership loops. We document that firms experiencing such a transition ("loop-removal firms") experienced a significant decline in Tobin's Q (about 7-11%) relative to other group firms.

While these results could be consistent with a transparency effect, we empirically test three alternative explanations. First, we examine whether the loop-removal process entailed significant changes in chaebol families' control, and thus the alignment of their incentives with those of loop-removal firms' minority shareholders. We find that neither the chaebol family's control of a group firm nor the discrepancy between chaebol families' voting rights and cash-flow rights in the firm undergoes any significant changes as a result of loop removal. We also examine whether the "centrality" of firms significantly changes as a result of loop removal. Almeida and Campello (2010) argues that chaebol families use more central firms in the business-group to conduct transactions that benefit the family at the expense of shareholders (e.g., acquisitions that destroy value for non-controlling shareholders of the firm). Consistent with our results on the family's control and incentive alignment, the centrality of a group firm does not change significantly following loop removal. Thus, the relative value declines of loop-removal firms do not appear to be driven by a significant increase in actual conflicts of interest between chaebol families and minority shareholders of group firms.

Second, we examine whether an erosion in loop-removal firms' access to internal capital markets could explain their relative value decline. To the extent that a circular shareholding structure facilitates access to internal capital markets, group firms with greater financial constraints could experience steeper valuation declines following loop removal. We do not find such valuation decline in financially constrained chaebol firms. Instead, the relative value decline is concentrated in low-financial-constraint loop-removal firms, raising the possibility that an increase in expropriation could explain our findings.

Third, we examine whether firms engaged in more expropriation during or after loop removal.

We show that the relative value decline of loop-removal firms is concentrated in those with more severe agency issues (i.e., relatively higher discrepancy between control and ownership); however, this relation is not driven by expropriation. Specifically, we show that equity transactions (e.g., equity swaps or merger transactions) that favor chaebol families at the expense of other minority shareholders do not drive this relative value decline. Nor is the removal of ownership loops associated with an increase in firms' related-party transactions or with a decline in profitability regardless of the severity of their agency issues. Thus, ability or willingness to expropriate from minority shareholders do not appear to explain our findings. Instead, these findings point to the possibility that the value effects resulted from the revelation of controllers' and managers' incentives to investors.

Our final set of analyses explicitly test the transparency hypothesis for why valuation of business-group firms could have changed as a result of loop removals. As mentioned above, the transparency effect on valuation is ex ante ambiguous because the positive effects from increased earnings informativeness could be offset by revisions in investors' priors about long-run earnings. Transparency leads to an improvement in valuation if investors discover that the controller's or the manager's conflicts of interest vis-à-vis minority shareholders are better than they originally anticipated: in this case, the positive expected incentives effect on value reinforces the the positive earnings responsiveness effect on value. However, transparency can lead to a deterioration in valuation if investors discover that the controller or the manager's conflicts of interest are worse than they originally anticipated and this negative effect on firm value dominates the positive effect of earnings responsiveness on firm value.

To test the transparency hypothesis, we begin by examining how the informativeness of chaebol firms' earnings changed with greater governance transparency. Consistent with theoretical predictions (Fischer and Verrecchia, 2000), we show that loop-removal firms' ERCs significantly increase after loop removal. This effect holds for loop-removal firms regardless of their relative position in the business group structure and thus not conflated by differences in the ease of ownership

observability. (Ownership in firms deeper in the group structure are more opaque.)

We also examine how ERCs changed for chaebol firms that were not part of ownership loops. Under the transparency hypothesis, valuations of *all* group firms could be potentially affected, since the revelation of controller's or managers' incentives in *other* group firms could lead investors to update priors about the likelihood a firm will benefit or lose from expropriation. We show that ERCs also improve in non-loop group firms, particularly those positioned deeper in the group structure, which probably experienced the greatest transparency effects. On the other hand, we do not find ERC improvements in non-loop group firms positioned higher in the group structure, for whom the transparency effects are likely relatively small since ownership in such firms is easier to identify.

Finally, we examine whether and how the transparency of ownership impacted investors' pricing of non-loop group firms. In line with Fischer and Verrecchia (2000), we hypothesize that improving governance transparency could accompany value improvements (deterioration) among group firms whose agency issues are less (more) severe than investors expected under a circular-shareholding structure. Consistent with these predictions, we find that the non-loop chaebol firms experienced a relative value increase (decrease) when group-structure simplified if (i) they had relatively less (more) severe agency issues, *and* (ii) it was relatively difficult to identify the extent of agency issues under the circular-shareholding structure (i.e., firms positioned deeper in the group structure and thus separated from the controlling family by multiple ownership layers). Overall, our findings show that, by allowing investors to better understand *differences* in controllers' conflicts of interest across business-group firms, improving governance transparency can lead to an improvement, a decline, or no change in firm value.

Our work contributes to the literature on business groups and ownership structures. We build on Almeida et al. (2011) by studying the implications of the evolution of business-group structures. Using the innovative metrics of group structure introduced by Almeida et al. (2011) and leveraging the South Korean regulatory push to eliminate circular shareholdings from chaebols, we are, to

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our knowledge, the first to empirically analyze the consequences of ownership loops and their elimination.

We also contribute novel evidence to the literature on the relation between features of business-group ownership structure and firm performance and valuation (e.g., Bertrand, Mehta, and Mullainathan, 2002; Baek, Kang, and Suh Park, 2004; Claessens, Djankov, Fan, and Lang, 2002; Joh, 2003; Lins, 2003). We show that the removal of circular shareholding structures can impact valuation even when it is not accompanied by significant changes in control, agency conflicts, observed expropriation, or access to internal capital markets. Our findings suggest that ownership transparency enables investors to discern business-group firms' relative severity of agency problems. We thus highlight the importance of an attribute of information transparency—transparency of ownership—that has been ignored by the literature on the implications of transparency for valuation (e.g., Lang, Lins, and Maffett, 2012).

We also add to the literature on earnings informativeness. Fan and Wong (2002) show that greater conflicts of interest between controllers and minority shareholders lower earnings informativeness. We build on this work by showing that, holding constant family owners' degree of control over group firms and their conflicts of interest, earnings informativeness can improve through more transparent ownership structures. Our analysis also contributes empirical evidence for the theory of Fischer and Verrecchia (2000). Like Ferri, Zheng, and Zou (2018), we show that reducing the uncertainty about managerial objectives increases ERCs, consistent with the theory. Unlike Ferri et al. (2018), which uses a disclosure setting in the US, we leverage an East Asian setting using variation in ownership transparency. Moreover, whereas Ferri et al. (2018) focuses on ERCs, we further show that transparency about managerial objectives can result in a value increase or decline.

Finally, our work evaluates the effects of a policy effort aimed at addressing a longstanding governance issue in Korea. Our study has implications for investors and for policy makers in countries where cross-shareholdings and circular ownership are more prevalent (Claessens et al., 2002): our results suggest that governance transparency can have both positive and negative valuation effects

for business-group firms.

2. Background

This section describes the history of circular shareholdings, their importance in Korean chaebols, and regulatory reforms to eliminate such structures.

2.1 Origins of Circular Shareholdings in Korean Chaebols

Controllers of business groups worldwide have traditionally sought to enhance control over group firms via particular ownership or voting structures. The stock pyramid—in which the controller owns a stake in a holding company that in turn owns stakes in other group firms—is the predominant control-enhancing structure. Another common structure entails circular ownership of group firms. For example, two group firms can own stakes in each other, creating circularity of ownership (that is, each firm owns a piece of itself via its ownership of another group firm). The literature (e.g., Claessens et al., 2002; Faccio and Lang, 2002; Masulis et al., 2011) has documented that around 10% of business-group firms worldwide participate in such reciprocal ownership. However, this figure is likely to underestimate the prevalence of circular shareholding, which also encompasses more complex arrangements. A simple example is a circular ownership loop involving three firms, A, B, and C, in which A has ownership in B, B in C, and C in A. This kind of circular ownership was prevalent in Korea, particularly among large business groups or chaebols. Circular cross-shareholdings are also found in other parts of the world, including Russia, Japan, Germany, and Thailand.

During the post-war reconstruction era, Korean conglomerates grew under government sponsorship. To facilitate Korean businesses' abilities to grow and compete against foreign enterprises, the government instituted import barriers and laws that allowed for circular corporate contributions. With circular contributions, controlling families can expand while maintain control over group firms

without having to build commensurate ownership (Lee, 2017).[4] The reliance on circular ownership structures in Korea was amplified 1980s, when the holding company or pyramidal structure was outlawed. By the early 2000s, around 25% of chaebol group firms in Korea belonged to ownership loops (Almeida et al., 2011). And, in 2011, when our sample begins, around 27% of public business-group firms in Korea were parts of loops.

As a result of their reliance on circular contributions, chaebols' ownership structures could be highly complex, involving intricate webs of ownership patterns. Figure 2 depicts a portion of the organizational structure of Lotte in April 2016. The figure shows only 6 of the more than 70 firms in the group; the directed edges (arrows) indicate the direction of ownership. Even this partial illustration reveals the difficulty of assessing the controller's incentive conflicts (that is, the wedge or discrepancy between the controller's voting rights and cash-flow rights in each group firm) vis-à-vis minority shareholders. This difficulty arises because understanding controllers' voting and cash-flow rights in a given company requires investors to understand controllers' rights in other group firms, an aim that is complicated by the presence of ownership loops. For example, Figure 2 illustrates an ownership loop in which Lotte Confectionery owns 7.9% of Lotte Shopping, which owns 34% of Daehong Communications, which in turn owns 3.3% of Lotte Confectionery. In such a circular loop, a firm can possess an ownership stake in itself. To accurately compute cash-flow and voting rights, and to estimate the value of a group firm, requires an investor to understand the ownership

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[4]To see why, consider the following example (see Figure 1 for a graphical illustration). Here, we assume that the family has control over a firm's decision rights when it has more than 30% stake in its equity. Suppose a *cheabol* family's initial business is in textiles, *KTex*, and has 50% stake in the company's $20 million of equity. The family expands into the chemicals industry by creating *KChem*, whose equity comes $3 million of *KTex*'s capital and $7 million of external capital. The family then expands into the shipping industry by creating *KShip*, whose equity comes $5 million of *KChem*'s capital and $10 million of external capital. Finally, the family enters the energy industry by creating *KEnergy*, whose equity comes from $2 million of *KShip*'s capital and $4 of external capital. In creating each of these new companies, the equity capital is partly provided by another group firm so to ensure family control over each firm's decision rights without having to increase its direct investments into the business group. Finally, suppose *KEnergy* now contributes $1 million of its capital to a capital increase in *KChem*, creating an ownership loop that has several implications. First, *KChem*'s capital increases from $10 to $11 million even though there are no "real" incremental contributions to the firm. Second, the family now controls $4/$11=36% of the equity in *KChem*, so the apparent capital increase serves to enhance the family's control over the company. One implication is that the family can free up some capital for other investments by lowering *KTex*'s stake in *KChem* while maintaining control over each company. In this way, circular shareholdings helps *chaebols* grow while maintaining control and limiting the amount of direct capital investments into their business-group firms.

structure of the entire business group and to solve a complex system of simultaneous equations (Elliott, Golub, and Jackson, 2014). Clearly, circular ownership structures impose substantial information-processing costs for governance and valuation purposes.

2.2 Reforming Circular Shareholdings

Over time, circular shareholdings' complex web-like structures attracted criticism from investors and regulators. The Asian Financial Crisis of 1997 first prompted alarm among regulators that the intricate networks of ownership among corporations propagated financial distress among firms.[5]

Regulators have subsequently focused on opaque governance as a problematic feature of circular cross-shareholding. Persistent undervaluation of Korean firms ("the Korea discount") relative to firms in other East Asian economies has been a source of concern for regulators and investors alike. Observers have pointed to the ubiquity of ownership loops as a driver of this discount. In several of the interviews we conducted, Korean hedge-fund managers argued that opaque ownership structures made it challenging to assess the control and ownership of the controlling family, thus obscuring potential agency issues, making monitoring difficult, and driving valuations lower.

Consequently, reforming chaebols by motivating them to unwind circular-shareholding structures became a critical agenda of Korean regulators. In 1999, as a first step, regulators amended the Fair Trade Act to allow for the establishment of holding companies under certain conditions; in 2002, reciprocal contributions were prohibited by law. In 2007, the requirements for establishing a holding-company structure were further relaxed. For example, the debt-to-equity ratio ceiling for a holding company was raised from 100% to 200%, and its legally required minimum shareholding in subsidiaries was lowered from 30% to 20% for public subsidiaries and from 50% to 40% for private subsidiaries. To incentivize the transition to a holding-company structure, the government amended the tax code to provide holding companies tax relief on their dividend income. Holding companies' dividend income from subsidiaries is fully tax-exempt so long as it holds a significant portion

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[5]However, academic evidence (e.g., Almeida et al., 2011; Baek et al., 2004) suggests that chaebol firms withstood the financial crisis better than non-chaebol firms, primarily due to their access to internal capital markets.

of the subsidiary's shares (40% ownership of public or 80% of private subsidiary shares); holding companies that do not meet these statutory ownership thresholds receive an 80% tax exemption.

The reform agenda gained momentum in the 2010s, partly due to popular pressure on politicians to regulate chaebols and reduce corruption. In 2014, the KFTC revised the country's antitrust law to classify as conglomerates all business groups with 10 trillion won (approximately US$10 billion) in assets, and to put them on a watchlist to monitor the prevalence of circular cross-shareholdings. In the same year, chaebols were banned from forming new circular shareholdings. The push to remove ownership loops was intensified by the 2017 election of a new political administration that backed the reforms pursued by the KFTC, elevating the implicit threat of regulation or perceived cost of non-compliance for cheabols.[6] As a result of these regulatory pressures, the number of chaebols with ownership loops dropped by 80% between 2011 and 2021, from 17 to four (Hyundai Motor Group, Teakwang Group, SM Group, and KG Group).

2.3 Common Mechanisms to Unwind Circular Shareholdings

This section briefly describes some common mechanisms by which chaebols unwound circular ownership structures. Some group firms sold their stakes in other group firms on the open market or to the controlling family; however, this model was typically considered costly for the controlling family, which had to expend considerable resources of their own to purchase these stakes in order to maintain control or mitigate the dilution of their economic interests.[7]

Another popular mechanism combined split-offs and mergers. Firms that belonged to loops were first split off into two companies, a holding company and an operating company; the holding company would own the operating company, and the original shareholders would own shares in both companies. Next, the holding companies of all the firms in a given loop would merge to form a consolidated holding company, in which the chaebol family would concentrate its ownership and

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[6]See, for example, "South Korea's Chaebol Edge Closer to Democracy," *Nikkei Asia*, Peter S. Kim, https://asia.nikkei.com/Economy/South-Korea-s-chaebol-edge-closer-to-democracy (accessed 9 May 21).

[7]For example, the Shin family of Lotte spent approximately $1 billion USD during the group's transition to a holding-company structure to implement this strategy.

control. This model imposed a lower financial burden on the family to preserve control. Figure 3 illustrates this mechanism using Lotte Group firms.

After the transition, ownership in chaebol group firms embodies a straightforward linear structure. Figure 4 illustrates a portion of Lotte Group's holding-company structure in 2017. Computing the Shin family's voting rights and effective ownership in the operating companies is much simpler under the new structure than in Figure 2.

3.   Measuring Changes in Business-Group Structure

The elimination of circular cross-shareholdings in Korea, coupled with the detailed ownership data made available by the Korean Fair Trade Commission (KFTC), presents a unique opportunity to study the valuation and governance implications of improving the transparency of business group ownership structures. This section briefly describes the measurement techniques and data sources that enable us to accurately capture the phenomenon.

3.1   Group-Structure Metrics

This section describes our empirical measures of group structure, adopted from Almeida et al. (2011), which introduced these measures in the context of Korean chaebols. Our goal is twofold: to explain the concept behind each measure and to illustrate how complex ownership structures such as circular shareholdings make it challenging for investors to understand chaebol families' incentives across firms. For a detailed treatment of each measure, see Almeida et al. (2011).

To begin, computing group-structure metrics requires a matrix of inter-corporate ownership:

$$
C = \begin{bmatrix} 0 & c_{12} & ... & c_{1N} \\ c_{21} & 0 & ... & s_{2N} \\ . & . & . & . \\ . & . & . & . \\ c_{N1} & c_{N2} & ... & 0 \end{bmatrix},
$$

where c_{ij} represents the percent ownership of group firm i in group firm j and N represents the total number of firms in the group. Moreover, to understand the controlling family's incentives across group firms requires knowledge of its direct stake in all firms in the group:

$$
f = \begin{bmatrix} f_1 & f_2 & ... & f_N \end{bmatrix}'.
$$

KFTC collects C and f from each chaebol annually and makes the information publicly available.

3.1.1 Chaebol Families' Ultimate Ownership (Cash-Flow Rights)

To understand the controlling family's incentives across group firms, or group-firm managers' incentives, requires an investor to assess the family's ultimate ownership or cash-flow rights in each group firm. The family's ultimate ownership in group firm i consists of its direct stake in the firm and its indirect stake via its holdings in other group firms that own direct or indirect stakes in i. Critically, calculating the family's ultimate ownership requires an investor to observe *all* the ownership ties between group firms in the chaebol. Ultimate ownership is difficult to infer even with such ownership data, particularly in the presence of ownership loops. In a pyramidal structure, determining the family's ultimate ownership of a given group firm calls for an investor to trace all possible links between the family and the firm in question, then multiply and sum ownership along each chain to determine the family's ultimate ownership. In the case of complex ownership webs involving circular shareholdings, this approach is infeasible because a firm in an ownership loop

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theoretically has *infinite* chains leading to it. Almeida et al. (2011) offers an elegant approach to determining ultimate ownership using the matrices defined above:

$$u = f'(I_N - C)^{-1} \tag{1}$$

where I_N is the $N \times N$ identity matrix, and $u = \begin{bmatrix} u_1 & u_2 & ... & u_N \end{bmatrix}'$ is the family's ultimate ownership in each group firm where u_i represents the family's ultimate percentage of ownership of the cash flows of group firm i in a particular year.

The intuition behind this formula lies in tracing the flow of one dollar of dividends paid by group firm i. In the first round, the family and all other group firms receive what their direct ownership in i warrants. In the next round, group firms pay out what they receive from firm i; the family receives part of this cash via its direct stake in these group firms. Iterating this process forward infinitely yields the above formula for the family's ultimate ownership in a dollar of each group firm's dividends. In our empirical tests, we refer to u_i as "Ultimate ownership."

3.1.2 Chaebol Families' Voting Rights and Control in Group Firms

Understanding the controlling family's incentives across group firms also requires an investor to assess the family's control rights in each group firm. Computation of control rights presents an even more challenging exercise, particularly in the presence of ownership loops; to ascertain whether a group firm is under the family's control requires an investor to determine the fraction of voting rights held by intermediate firms that the family controls, which in turn requires determining which of the intermediate firms are controlled by the family.

For pyramids, the literature (e.g., La Porta, Lopez-De-Silanes, and Shleifer, 1999) has taken the approach of identifying a "chain of control." This approach requires establishing a threshold of ownership that confers control and then identifying chains leading to the family in which each entity (firm or family) owns more than the threshold in the firm just below it in the chain. All firms that are part of such a chain of control are assumed to be controlled by the family. Faccio

and Lang (2002) use the idea of the "weakest link" to compute effective voting rights in firms controlled by the family via a chain of control. The weakest link is defined as the minimum stake along the chain of control for a particular firm. If the family controls a firm through multiple chains of control, this approach would require adding up the minimum stakes throughout all the chains. As Almeida et al. (2011) points out, there is no clear intuition behind the idea of adding up the weakest links. Moreover, if multiple chains of control lead to a given firm, adding up the weakest links could imply that the family owns more than 100% of the voting rights in the firm. These methods are particularly inappropriate for assessing control rights in the context of circular shareholdings. For example, the weakest-link concept is not well defined for loop firms, which in theory belong to infinite chains.

We adopt the approach introduced by Almeida et al. (2011), which relies on two assumptions: first, there is a threshold of voting rights, T, which determines whether a firm is under the family's control; second, if a family controls a firm, it also controls the votes that the firm holds directly in other firms. Thus, the chaebol family controls the following set of group firms:

$$
C(T) = \left\{ i \in N : f_i + \sum_{j \in C(T), j \neq i} c_{ji} \geq T \right\}. \tag{2}
$$

We compute this set for each group in each year by assuming a control threshold of 30%.[8] We designate firms in this set as being under the family's control in that year, and create an indicator variable, *Control*, to capture the set.

Computing the family's effective voting rights in a group firm is relatively simple once we have identified the set of firms controlled by the family: an investor needs only to add up the family's direct ownership of the family in that firm and the ownership in that firm of all other group firms controlled by the family. We label this variable *VR* in our empirical analysis.

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[8]Under Enforcement Decree Articles 3-1 and 3-2 of the Fair Trade Act, a group firm in which the family has 30% effective ownership is deemed to be under the family's control (see, e.g., https://egroup.go.kr/egps/ps/io/lkm/kmbntDfn.do). Several other jurisdictions around the world, such as China, Hong Kong, and the UK, use the same 30% threshold to determine control for statutory purposes. Singapore applies a 15% threshold.

Finally, we compute a measure that captures the extent of incentive conflicts between the chaebol family and minority shareholders. To do so, we estimate for each group firm the discrepancy between the chaebol family's effective voting rights and its ultimate cash-flow rights. In our empirical tests, we refer to this variable as Separation.

3.1.3 Ownership Loop

Our main analysis examines the consequences of the elimination of ownership loops. Thus a key variable is designating firms that do and do not belong to loops. Identification of loop firms relies on the property that when firm i in a loop pays out a dollar in dividends, a portion of that dollar flows to firm i. In other words, loop firms are those whose dividends return after a finite number of payment cycles.

More precisely, let

$$loop_i = min[n : n \geq 1 \text{ and } d_i' C^n d_i > 0] \tag{3}$$

where d_i, a unit vector where the ith element is 1 and 0 otherwise, represents i's dividend payout of 1 and all other group firms' payouts of 0. $loop_i$ gives the number of firms in the shortest loop of which i is a part; firm i is part of a loop if and only if $loop_i < \infty$.

We create an indicator variable, *Loop*, denoting whether a firm is part of a loop in a particular year. Our main variable of interest, *Remove Loop*, is an indicator variable evaluating to one for a firm in a given year if *Loop* was 1 in the prior year 0 in the current year.

3.1.4 Position

Our empirical analysis also leverages the position of a firm within the business group's ownership hierarchy. We follow Almeida et al. (2011), which offers a robust measure of a firm's position in its business group, defined as its "distance" from the controlling family's ownership.

In a simple pyramidal structure, this distance is easy to capture. Consider a business-group

structure where the controlling family holds a controlling stake in firm A, which owns stakes in firms B and C. Firm A, directly owned by the family, is in *position* 1; firms B and C are in *position* 2. In this simple example, determining a firm's position vis-à-vis the family simply requires an investor to enumerate the number of intervening firms in the ownership chain between it and the family. However, such an approach does not work for more complex organizational structures.

Almeida et al. (2011) offers an alternative and more general measure of position that can accommodate more complex ownership structures.

$$position_i = \frac{f'd_i}{u_i} \times 1 + \frac{f'Cd_i}{u_i} \times 2 + \frac{f'C^2d_i}{u_i} \times ... = \sum_{n=1}^{\infty} \frac{f'C^{n-1}d_i}{u_i} \times n = \frac{1}{u_i}f'(I_N - C)^{-2}d_i. \quad (4)$$

To understand this expression, recall that the family's ultimate claim on a dollar of firm i's dividends is given by u_i from Eq., (1). Thus if the family has direct ownership of i, it receives $f'd_i$ of u_i through the direct ownership chain (of distance 1). For an ownership chain between the family and i involving one intervening firm, the family receives $f'Cd_i$ through that chain (of distance 2). Thus, this position measure weights the distance between a firm and the family on a given ownership chain by the proportion of total cash flows that the family receives from that firm via that chain.

3.2 Data Description

To compute the measures of group structure described in the previous section, we rely on chaebol ownership data collected and published by the Korean Fair Trade Commission (KFTC). A key mandate of the KFTC is to restrain the concentration of economic power, especially that of a small number of business groups. For that purpose the KFTC has a special division, the Business Group Bureau, which regulates chaebol activities, including formulating and administering corporate-governance policies. Among other regulations, the KFTC requires detailed disclosure of ownership data. Since the mid-1990s, Korean chaebols have had to report complete ownership information to the KFTC (Almeida et al., 2011). Since 2007, the KFTC has managed the *Business Group Portal*

website, a market-monitoring tool through which chaebol firms are required to disclose complete ownership data annually on April 1. The website makes two primary datasets widely available to investors: chaebols' cross-shareholding and insider-ownership data. The cross-shareholding dataset captures, in both share counts and percentages, how much equity each chaebol group firm owns in another group company. The insider-ownership dataset, captures the controlling family's direct stakes in group firms. We obtain data on all chaebol firms for the 2011-2018 period and compute the group-structures metric described in the previous section for each public and private firm in each year of the sample.

We obtain accounting and financial data for listed Korean companies from Worldscope and manually match them to the KFTC data. Specifically, we match KFTC data from April of a given year to financial data for the prior fiscal year. Our matching procedure yields a sample of approximately 1,850 firm-year observations on public chaebol firms in the 2011-2018 period. Finally, we obtain data on related-party transactions from the Korean Listed Company Association's database and analyst estimates from IBES.

3.3   Summary Statistics

Table 1 reports summary statistics for the main variables in our study pertinent to the accounting, financial, group-structure, and ownership attributes of the listed chaebol firms in our sample. As the table shows, data availability varies across variables. The sample for our main regression analyses consists of around 1,850 firm-year observations in the 2011-2018 period, representing more than 200 public chaebol firms each year. Note that the sample including related-party transactions from the Korean Listed Companies Association database is smaller, containing 1,576 firm-year observations. We use this smaller sample only on a limited basis, in Table 6.

Table 1 suggests that, in our sample, the median firm is under a chaebol family's control; yet, the family's direct stake (*Family stake*) in the median firm is only 1%. Through cross-shareholding structures or circular ownership, however, the family's cash-flow rights (*Ultimate ownership*) in

the median firm is 17%; the family's voting rights (*VR*) in the median firm (assuming a control threshold of 30%) are even higher at 33%, consistent with the family on average controlling more than half of the group firms. Indeed, the mean value of *Control* suggests that the family controls 54% of listed group firms.

One of the main business-structure variables of interest in our analyses is *Loop*, which indicates the presence of a circular shareholding in a firm in a particular year. Its mean value suggests that 16% of listed chaebol firms were part of an ownership loop. Naturally, the prevalence of a loop varies over time as groups unwind their circular cross-shareholdings.

Figure 5 depicts how chaebols' ownership complexity and families' control over group firms have evolved over our sample period. It demonstrates that Korean regulators' attempts to improve ownership transparency have been successful: the proportion of business-group firms that are part of ownership loops declined proportionally by 81%, from 27% in 2011 to 5% in 2018. However, chaebol families' control over group firms have remained relatively constant: families controlled about 57% of chaebol firms in 2011 and in 2018.

4. Empirical Analysis

In this section, we test the valuation and governance implications of the elimination of cross-shareholding loops. We also examine possible mechanisms behind the valuation effects.

4.1 Valuation Effects of Loop Removal on Affected Firms

Our empirical analyses begin by examining the valuation consequences of loop removal for the affected firms. In particular, we study the evolution of firm value, as measured by Tobin's Q, for a *Remove Loop* firm relative to other group firms whose loop status did not change. Table 2 reports results from regression specifications of the following form:

$$Q_{i,t+1} = \alpha + \beta \times Remove\ Loop_{i,t} + \gamma X_{i,t} + year_t + group_g + industry_j + \epsilon_{i,t}, \qquad (5)$$

where $Q_{i,t+1}$ is a firm's Tobin Q in the year following the circular-shareholding-status measurement; *Remove Loop* captures the removal of firms' circular-shareholdings, as described in Section 3.1.3. The vector of controls $(X_{i,t})$ includes return-on-assets, log of market capitalization, leverage, the preceding 12 months' stock returns, and attributes that capture the discrepancy between the family's voting and ownership rights in a group firm, such as *Ultimate ownership*, *Control*, and *VR*.[9] Finally, our main specifications examine the impact of various fixed effects (i.e., year, business group, industry, and firm).[10] We cluster standard errors at the firm level.

Table 2 suggests that a firm experiences a significant decline in Tobin's Q in the year following loop removal. Column 1 estimates the simplest specification with *Remove Loop*, time- and business-group fixed effects, and no covariates. The coefficient on *Remove Loop* suggests that, compared to firms whose loop status did not change, *Remove Loop* firms experience a statistically significant (at the 1% level) relative decrease in Tobin's Q of 0.114. This effect is economically significant, representing around 10% of the average Tobin's Q of public chaebol firms in our sample period.

Table 2, columns 2-4, report estimates from increasingly stringent specifications, including additional control variables, relative to the specification of column 1. Column 2 introduces industry fixed effects; column 3 additionally includes contemporaneous firm-level controls. In both cases, the coefficient on *Remove Loop* remains both economically and statistically significant at the 5% level.

Column 4 imposes the most restrictive fixed effects structure in our analyses by replacing industry and business-group fixed effects with firm fixed effects; these fixed effects address the possibility that time-invariant firm characteristics of firms which are parts of loops may confound our inferences. The coefficient of -0.059 on *Remove Loop* remains statistically significant at the 1% level. Although the magnitude of the effect attenuates relative to the prior three columns, it remains economically meaningful, representing 5% of the average Tobin's Q of public chaebol firms in our

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[9]In untabulated tests, we also include controls for a firm's relative position in the group structure (namely, *Position* and *Centrality*). The results are quantitatively and qualitatively similar.

[10]The industry classification is based on the first digit of a firm's primary industry classification, and is analogous to a one-digit standard industrial classification in the United States.

sample period.

In untabulated tests, we repeat these analyses using Almeida et al. (2011)'s measure of "*stand-alone Q*." To compute this measure, we remove from the numerator the value of a firm's equity stakes in other group firms while removing the book value of investments in associated firms from the denominator of Q. Our results are qualitatively and quantitatively unchanged, suggesting that the results of Table 2 are not driven by a mechanical relation between loop removal and the market or book value of assets.

Overall, the results in Table 2 suggest that group firms experience a *relative* decline in stock valuations following the unwinding of loops or an improvement in ownership transparency. While these results are surprising, we stress the *relative* nature of these results and the possibility that the transition could have positively impacted the valuation of group firms that were not part of ownership loops, particularly if the elimination of loops in a given chaebol reduces its overall opacity surrounding ownership and control. We examine these possibilities in later analyses.

4.2 **Exploring Standard Mechanisms**

The results in the previous section document a robust negative association between the removal of loops and subsequent valuations. While these results could be consistent with a transparency effect, they could be counfounded by other real changes associated with the simplification of ownership structures. We analyze on three channels frequently examined in the business-group literature: (i) the ownership and control rights of the controlling family; (ii) group firms' access to internal capital markets; and (iii) expropriation from group firms by the controlling family.[11]

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[11]There is a long-standing debate in the literature about the predominant function of business groups. One theory suggests that they serve to fill critical institutional voids, particularly in emerging capital markets, for example by providing internal capital markets that support business investments and growth (e.g., Khanna and Palepu, 2000a,b). Another theory suggests that business groups serve as mechanisms of expropriation by controlling families (e.g., La Porta et al., 1999; Johnson, La Porta, Lopez-de Silanes, and Shleifer, 2000; Bertrand and Mullainathan, 2000). Empirical work provides evidence in favor of both theories, consequently we examine both sets of explanations for our initial findings.

4.2.1 **Ownership and Control Rights**

We begin by examining whether group-structure transitions exacerbated incentive conflicts between chaebol families and group firms' minority shareholders. We examine three outcome variables: *Forward Control*, *Forward Separation*, and *Forward Centrality*.[12]

An extensive literature has documented that controlling families use group firms to undertake activities that transfer wealth from group firms characterized by higher incentive conflicts (i.e., discrepancies between the controlling family's voting and ownership rights) to those with lower incentive conflicts. Thus, an increase in *Control* or *Separation* among *Remove Loop* firms could explain their losses of value. Almeida et al. (2011) also documents that loop firms are likely to be more *central*, in that they are more critical for maintaining the family's control over other group firms. To the extent that firms that were participants in a loop become even more central after loop the loop's discontinuance, we would expect a valuation decline.

The empirical tests, reported in Table 3, resemble the main tests in Table 2. We regress the outcome variables of interest on *Remove Loop*, control variables, and fixed effects. The odd-numbered columns consider the same set of controls and fixed effects as Table 2, column 3; the even-numbered columns also include group-structure controls.

Across all specifications in Table 3, we find no evidence that, relative to group firms whose loop status does not change, *Remove Loop* firms are associated with any changes in controlling families' degrees of control or conflicts of interest. The coefficients on *Remove Loop* in all six columns are statistically indistinguishable from zero at the 10% level. Overall, these results suggest that the valuation changes associated with loop removals are not explained by changes in agency issues.

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[12]Almeida et al. (2011) introduce two measures of centrality that capture the role played by a group firm in ensuring the family's control over other group firms. We adopt the simpler measure, which we label *Centrality*. This measure captures the importance of a group firm in terms in helping the family exert control over *other* group firms, and it is computed as the aggregate equity stake of group firm i in other group firms, scaled by i's total assets. In the absence of data on private firms, we consider only public group firms in computing this measure.

4.2.2 Internal Capital Markets

Next, we examine whether group firms' access to internal capital markets deteriorated after they were removed from ownership loops. Our test is motivated by the large literature (e.g., Gopalan, Nanda, and Seru, 2007; Khanna and Palepu, 2000a; Stein, 1997) that analyzes the role of business groups or conglomerates in internal capital allocation; that literature shows that financially constrained group firms are supported by group firms with excess capital. Consistent with this literature, Almeida, Kim, and Kim (2015) and Baek et al. (2004) also document the beneficial role of internal capital markets in the context of Korean chaebols. Thus, to the extent that loop-removal firms experienced a deterioration in their ability to access needed capital from internal markets, their firm values may also decline.

To test this hypothesis, we examine how the association between firm value and loop removal varies with firms' financial constraints. In keeping with the internal capital markets explanation, we expect the negative association to be pronounced in financially constrained firms.

Table 4 examines the association between *Forward Q* and *Remove Loop* separately for firms with high and low levels of financial constraints, using the specification from Table 2, column 3. We consider two measures of financial constraint, *Cash to Assets* and *Debt to CF*, defined in Appendix A. Firms are classified as High-Constraint (Low-Constraint) in a given year if their financial-constraint values are greater (less) than the cross-sectional median of the pertinent proxy. The odd-numbered columns report the results estimated using the High-Constraint samples; the even-numbered columns report the results estimated using the Low Constraint samples.

The results of Table 4 shows that, regardless of the financial-constraint variable used, we do not find evidence that the negative relation between *Forward Q* and *Remove Loop* is concentrated in the High-Constraint sample. In fact, our evidence suggests the opposite. For example, columns 1 and 2 report results of estimating Equation (5) separately for the subsamples partitioned by *Cash to Assets*. The coefficient on *Remove Loop* is negative and statistically significant at the 1% level for the Low-Constraint sample; it is much smaller in magnitude and statistically indistinguishable

from zero for the High-Constraint sample. Similarly, the results in columns 3 and 4 using *Debt to CF* as the partitioning variable show that, while the coefficient on *Remove Loop* is negative and statistically significant for both subsamples, the point estimate for the Low-Constraint sample is nearly double the magnitude of that in the High-Constraint subsample.

Overall, the results in Table 4 suggest that constrained access to internal capital markets does not explain the negative association between loop removal and firm value. Instead, the observation that our main result is more pronounced for firms with more cash on their balance sheets suggests the possibility of an expropriation-based explanation.

4.2.3 Agency Issues and Expropriation

Next, we will examine the possibility that expropriations by the controlling family during the transition explain our findings in Table 2. For example, value could have been transferred from *Remove Loop* firms *during* the removal process.

We begin by studying how the effect of loop removal on firm value varies with possible conflicts of interest between the family and minority shareholders. Under the expropriation hypothesis, we expect our main findings to be concentrated in the sample of group firms in which the controlling family has the greatest conflicts of interest. We proxy for conflicts of interest using *Separation*, and partition the sample into High-Separation and Low-Separation subsamples based on cross-sectional medians of the proxy. Firms with *Separation* higher (lower) than the median in a given year are assumed to have relatively higher (lower) conflicts of interest vis-à-vis the minority shareholders.

Table 5 reports the results of estimating Eq., (5) for the Low-Separation (column 1) and High-Separation (column 2) subsamples. Consistent with the expropriation hypothesis, the coefficient on *Remove Loop* is negative and statistically significant (at the 1% level) for the High-Separation subsample; its magnitude is substantially smaller and statistically distinguishable from zero for the High-Separation subsample. In other words, only loop firms with relatively high degrees of conflict of interest seem to experience relative valuation declines following loop removals.

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However, the results of Table 5, columns 1 and 2, could also be consistent with loop removals making more transparent to investors the controlling families' conflicts of interest across chaebol firms. Thus, to further test the expropriation hypothesis, we examine whether evidence of *actual* expropriation is associated with loop removals. In particular, we test whether the controlling families used the transactions undertaken to unwind loops to facilitate wealth transfer from loop firms with higher conflicts of interest to other group firms.

Table 5, columns 3 and 4, examine the possibility that, during the unwinding of loops, expropriation could have occurred via sales or purchases of group-firm shares at prices advantageous to the controlling family. If so, the negative relation between firm value and *Remove Loop* should be driven by the firms that exhibit significant equity transactions. We test this possibility indirectly by omitting from our sample all firms that experienced a greater than 5% change in their treasury shares. Column 4 shows that, among the Low-Separation firms, the coefficient on *Remove Loop* remains economically small and statistically indistinguishable from zero. Column 5 shows that, among the High-Separation firms, *Remove Loop* remains negatively and significantly (at the 1% level) associated with subsequent firm value. These results are inconsistent with the expropriation hypothesis.

Next, we provide more direct tests of the expropriation hypothesis by examining evidence of tunneling following the removal of loops. An extensive literature (e.g., Bertrand et al., 2002) has documented tunneling in business groups, including Korean chaebols. We use two measures to capture tunneling: related party sales and profitability. Specifically, we examine the behavior of *Forward RPT to Assets*, *Forward RPT to Sales*, and *Forward ROA* following the removal of loops.[13] The empirical model for these tests remains the same as in Table 2, column 3, except for the choice of outcome variable.

Columns 1 and 2 of Table 6 report results that examine related-party transactions scaled by

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[13]Hwang and Kim (2016) document that related party sales are used as a means of financial support between firms in Korean chaebols; Almeida et al. (2011) and Bertrand et al. (2002) use profitability to examine tunneling. The specification using *Forward ROA* also tests whether the removal of loops was associated with suboptimal acquisitions or transactions, on the part of loop-removal firms, to the extent of affecting profitability in the following year.

assets for the Low-Separation and High-Separation subsamples respectively. The coefficient on *Remove Loop* is statistically indistinguishable from zero in both columns, suggesting that group firms did not undertake measurably different amounts of related-party transactions following removal of loops, regardless of the group firms' incentive conflicts. Columns 3 and 4 report results using related-party transactions scaled by sales, and provide results quantitatively and qualitatively similar to those in columns 1 and 2.

Table 6, columns 5 and 6, examine *Forward ROA* as the outcome variable of interest. For consistency, we remove *ROA* as an explanatory variable because the prior specifications do not include lagged dependent variables; however, including this variable does not change the results. Again, the coefficients on *Remove Loop* are not statistically different from zero for the Low-Separation and the High-Separation subsamples.

Overall, the results in Table 6 suggest that expropriations by the controlling family during the transition do not explain our results. Juxtaposing these findings against those of Table 5, the evidence points to the possibility of a transparency effect: the removal of ownership loops facilitates revision of chaebol firms' pricing by helping investors better identify controlling families' conflicts of interest or managerial incentives.

4.3   Testing the Ownership Transparency Hypothesis

This section examines the possibility that ownership transparency—the revelation of controllers' and managers' incentive conflicts vis-à-vis minority shareholders—explains changes in chaebol firms' value after simplification of business-group structures ("transparency hypothess"). In theory, the impact of making controllers' and managers' incentives more transparent on firm valuation is ambiguous ex ante.

Fischer and Verrecchia (2000) shows analytically that, all else equal, improving the transparency of incentives improves the informativeness of disclosed earnings, leading to a higher response coefficient and higher valuations. However, transparency also leads investors to update their priors

about the company's long-run earnings potential. This second channel could reinforce the earnings informative effect of transparency on firm value if investors discover that the controller or the manager's conflicts of interest vis-à-vis minority shareholders are better than they originally anticipated. However, this expected incentives channel can operate to lower firm valuation if investors discover that the controller or the manager's conflicts of interest are worse than they originally anticipated and this negative effect on firm value dominates the positive effect of earnings responsiveness on firm value. Thus, net-net, valuations of business-group firms could increase, decrease, or remain the same as a result of an improvement ownership and controller-incentive transparency.[14]

Another implication of the transparency hypothesis is that a transparency effect on valuation could potentially apply to *all* group firms, including those that were not part of ownership loops. This is because the revelation of controlling family incentives in other group firms could lead investors to update priors about the likelihood a firm will benefit or lose from expropriation. We test the implications of the transparency hypothesis below.

4.4   Earnings Informativeness

Our examination of the transparency hypothesis begins by testing how earnings informativeness changed due to the simplification of business-group structures. In theory, the revelation of agency issues should reduce investors' uncertainty about group firm managers' objectives and make reported earnings more informative (e.g., Ferri et al., 2018; Fischer and Verrecchia, 2000).

To test these predictions, we examine how investors' responses to annual earnings announcements changed following the removal of ownership loops. We begin by estimating the following

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[14]Under this explanation, the finding of Table 5—that the value decline in *Remove Loop* firms is concentrated in high-*Separation* firms—could be due to investors' downward revision of to revise the valuation of certain business-group firms—those whose agency issues are more severe than investors expected—in response to increased ownership transparency.

empirical model:

$$CAR_{i,t+1} = \alpha + \beta_1 \times SUE_{i,t+1} + \beta_2 \times Remove\ Loop_{i,t} + \beta_3 \times Remove\ Loop_{i,t} \times SUE_{i,t+1}$$
$$+ \gamma X_{i,t} + year_t + group_g + industry_j + \epsilon_{i,t}. \tag{6}$$

The outcome variable of interest is $CAR_{i,t+1}$, the 3-day cumulative abnormal market reaction to a firm's earnings announcement for the next fiscal year; the main regressor of interest is a measure of unexpected earnings, $SUE_{i,t+1}$. We measure SUE by subtracting analysts' median estimate, obtained from IBES, from the reported earnings, scaled by the firm's stock price at the end of the fiscal year.[15] To estimate how loop removals impacted earnings responses, we interact $SUE_{i,t+1}$ with *Remove Loop*. Finally, we include the same set of fundamental and ownership characteristics used in previous analyses.

Table 7, column 1, reports results of estimating Eq., (6) for the sample of chaebol firms with the requisite IBES data. The coefficient on *Remove Loop* $\times$ *Forward SUE* is positive and statistically significant at the 5% level. The magnitude of the coefficient (0.125) is also economically significant relative to the baseline ERC (0.027). This result suggests that the earnings of loop firms become more informative following the removal of loops.

We also examine whether the increase in earnings responsiveness among loop-removal firms could be conflated by their position in the business group. Our intuition is that, all else equal, group firms' ownership structures are more easily observable when they are positioned higher in the group (i.e., closer to the controlling family). Thus, to the extent loop firms tend to exist lower in the business group's ownership structure, we could also be capturing an observability effect.

Table 7, columns 2 and 3, reports the results of estimating Eq., (6) for the subsample of firms that are lower in the group ($Position > 2$) and that are higher in the group ($Position \leq 2$).[16] We

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[15]We choose the latest available consensus estimate for a fiscal period as our measure of *expected earnings*. Our results are robust to measuring the consensus estimate at varying points during the fiscal period prior to the earnings announcement.

[16]Based on this definition, a firm that is lower in the business group has at least one intervening group firm in the ownership chain between it and the family and more than one chain leading back to the family.

find that the positive and significant association between loop removal and earnings responsiveness persists in both subsamples.

Overall, these results confirm the prediction that a transparency effect on value should be accompanied by an increase in earnings informativeness. They also suggest that, to the extent that a group firm's position in the business group's ownership structure is related to the relative ease of observability of controllers' and managers' incentives, they are unimportant for firms in ownership loops. Put differently, loops impose a level of opacity that is not mitigated by differences in position.

Next, we examine the possibility that the transparency effects on valuation could also apply to non-loop-removal firms. Table 8 examines the impact of ownership transparency on the ERCs of business-group firms that were not part of loops. To empirically proxy for the degree of the transparency effect, we construct *Removal Fraction* at the group-year level, defined as the percentage of firms in a business group that had loops removed in a given year. We estimate the following specification:

$$
\begin{aligned}
CAR_{i,t+1} \;=\; & \alpha + \beta_1 \times Removal\ Fraction_{g,t} + \beta_2 \times SUE_{i,t+1} \\
+\; & \beta_3 \times Removal\ Fraction_{g,t} \times SUE_{i,t+1} + \gamma X_{i,t} \\
+\; & year_t + group_g + industry_j + \epsilon_{i,t}. \qquad (7)
\end{aligned}
$$

The main variable of interest is *Removal Fraction × Forward SUE*, which captures the incremental earnings informativeness associated with the extent of simplification of group structure. In this specification, we also cluster standard errors at the *group-year* level, given that the treatment variable of interest, *Removal Fraction*, varies at this level.

Table 8, column 1, reports results using all non-loop chaebol firms. The coefficient of 0.595 on *Removal Fraction × Forward SUE* is positive, economically significant, and statistically significant at the 5% level. In columns 2 and 3, we then partition firms based on *Position* as in Table 7.

Column 2 suggests that for non-loop firms in lower positions in the group structure, ownership stakes in which are more difficult to observe, the simplification of ownership structures is positively and significantly associated with a substantial increase (at the 1% level) in ERCs. On the other hand, column 3 suggests that for non-loop firms higher in the group structure, ownership stakes in which are more easily observable, the simplification of ownership structures is not associated with changes in ERCs. These results suggest that the transparency effect on non-loop firms is largely concentrated in firms with the lowest level of observability (i.e., lower in the group structure).

4.5 Spillover Transparency Effects on Value

Next, we examine whether and how the transparency of ownership impacted investors' pricing of non-loop group firms. As explained above, under the transparency hypothesis, *all* group firms' values, even those of firms that were not part of ownership loops, could be affected by an increase in ownership transparency. The intuition is that, to evaluate likely consequences of conflicts of interest at a given group firm, an investor would want to understand the controlling family's incentives (e.g., the discrepancy between their voting rights and cash-flow rights) across all group firms. Complex ownership structures can obscure the controlling family's incentives across group firms, and simplification of group structure can lead to revisions of firm value as investors update priors about the likelihood a firm will benefit or lose from expropriation.

In particular, we hypothesize that the simplification of business-group ownership structure can lead to value improvement (deterioration) among those group firms whose agency issues are less (more) severe than investors expected under a circular-shareholding structure. In general, we do not observe investors priors about controllers' or managers' incentive conflicts. However, Table 8 suggests that those priors are likely more precise for firms higher in the group than firms lower in the group. Thus, we analyze the evolution of value in non-loop firms by exploiting their relative positions in the group and the controlling families' conflicts of interests in them.

Table 9 reports the results of estimating the following empirical model:

$$Q_{i,t+1} \;=\; \alpha + \beta_1 \times Removal\ Fraction_{g,t} + \gamma X_{i,t} + year_t + group_g + industry_j + \epsilon_{i,t}. \quad (8)$$

Columns 1 and 2, report the results of estimating Eq., (8) using the Low-Separation subsample of firms. Column 1 shows that the Low-Separation firms lower in the group experienced a statistically significant (at the 5% level) improvement in valuation. This result is consistent with the idea that, after the simplification of business-group structure, investors realize that low-incentive-conflict (Low-Separation) firms whose ownership structure is most opaque (lower in the group) have better incentives than they originally anticipated. The resultant value-improving effects are economically meaningful: a chaebol, 10% of whose group firms are removed from loops, would experience a 21% improvement in the firm values of Low-Separation non-loop firms lower in the group ownership structure. In contrast, column 2 shows that Low-Separation firms higher in the group did not experience any economically or statistically significant (at the 10% level) changes in firm value, consistent with the idea that investors had more precise priors about controllers' and managers' incentives in firms whose ownership is more easily observable (i.e., Table 8).

Table 9, columns 3 and 4, examine the value implications of group-structure simplification among High-Separation firms. Interestingly, we find a negative and statistically significant (at the 10% level) coefficient on *Removal Fraction* for such firms lower in the group structure. This result is consistent with the idea that, after the simplification of business-group structure, investors realize that high-incentive-conflict (High-Separation) firms whose ownership structure is most opaque (lower in the group) have worse incentives than they originally anticipated. As in column 1, the resultant value-decreasing effects are economically meaningful: a chaebol 10% of whose group firms are removed from loops would experience a 11% decline in the firm values of High-Separation non-loop firms lower in the group ownership structure. In contrast, we do not find statistically significant (at the 10% level) coefficient on *Removal Fraction* for High-Separation firms higher in the business group, again consistent with the idea that investors had more precise priors about controllers' and

managers' incentives in firms whose ownership is more easily observable (i.e., column 2 of Table 9 or column 3 of Table 8).[17]

Jointly, the results of Table 9 suggest the possibility that investors make imprecise guesstimates of the controllers' and managers' relative incentive conflicts in group firms, particularly for those firms deeper in the groups' ownership structures. In doing so, they overestimate the relative severity of conflicts of interest at some firms, particularly those with relatively low incentive conflicts that are difficult to identify and those with relatively high incentive conflicts that are easy to identify.

5.   Conclusion

This paper sheds new light on the consequences of the evolution of business groups by studying a salient governance phenomenon: the transition of Korean chaebols to simpler ownership structures. We provide evidence on the valuation consequences of one of motivation behind this regulatory push—to improve the transparency of ownership structure and incentives. Transitions to pyramidal structures had significant value implications, even though they had no discernible effects on the ability or willingness of controlling families to expropriate from minority shareholders or on firms' access to internal capital markets. Our findings suggest that governance transparency can create offsetting effects on firm value. On the one hand, it may increase valuations by intensifying earnings responsiveness or the multiple that the market applies to a firm's long-term earnings. On the other hand, it may depress valuations by revealing to investors that controllers' and managers' incentives in a particular firm were worse than investors originally anticipated. Our empirical evidence shows that simplifying business-group ownership structures accompanied improvements, declines, and no changes in group-firm values.

We leave several questions for future research. Though we document differential value effects among group firms, we do not attempt to infer the aggregate value implications of this reform.

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[17]We repeat these analyses using Almeida et al. (2011)'s measure of "*stand-alone Q*." Our results are qualitatively and quantitatively similar, suggesting that the results of Table 9 are not driven by a mechanical relation between loop removal and the market or book value of assets.

Moreover, our findings analyze the short-horizon effects of a novel phenomenon whose long-term effects remain to be seen. Such analyses could have important policy implications, particularly relevant for economies where complex cross-shareholdings are prevalent or where controllers' incentives are particularly opaque. We look forward to further research in this area.

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Appendix A   Description of Variables

This table defines accounting and financial variables used in our analyses. The construction of variables based on ownership data obtained from the Korea Fair Trade Commission Business Group Portal (https://www.egroup.go.kr/egps/wi/stat/spo/psitnCmpnyStockHoldList.do) is described in Section 2.. Data on related-party transactions are obtained from the Korean Listed Companies Association. Data on analysts' earnings estimates are obtained from IBES. All financial data are obtained from the Thomson Reuters Datastream database: Datastream variable codes are specified in brackets in the Computation column. *Forward* variables refer to one-year-ahead value; *Lagged* variables refer to prior-year value.

| Variable	Description	Computation
CAR	3-day cumulative abnormal returns around the date of an earnings announcement	(Return Index at day $d+1$ $[RI_{i,d+1}]$ / Return Index at day $d-2$ $[RI_{i,d-2}]$) - (Market Return Index at day $d+1$ $[RI_{m,d+1}]$ / Market Return Index at day $d-2$ $[RI_{m,d-2}]$)
Cash-to-assets	Ratio of cash and short-term investments to total assets	Cash & Short-Term Investments [WC02001] / Total Assets [WC02999]
Debt-to-CF	Ratio of long-term debt to cash flows	Long-Term Debt [WC03251]) / (Net Income [WC01551] + Depreciation [WC01148])
Log leverage	Natural logarithm of the ratio of long-term debt to total assets	ln(1 + Long Term Debt [WC03251] / Total Assets [WC02999])
Log market-cap	Natural logarithm of market capitalization	ln(Market Value [MV])
Q	Tobin's Q	(Total Assets [WC02999] + Market Value [MV] - Common Equity [WC03501]) / Total Assets [WC02999]
Returns	Net stock returns measured over the 12 months prior to fiscal end	(Return Index at time t $[RI_t]$ / Return Index at time (t-1) $[RI_{t-365}]$) - 1
ROA	Return on assets	Operating Income [WC01250] / Lagged Total Assets [WC02999]
RPT to assets	Ratio of income from related party transactions to lagged total assets	RPT Income / Lagged Total Assets [WC02999]
RPT to sales	Ratio of income from related party transactions to lagged sales	RPT Income / Lagged Sales [WC01001]
SUE	Standardized unexpected earnings	(Actual earnings [actual] - Median analyst forecast estimate [medest]) / Price
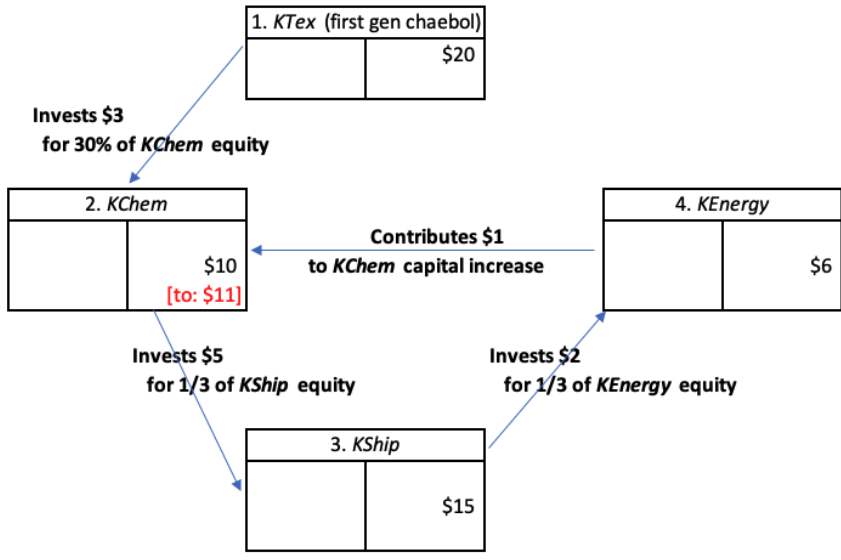
Fig. 1. An Illustration of Circular Contributions' Role in Business Group Growth and Control
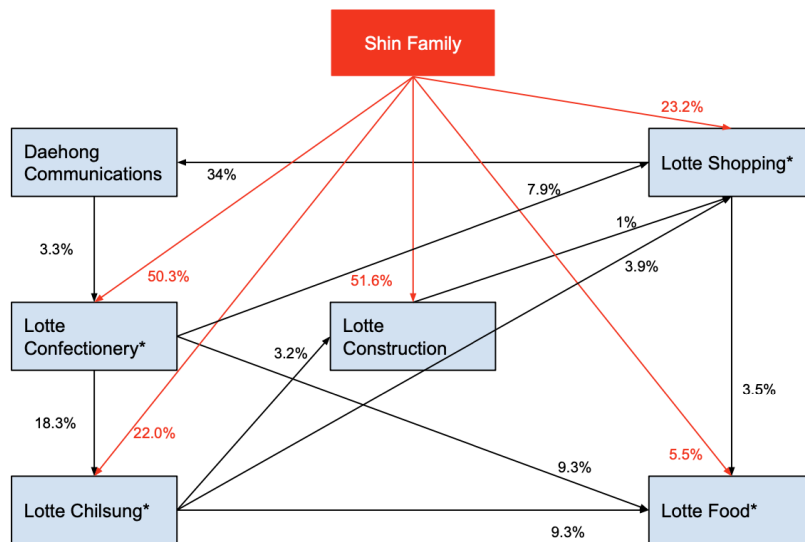
Fig. 2. A partial example of Lotte's ownership structure in 2016
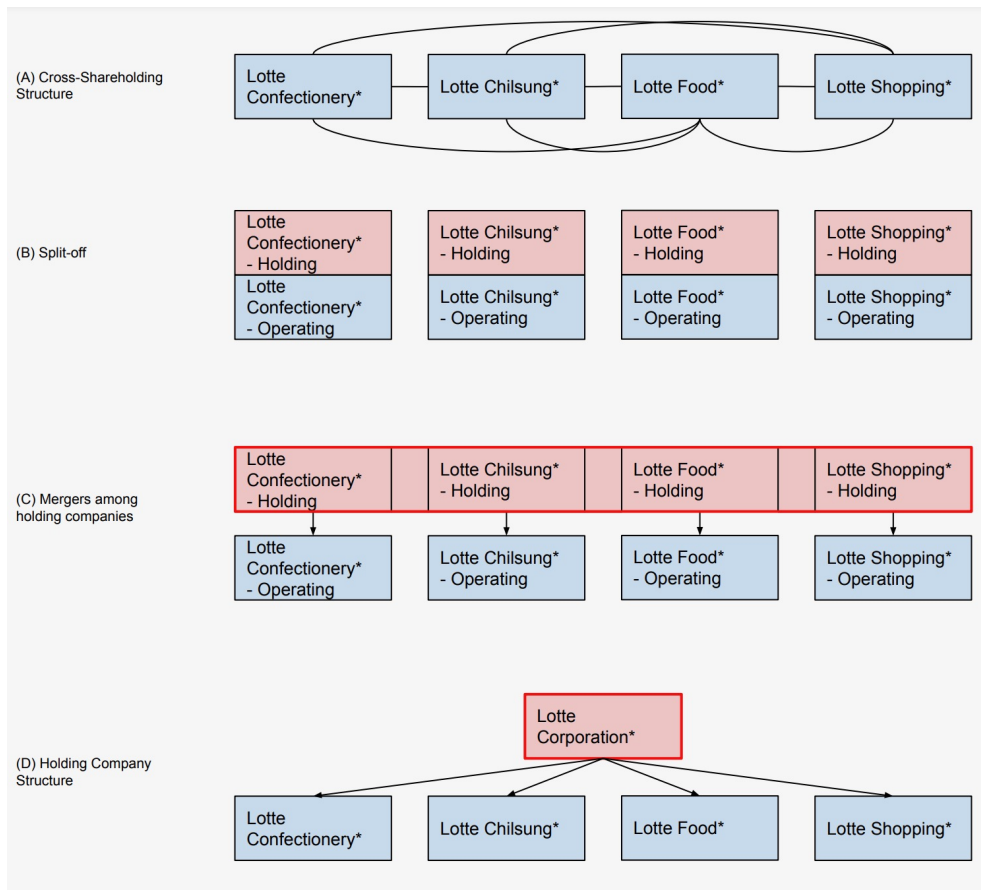
Fig. 3. An example of transition process at Lotte: Split-off and Merge
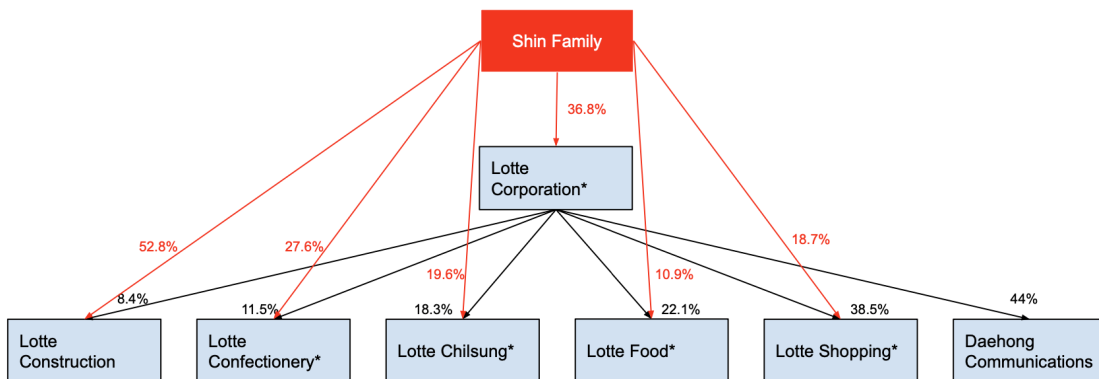

Fig. 4. A partial example of Lotte's ownership structure in 2017
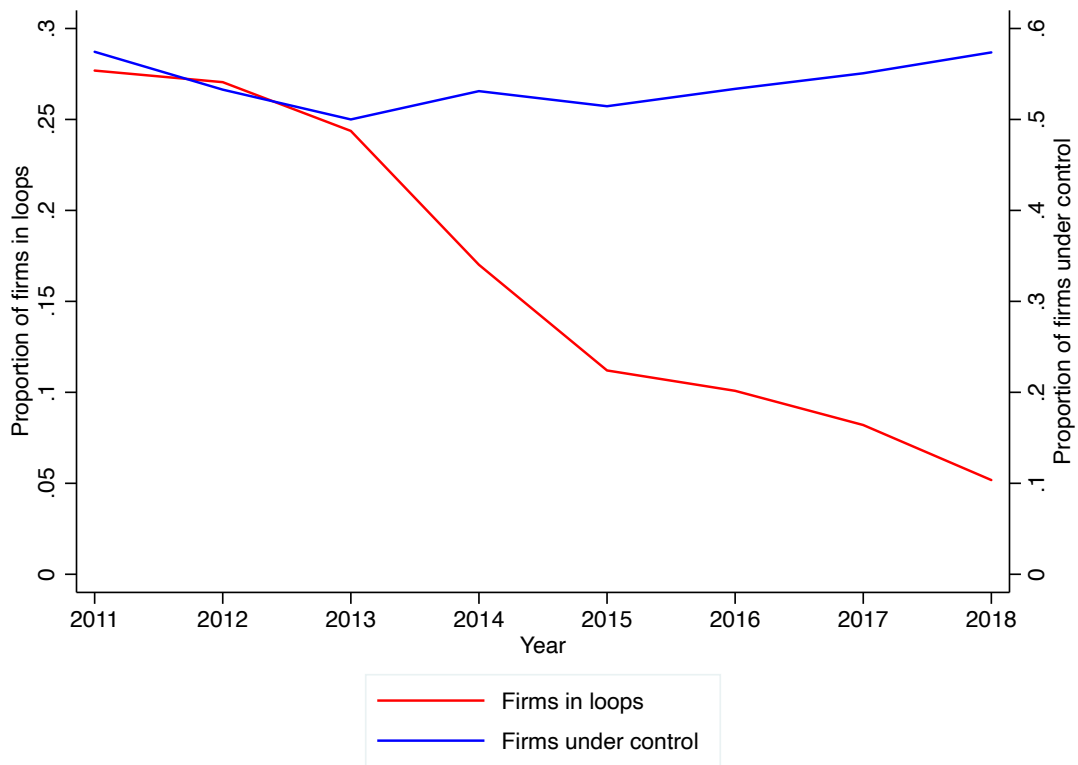
Fig. 5. Simplification of Business Group Structure Over Time

Table 1. Firm Characteristics and Ownership Variables of Public Group Firms, Summary Statistics

Table 1 reports summary statistics on the firm characteristics and ownership variables of publicly listed chaebol firms in our sample from 2011 through 2018. All continuous variables, both financial and ownership-related, are winsorized at the top and bottom 1% of the cross-sectional distribution. Accounting and financial variables are described in Appendix A. The variables on ownership structure are described in Section 2.

	$p25$	$p50$	$Mean$	$p75$	$p95$	SD	$Count$
	p25	p50	mean	p75	p95	sd	count
Q	0.88	1.00	1.18	1.24	2.33	0.64	1,843
ROA	0.01	0.04	0.04	0.07	0.16	0.06	1,908
Log market-cap	12.34	13.49	13.60	14.83	16.55	1.67	1,843
Log leverage	0.01	0.09	0.11	0.17	0.28	0.10	1,941
Returns	-0.22	-0.03	0.03	0.18	0.73	0.39	1,790
RPT to assets	0.02	0.06	0.19	0.20	0.95	0.31	1,577
RPT to sales	0.02	0.08	0.17	0.23	0.73	0.23	1,574
Cash-to-Assets	0.05	0.09	0.14	0.17	0.53	0.16	1,881
Debt-to-CF	0.00	1.21	2.87	4.09	16.42	13.12	1,806
Family stake	0.00	0.01	0.12	0.20	0.49	0.19	1,951
Ultimate ownership	0.08	0.17	0.22	0.32	0.57	0.18	1,951
Control	0.00	1.00	0.54	1.00	1.00	0.50	1,951
VR	0.08	0.33	0.32	0.49	0.73	0.24	1,951
Centrality	0.00	0.00	0.05	0.05	0.32	0.11	1,950
Separation	0.00	0.00	0.11	0.22	0.44	0.16	1,951
Position	1.24	2.00	1.96	2.38	3.27	0.81	1,951
Loop	0.00	0.00	0.16	0.00	1.00	0.37	1,951
Remove Loop	0.00	0.00	0.04	0.00	0.00	0.19	1,936
Removal Fraction	0.00	0.00	0.02	0.00	0.10	0.06	1,951

Table 2. Valuation Effects of Cross-Shareholding Changes: Tobin's Q

Table 2 reports estimates of linear regressions using *Forward Q* as the dependent variable. *Remove Loop* is an indicator variable that evaluates to one for the firms removed from a circular loop. Column 1 reports a baseline specification with time and group fixed effects; Column 2 adds industry fixed effects, where industry is defined by a one-digit SIC industry code; Column 3 adds firm-level controls. Column 4 replaces industry fixed effects with firm fixed effects. All firm-level control variables are defined in Appendix A. Standard errors, clustered at the firm level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)
	Forward Q	*Forward Q*	*Forward Q*	*Forward Q*
Remove Loop	-0.112**	-0.090**	-0.097***	-0.054**
	(0.04)	(0.04)	(0.03)	(0.02)
ROA			1.663***	0.071
			(0.60)	(0.34)
Log market-cap			-0.011	0.040
			(0.02)	(0.04)
Log leverage			-0.102	0.049
			(0.20)	(0.13)
Returns			0.182***	0.126***
			(0.04)	(0.04)
Ultimate ownership			-0.383*	0.240
			(0.22)	(0.24)
Control			0.003	-0.015
			(0.07)	(0.07)
VR			0.025	-0.088
			(0.20)	(0.18)
Industry FE	No	Yes	Yes	No
Time FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	1,829	1,829	1,751	1,720
R-sq	0.3567	0.4066	0.4472	0.7892

Table 3. Control Effects of Changes in Circular-Shareholding

Table 3 reports linear regressions estimating the effect of loop addition or removal on a variety of control-related outcomes. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop within a business group. The dependent variables in Columns 1 and 2, 3 and 4, and 5 and 6 are *Forward Control*, *Forward Separation*, and *Forward Centrality* respectively. Columns 1, 3, and 5 include control variables; columns 2, 4, and 6 add firm-level contemporaneous dependent variables as controls. All specifications include industry, time, and group fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors, clustered at the firm level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Forward Control	*Forward Control*	*Forward Separation*	*Forward Separation*	*Forward Centrality*	*Forward Centrality*
Remove Loop	0.061	0.041	0.010	0.010	0.015	0.010
	(0.04)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
ROA	0.045	0.055	0.183**	0.065*	-0.321***	-0.254***
	(0.25)	(0.11)	(0.09)	(0.04)	(0.11)	(0.08)
Log market-cap	-0.005	-0.004	-0.018***	-0.006***	0.018***	0.012**
	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Log leverage	0.159	0.031	0.086	0.031	-0.217***	-0.188***
	(0.22)	(0.07)	(0.08)	(0.03)	(0.07)	(0.06)
Returns	-0.010	-0.000	-0.004	-0.001	-0.001	-0.003
	(0.02)	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)
Ultimate ownership		0.191**		-0.799***		0.553***
		(0.08)		(0.04)		(0.08)
Control		0.753***		-0.005		-0.016
		(0.04)		(0.01)		(0.02)
VR		-0.080		0.746***		-0.123***
		(0.07)		(0.04)		(0.05)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,681	1,681	1,681	1,681	1,684	1,684
R-sq	0.5428	0.8005	0.3486	0.7607	0.1992	0.3688

Table 4. Valuation Effects: Variation by Financial Constraints

Table 4 reports the results of regressions estimating the valuation effects of financial constraints, using *Forward Q* as the dependent variable. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop within a business group. For columns 1 and 2, we partition the sample by *Cash-to-Assets*. Column 1 reports results for the sample with higher *Cash-to-Assets* and thus lower financial constraints (*Low Constraint*); column 2 reports results for the sample with lower *Cash-to-Assets*. For columns 3 and 4, we similarly partition the sample using *Debt-to-CF*. Column 3 reports results for the sample with lower *Debt-to-CF* ratio and thus lower constraints; column 4 reports results for the sample with higher *Debt-to-CF*. All specifications include industry, time, and group fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors, clustered at the firm level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	Cash-to-Assets		*Debt-to-CF*	
	Low Constraint	High Constraint	Low Constraint	High Constraint
	(1) *Forward Q*	(2) *Forward Q*	(3) *Forward Q*	(4) *Forward Q*
Remove Loop	-0.181***	-0.031	-0.156**	-0.088*
	(0.06)	(0.05)	(0.06)	(0.05)
ROA	1.082*	1.811*	1.209*	2.809***
	(0.64)	(1.01)	(0.62)	(1.07)
Log market-cap	-0.031	-0.001	0.018	-0.025
	(0.03)	(0.02)	(0.03)	(0.02)
Log leverage	-0.128	0.049	0.405	0.002
	(0.35)	(0.25)	(0.28)	(0.30)
Returns	0.231***	0.153**	0.192***	0.195***
	(0.05)	(0.06)	(0.07)	(0.05)
Ultimate ownership	-0.455	-0.603***	-0.419	-0.163
	(0.44)	(0.20)	(0.35)	(0.21)
Control	-0.157	0.128	0.031	-0.001
	(0.12)	(0.08)	(0.12)	(0.07)
VR	0.427	-0.032	0.126	-0.084
	(0.40)	(0.17)	(0.31)	(0.17)
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	817	867	778	854
R-sq	0.5525	0.4259	0.5515	0.4126

Table 5. Valuation Effects: Variation by Conflicts of Interest

Table 5 reports the results of regressions estimating valuation effects by partitioning the sample based on the discrepancy between the controlling family's voting rights and cash-flow rights. As in prior analyses, we use *Forward Q* as the dependent variable. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from such a circular loop. We partition the sample by the cross-sectional median of *Separation*; we estimate equation 5 for the sample with lower *Separation* in Column 1 and for the sample with higher *Separation* in Column 2. Columns 3 and 4 repeat the same analyses for a sample that excludes all firm-year observations with greater than 5% change in treasury shares. All specifications include industry, group, and time fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors, clustered at the firm level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	Separation			
	Low Separation	High Separation	Low Separation	High Separation
	(1) *Forward Q*	(2) *Forward Q*	(3) *Forward Q*	(4) *Forward Q*
Remove Loop	-0.010	-0.146***	0.018	-0.208***
	(0.04)	(0.05)	(0.05)	(0.07)
ROA	0.584	1.903**	0.639	2.359*
	(0.50)	(0.96)	(0.64)	(1.23)
Log market-cap	0.013	-0.021	0.018	-0.017
	(0.02)	(0.03)	(0.02)	(0.03)
Log leverage	-0.069	0.081	-0.055	0.185
	(0.21)	(0.33)	(0.21)	(0.39)
Returns	0.105*	0.262***	0.104**	0.238***
	(0.06)	(0.06)	(0.05)	(0.07)
Ultimate ownership	2.428**	0.008	2.139**	0.065
	(0.97)	(0.43)	(0.89)	(0.48)
Control	-0.120	0.048	-0.190***	0.109
	(0.08)	(0.12)	(0.07)	(0.13)
VR	-2.194***	-0.140	-1.854***	-0.159
	(0.76)	(0.38)	(0.70)	(0.44)
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	892	856	746	697
R-sq	0.5110	0.5358	0.6034	0.5269

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Table 6. Expropriation Effects of Cross-Shareholding Changes

Table 6 reports the results of various regressions that test the expropriation effects of cross-shareholding changes; we partition the samples based on the discrepancy between the controlling family's voting rights and cash-flow rights. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop. The dependent variables in Columns 1 and 2, 3 and 4, and 5 and 6 are *Forward RPT to Assets*, *Forward RPT to Sales*, and *Forward ROA* respectively. For each outcome variable, the first column reports results for the sample with lower than the cross-sectional median of *Separation*; the second column reports results for the sample with higher than the cross-sectional median of *Separation*. All specifications include industry, group, and time. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors, clustered at the firm level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	Separation					
	Low Separation	High Separation	Low Separation	High Separation	Low Separation	High Separation
	(1)	(2)	(3)	(4)	(5)	(6)
	Forward RPT to Assets	*Forward RPT to Assets*	*Forward RPT to Sales*	*Forward RPT to Sales*	*Forward ROA*	*Forward ROA*
Remove Loop	0.031	-0.044	0.032	-0.038	0.011	-0.006
	(0.04)	(0.04)	(0.04)	(0.03)	(0.01)	(0.01)
ROA	1.333***	0.022	0.523*	-0.105		
	(0.40)	(0.29)	(0.29)	(0.24)		
Log market-cap	-0.029*	-0.033	-0.001	-0.010	0.009***	0.011***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.00)	(0.00)
Log leverage	-0.652**	-0.585**	-0.412*	-0.270	-0.055*	-0.037
	(0.26)	(0.28)	(0.21)	(0.20)	(0.03)	(0.04)
Returns	-0.004	0.022	0.005	0.020	0.032***	0.030***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Ultimate ownership	-0.514	-0.256	-0.048	-0.173	0.170**	-0.039
	(0.74)	(0.20)	(0.55)	(0.17)	(0.08)	(0.05)
Control	0.054	0.051	0.005	-0.004	0.008	-0.014
	(0.09)	(0.07)	(0.07)	(0.05)	(0.01)	(0.01)
VR	-0.015	0.211	-0.156	0.224	-0.144**	0.027
	(0.51)	(0.22)	(0.38)	(0.17)	(0.06)	(0.03)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	674	620	674	620	892	857
R-sq	0.4879	0.2745	0.3346	0.2977	0.2348	0.3746

Table 7. ERC Effects of Cross-Shareholding Changes

Table 7 reports the results of regressions that test the association of loop removal with earnings informativeness. The dependent variable in columns 1–3 is *Forward CAR*, the 3-day cumulative abnormal returns around the date of the following fiscal year's earnings announcement. *Forward SUE*, the unexpected earnings in the following year, is measured as actual earnings minus the earliest median analyst estimate scaled by price at fiscal-end. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop within a business group. Column 1 reports results using the entire sample; columns 2 and 3 report results for samples partitioned by *Position*. Column 2 reports results for the sample of chaebol firms with *Position* greater than 2, i.e., firms positioned lower in a chaebol; column 3 reports results for firms with *Position* less than or equal to 2, i.e., for firms positioned higher in a chaebol. All specifications include industry, group, and time fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. For the specification in column 1, standard errors are clustered at the firm level. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

| | *Position* | | |
| | All | Lower in Group | Higher in Group |
	(1) *Forward CAR*	(2) *Forward CAR*	(3) *Forward CAR*
Forward SUE	0.027	0.047	0.013
	(0.02)	(0.03)	(0.03)
Remove Loop	0.015	0.018	0.012
	(0.01)	(0.02)	(0.01)
Remove Loop × Forward SUE	0.125***	0.091*	0.232**
	(0.05)	(0.05)	(0.11)
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Group FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	961	338	616
R-sq	0.0422	0.0332	0.0408

Table 8. Spillover Effects: ERC

Table 8 reports the results of regressions that test the spillover effects of loop removal on earnings informativeness. The sample for this test excludes all firms that either had loops removed or were part of a loop. The dependent variable in columns 1–3 is *Forward CAR*, the 3-day cumulative abnormal returns around the date of the following fiscal year's earnings announcement. *Forward SUE*, the unexpected earnings in the following year, is measured as actual earnings minus the earliest median analyst estimate scaled by price at fiscal-end. *Removal Fraction*, measured at the group-year level, is defined as the ratio of the number of firms, in a particular business group, that had loops removed to the total number of firms in that group in that year. Columns 1 reports results using the entire sample; columns 2 and 3 report results for samples partitioned by *Position*. Column 2 reports results for the sample of chaebol firms with *Position* greater 2, i.e., firms positioned lower in a chaebol; column 3 reports results for firms with *Position* less or equal to 2, i.e., for firms positioned higher in a chaebol. All specifications include industry, group, and time fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors are clustered at both the firm and the group-year level. Significance levels are indicated by $*$, $**$, and $***$ for 10%, 5%, and 1% respectively.

	Position		
	All	Lower in Group	Higher in Group
	(1) *Forward CAR*	(2) *Forward CAR*	(3) *Forward CAR*
Forward SUE	0.029	0.010	0.045
	(0.02)	(0.01)	(0.04)
Removal Fraction	0.062*	0.091	0.075
	(0.03)	(0.08)	(0.05)
Removal Fraction $\times$ Forward SUE	0.595**	1.160***	-0.141
	(0.29)	(0.26)	(0.85)
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Group FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	699	234	459
R-sq	0.0388	0.0408	0.0410

Table 9. Spillover Effects: Valuation

Table 9 reports the results of regressions that test the spillover effect of loop removals on the valuation of other group firms. The sample excludes all firms that either had loops removed or were part of a loop. We partition the sample along two dimensions: *Separation* and *Position*. The dependent variable in all columns is *Forward Q*. The main variable of interest, *Removal Fraction*, is measured at the group-year level. It is defined as the ratio of the number of firms, in a particular business group in a particular year, that had loops removed to the total number of firms in that group in that year. Columns 1 and 2 examine the sample of chaebol firms with *Separation* lower than the cross-sectional median; this sample is further subdivided in two based on *Position*. Column 1 reports results of estimating Equation 8 for the sample of firms with *Position* greater than 2, i.e., firms positioned lower in a chaebol. Column 2 reports the results of the same estimation for firms with *Position* lower than or equal to 2, i.e., firms positioned higher in the chaebol. Columns 3 and 4 report results of the same analyses but for firms with *Separation* greater than the cross-sectional median. All specifications include industry, group, and time fixed effects. Accounting and financial variables are defined in Appendix A. Variables related to group structure and ownership are defined in Section 2.. Standard errors, clustered at the firm and group-year level, are reported in parentheses. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	Separation			
	Low Separation		High Separation	
	Lower in Group	Higher in Group	Lower in Group	Higher in Group
	(1) *Forward Q*	(2) *Forward Q*	(3) *Forward Q*	(4) *Forward Q*
Removal Fraction	2.484**	0.037	-1.271*	0.723
	(1.07)	(0.06)	(0.66)	(1.44)
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	177	524	315	347
R-sq	0.6231	0.5131	0.5229	0.6206