Business Groups and the Value Implications of Ownership Transparency

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Abstract

We examine Korean business groups (*chaebols*) firms' transitions from circular-shareholding to pyramidal shareholding structures between 2011-2019. Among the firms that were part of circular-shareholdings, the transition did not impact *chaebol* families' degree of control nor the separation between their voting and ownership rights in these firms. Nevertheless, the removal of circular-shareholdings corresponded to a 10% decline in Tobin's Q and market returns relative to other group firms. Increased observed expropriation or erosion of access to internal capital markets do not explain this relative decline in value. Instead, our evidence is consistent with ownership transparency, allowing investors to identify agency issues among business group firms better. Consistent with this hypothesis, we find that group firms that were not part of circular shareholdings experienced an increase (decline) in Tobin's Q with the simplification of group structure if the firms had little (significant) agency issues that were difficult to identify under the cross-shareholding structure. We also find an improvement in earnings informativeness, consistent with the revelation of managerial objectives following the removal of circular-shareholdings.

Keywords: Business groups; Cross shareholding; Pyramid shareholding; Corporate governance; Valuation

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

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1. Introduction

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

The empirical literature has examined the consequences of business groups but has generally taken the group structure as exogenously given and studied the consequences of the structures. The literature has traditionally focused on the wedge between the controlling family's voting and cash flow rights and how they influence accounting performance and market valuation (Claessens, Djankov, and Lang, 2000; Faccio and Lang, 2002). Researchers have only begun to analyze the features of business group structures, addressing questions around why they arise, how they evolve, and the consequences of these features. As the first step in this direction, Almeida, Park, Subrahmanyam, and Wolfenzon (2011) developed empirical measures that describe the attributes and complexity of business groups (see Section 2. for a full description) and document 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 the prevalence of circular shareholdings in *chaebol* firms.

Relatively little attention has been devoted to understanding the *implications* of circular shareholdings, despite their prevalence as a control-enhancing mechanism around the world. Compared to other control enhancing mechanisms, such as pyramidal or dual-class share structures, circular shareholdings make ownership structures substantially more opaque (Bebchuk, Kraakman, and

[1] For a sample of public firms from 45 countries, Masulis, Pham, and Zein (2011) estimate that 19% of listed firms are part of family-controlled business groups; in emerging market economies, they estimate this number to be 40%.

Triantis, 2000). Unlike a pyramidal structure, where capital linearly flows through the business group, in a circular-shareholding structure capital flows through a complex web of circular inter-corporate linkages. Compared to a pyramidal structure, the presence of ownership loops obfuscate the family's ultimate voting and cash-flow rights in each firm. Indeed, one of the open questions in this literature relates to the implications of ownership structure opacity.

A circular shareholding structure results from the cross-ownership of group firms that create ownership "loops." In its simplest variant, ownership loops can be created with reciprocal ownership between two firms: firm A owns shares in firm B and vice versa. However, ownership loops can result from more complex arrangements, such as when firm A has ownership in B, B in C, and C in A.[2] If loops hinder investors' ability to understand their cash flow in a firm or their incentive alignment with the controlling shareholders of the firm (e.g., the controller's wedge between cash flow and voting rights in the firm), the opacity of ownership could portend significant valuation consequences.

In this paper, we examine the valuation implications of ownership opacity in South Korean business groups. The South Korean setting offers a unique opportunity to study this question for two reasons. First, a regulatory mandate for *chaebols* to remove circular ownership structures and transition to a holding company (i.e., stock pyramid) structure induces time-series variation in business group ownership structure and transparency. In the aftermath of the 1997 Asian Financial Crisis, the corporate governance of South Korean firms became a matter of significant priority and policy debate (Lee, 2017). Subsequently, through a series of legal amendments, the Korean Fair Trade Commission (KFTC) allowed for and incentivized the establishment of holding companies.[3] A desired benefit of the holding company structure is its relative transparency. Second,

[2] Masulis et al. (2011) estimates that 10% of business groups around the world employ reciprocal ownership structures. Claessens et al. (2000) obtains a similar estimate by analyzing business groups in East Asian countries. Because circular shareholding structures can result from more general and complex structures than reciprocal ownership, they are likely to be significantly more prevalent than the 10% estimate. For example, in our sample of South Korean *chaebol* firms, only 10% were part of reciprocal ownership arrangements; however, nearly 30% of firms were part of a circular ownership loop.

[3] In 1999, the "Fair Trade Act" was amended to allow for the establishment of holding companies under certain conditions. In 2007, the requirements for establishing a holding company structure were relaxed. For example, the

the availability of highly detailed data on the ownership structure of the Korean business groups allows us to study these questions of interest empirically. Since the mid-1990s, the KFTC has required *chaebols* to report the details of their group firms' cross-ownership. As Almeida et al. (2011) notes, such detailed and comprehensive data about business groups' ownership structures are generally not available in other countries.

We study a comprehensive sample of public firms belonging to Korean *chaebols* from 2011 to 2019. We begin our study from 2011, when the transition to IFRS was completed in Korea, to ensure the comparability and consistency of accounting information. The focus on the 2011-2019 period is also appropriate since most of the 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 a variety of variables to characterize the structure of the business group. One of the main features of the business group that we focus on is whether a group firm is part of a circular shareholding ("loop") and, if so, the size of such a circular shareholding structure. To study the consequences of ownership structure opacity, we merge in financial statement and stock return data from Worldscope. The final sample of firms with available financial and market data consists of approximately 1,800 group-firm-year observations.

We begin our analyses by examining how firm value evolved when group firms that were part of a circular shareholding structure were no longer part of any ownership loops. We find that firms experiencing such a transition ("loop-removal firms"), relative to group firms that were not part of ownership loops, experienced a significant decline in Tobin's Q (about 7-11%) as well as significantly lower stock returns (about 13-16 percentage points).

We empirically test three hypotheses for why loop-removal firms experienced relative value de-

debt-to-equity ratio ceiling for the holding company was raised from 100% to 200%; the holding company's legally required minimum shareholdings 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, regulators amended the tax code to provide holding companies tax relief on their dividend income. Holding companies' dividend income from subsidiaries are fully tax exempt so long as it holds a significant portion 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 a 80% tax exemption.

clines. First, we examine whether the loop-removal process entailed significant changes in *chaebol* families' control and thus the alignment of their incentives to loop-removal firms' minority shareholders. We find that, although a *chaebol* family significantly increases its control of a group firm when it is added to a circular shareholding loop, the family's control in a group firm does not significantly change as a result of loop removal. In addition to maintaining the level of control in loop-removal firms, we also find that the separation between *chaebol* families' cash-flow and voting rights do not experience any significant changes as a result of loop removals. We also examine whether the "centrality" of firms significantly changes as a result of loop removals. Almeida and Campello (2010) argues that *chaebol* families use more central firms in the business group to materialize transactions that benefit the family at the expense of shareholders (e.g., acquisitions that destroy value for non-controlling shareholders of the firm). However, we find that although a group firm's centrality significantly increases when it is added to a circular shareholding loop, its centrality does not significantly change with loop removals. Thus, the relative value declines in loop-removal firms do not appear to be driven by a significant increase in the conflict of interest between *chaebol* families and minority shareholders.

Second, we examine whether the relative value decline could be due to increased financial constraints stemming from erosion in loop-removal firms' access to internal capital markets. To the extent that a circular shareholding structure facilitates access to internal capital markets, group firms with greater financial constraints could experience a bigger valuation decline following loop removals. However, we do not find such valuation decline in financially constrained firms. Instead, we find that the relative value decline concentrates in low-financial-constraint loop-removal firms, consistent with the possibility that the relative value decline in loop-removal firms could be due to expropriation.

Third, we examine whether firms engaged in more expropriation after loop removal. We find that, although a group firm experiences a significant increase in related party transactions after it is added to a circular shareholding loop, it does not experience any significant changes in related

party transactions as a result of loop removal. This asymmetric result suggests that the transition to holding company structure does not hamper the ability (or willingness) to engage in such transactions. Consistent with these findings, we also show that the removal of circular shareholding structure is not associated with significant changes in profitability (i.e., ROA). In addition, we also show that equity transactions (e.g., equity swaps or merger transactions) that favor *chaebol* families and at the expense of other minority shareholders do not drive this relative value decline. Thus, the relative value declines in loop-removal firms do not appear to be driven by a significant increase in the ability or willingness to expropriate from minority shareholders.

Our next set of analyses shows that the relative value decline in loop-removal firms is consistent with improved ownership transparency, allowing investors to better identify agency issues among business group firms. Consistent with this possibility, we first find that the relative value decline in loop-removal firms is concentrated in those with a relatively high degree of separation between ownership and control. Moreover, the relative value declines are more significant in those firms where the removal of loops contributes more to the transparency of investors' cash-flow rights.

Next, we test the transparency hypothesis by examining the spillover effects of loop removal on group firms that were not part of ownership loops. We find that group firms that were not part of circular shareholdings experienced a relative increase (decrease) in Tobin's Q after the transition to a holding company structure if the firms had relatively lower (higher) agency issues (measured by the wedge between the family's cash flow and voting rights), and it was also relatively difficult to identify the extent of agency issues under the circular-shareholding structure (i.e., firms that were deeper in the group structure and thus separated from the controlling family by multiple layers). We also find that group firms that were not part of circular shareholdings experienced a relative increase in Tobin's Q with the simplification of group structure if the firms had significant agency issues (i.e., large wedge between cash flow and voting rights) and it was relatively easy to identify the extent of agency issues under the circular-shareholding structure (i.e., firms that were higher up in the group structure, closer to the family). Overall, our findings are consistent with the

ownership transparency facilitated by the transition to holding company structures, revealing the differences in group firms' conflicts of interests. Investors update their pricing of group firms based on this revelation, even in the absence of changes in *chaebol* families' effective control, observed expropriation among group firms, or access to internal capital markets.

Our final set of tests examines the transparency hypothesis by analyzing how the informativeness of *chaebol* firms' earnings changed with the simplification of group structure. We find that the removal of loops is associated with a significantly higher earnings response coefficient. Moreover, this effect is particularly salient for firms located deeper in the group who were more likely to experience greater transparency about their ownership structures. This evidence on the increased informativeness of earnings is consistent with the simplification of group structures allowing investors to better understand potential agency issues and managerial objectives.

Our work makes several contributions to the literature analyzing business groups and ownership structures. First, we build on the work in Almeida et al. (2011) in studying the evolution of business groups. Using the innovative metrics of group structure first introduced by Almeida et al. (2011), we are the first to empirically analyze and document the consequences of ownership loop removals, by leveraging the South Korean regulatory push to eliminate circular shareholdings from *chaebols*.

Second, we contribute novel evidence to literature that examines 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). In particular, we show that the removal of circular shareholding structures can be associated with a significant valuation impact even when they are not accompanied by significant changes in control, agency conflicts, observed expropriation, or access to internal capital markets. Our findings suggest that ownership transparency *per se* can have valuation consequences, and we argue these consequences result from investors' improved abilities to discern the relative degree of agency problems between business group firms. In doing so, we highlight the importance of an attribute of information transparency—transparency of ownership—that has been previously

ignored by the literature studying the implications of transparency on valuation (e.g., Lang, Lins, and Maffett, 2012).

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

2. Background

In this section, we describe the history of circular-shareholdings and their importance in Korean *chaebols*, and the regulatory reform efforts to eliminate such structure.

2.1. Origins of Circular-Shareholdings in Korean Chaebols

Business groups worldwide have traditionally sought to enhance control over their group firms through cross-shareholdings, that is when a group firm holds an equity stake in other group firms. Pyramids are the the most predominant control-enhancing cross-shareholding structure. Another common structure involves circular ownership among group firms. For example, cross-shareholding can be reciprocal where two group firms own a stake in each other, which creates a circularity of ownership (i.e., one firm owns itself through 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 are part of such reciprocal ownership patterns. However, this is likely an underestimate of the prevalence of circular shareholding, which can involve 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 common in other parts of the world, such as Russia, Japan, and Germany.

The popularity of these circular loops in Korea traces back to the 1980's, when the holding company or pyramidal structure (in which the family has a stake in a holding company which, in turn, has stakes in group firms) was outlawed. Consequently, to expand in size while preserving control without having to build commensurate ownership, *chaebols* resorted to more complex organizational structures involving circular ownership. Almeida et al. (2011) documents that in the early 2000s, around 25% of *chaebol* group firms in Korea were parts of loops. In 2011, when our sample begins, we estimate that around 27% of public business group firms in Korea were parts of loops.

The organizational structures of *chaebols* could be highly complex, involving intricate webs of ownership patterns. As an illustration, Figure 1 present a partial depiction of the organizational structure of Lotte in April 2016, involving only 6 of the more than 70 affiliated firms in the group with the arrows indicating the direction of ownership. Even from this partial depiction, we can infer that computing ownership metrics for this small set of companies is not an easy task. In the figure, we can also observe an ownership loop in which Lotte Confectionery owns 7.9% of Lotte Shopping, which owns 34% of Daehong Communications, which again owns 3.3% of Lotte Confectionery. Such a circular loop, through which a firm can have ownership stake in itself, further obfuscates the cash flow and voting rights of a group firm's shareholders. To accurately estimate such rights requires one to understand the details of ownership structure across group firms, and to estimate the value of a group firm requires estimating the enterprise cash flows of group firms and solving a complex system of equations (Elliott, Golub, and Jackson, 2014). Clearly, circular ownership structures impose substantial information processing costs for governance and valuation purposes.

2.2. Reforming Circular-Shareholding

Over time, the complex web-like structures of cross-shareholding invited criticism from investors and regulators. The Asian Financial Crisis of 1997 first prompted concerns among regulators that the intricate networks of ownership among corporations exacerbated matters by propagating

financial distress among firms.[4]

Subsequently, regulators have focused on governance opacity as a problematic feature of circular cross-shareholding. The 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 pointed to the ubiquity of cross-shareholdings loops as a driver behind this discount. They argued that the opaque ownership structures made it challenging to determine the control and ownership of the controlling family, thus obfuscating potential agency issues, making monitoring difficult, and driving valuations lower.

Consequently, reforming *chaebols* by motivating them to unwind their circular-shareholding structure became a critical agenda of regulators. As a first step, in 1999, regulators amended the "Fair Trade Act' to allow for the establishment of holding companies under certain conditions; at the same time, reciprocal ownership between *chaebol* companies was outlawed.[5] In 2007, the requirements for establishing holding company structure were further relaxed. For example, the debt-to-equity ratio ceiling for the holding company was raised from 100% to 200%; the holding company's legally required minimum shareholdings 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 are fully tax exempt so long as it holds a significant portion 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 a 80% tax exemption.

The reform agenda has gathered momentum over the last decade, partly precipitated by popular pressure on politicians to reduce corruption among *chaebol* firms. In 2014, the KFTC revised the

[4]Somewhat contrary to this notion, academic evidence (e.g., Almeida et al., 2011; Baek et al., 2004) suggests that *chaebols* withstood the financial crisis better than non-chaebol firms, primarily due to their internal capital markets.

[5]However, academics (e.g., Almeida et al., 2011; Claessens et al., 2002) have documented that this sort of cross-shareholding structures was still prevalent in Korean *chaebols* in the early 2000s. In our sample, we find that around 10% of cross-shareholding loops involved only two firms.

country's antitrust law to classify all business groups with 10 trillion won (approximately US$10bn) in assets as conglomerates and put them on a watch-list to monitor the prevalence of circular cross-shareholdings. The drive to remove loops was further expedited with the election of a new political administration in 2017, which backed the reforms pursued by the KFTC.[6] As a result of these regulatory pressures, the number of *chaebols* with any cross-shareholding loops dropped from 17 in 2011, when our sample begins, to only four (Hyundai Motor Group, Teakwang Group, SM Group, and KG Group) as of May 2021, a nearly 80% decline.

2.3. Popular Mechanisms to Unwind Circular-Shareholding

We briefly describe some of the popular mechanisms through which *chaebols* unwound circular cross-shareholding structures. One popular mechanism involved group firms selling their stake in other group firms on the open market or to the controlling family. However, this model was typically considered to be costly for the controlling family, which had to expend considerable additional resources of their own to purchase these stakes.[7]

Another popular mechanism involved split-offs and mergers. Firms that were part of loops were first split off into two companies: a "holding company" and and an "operating company." In this structure, the holding company would own the operating company while shareholders would own shares of both companies. Next, the holding companies of all the firms which were parts of loops would merge to form a consolidated holding company where the founding family would concentrate their ownership. This model of transitioning placed a lower financial burden on the controlling family while preserving control. We illustrate this mechanism in Figure 2 with an example involving the Lotte Group. Initially, four companies within Lotte: Lotte Confectionery, Lotte Chilsung, Lotte Food, and Lotte Shopping (Step A) were part of a circular-shareholding structure. In the next step (Step B), these companies were individually split into holding companies and operating companies.

[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, in implementing this strategy, the Shin family of Lotte spent approximately $1bn during the group's transition to a holding company structure.

Finally, in Step C the holding companies merged to form Lotte Corporation which had ownership in all four operating companies created in Step B. Following this transition, the partial example of Lotte's circular-shareholding ownership structure in 2016 (shown in Fig. 1) changed to a more straightforward, linear holding company structure by 2017 (shown in Fig. 3). As can be seen from the figure, computing the family's voting rights and effective ownership in the operating companies is more straightforward in this structure.

3. Measuring Changes in Business Group Structure

The push towards removing circular cross-shareholdings in Korea represents a unique effort to improve corporate governance by changing ownership structure and improving ownership transparency. Coupled with the detailed ownership data made available by the Korean Fair Trade Commission (KFTC), this phenomenon presents an ideal opportunity to study the valuation and governance implications of changes in organizational structure and ownership transparency. In this section, we briefly describe the measurement techniques and the data sources that allow us to accurately capture the phenomenon.

3.1. Metrics of Group Structure

In this section, we describe the formulation of, and intuition behind, the empirical measures of group structure we use. Almeida et al. (2011), which introduced these measures in the context of Korean *chaebols*, carries a more detailed explanation behind each measure.

To derive these measures, we represent the inter-corporate holdings within a business group for a particular year as a matrix as follows:

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

where c_{ij} represents the ownership of group firm i in group firm j and N represents the total number of firms in the group. We also represent the family's direct stake in all firms in the group as a vector $f = \begin{bmatrix} f_1 & f_2 & ... & f_N \end{bmatrix}'$

*3.1..*1 Ultimate ownership

The family's ultimate ownership or cash-flow rights in a group firm, i, comprises its direct stake in the firm and the indirect stake through its holdings in other group firms that have direct or indirect stakes in i. Measuring ultimate ownership requires us to be able to observe all the ownership ties within a business group. Nevertheless, even with ownership data, ultimate ownership is difficult to compute. We would need to trace all possible links from the family to a group firm in a purely pyramidal structure. We would then need to multiply the ownerships along each chain and add them to the ultimate ownership. For *chaebols* with intricate networks of both pyramidal ownership and cross-shareholding loops, this approach is infeasible because firms in loops theoretically have *infinite* chains leading to it. Almeida et al. (2011) offer an elegant approach to compute this using the matrices defined above.

If we represent the family's ultimate ownership in group firms as $u = \begin{bmatrix} u_1 & u_2 & ... & u_N \end{bmatrix}'$, we can derive:

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

where I_N is the $N \times N$ identity matrix.

The elements of the above vector represent the family's ultimate percentage ownership of the cash-flows of each group firm for a particular year. We label this variable as *Ultimate ownership*. The intuition behind this formula lies in tracing the flow of one dollar of dividends paid by a group firm, i. In the first round, the family and all other group firms receive what their direct ownership in i dictates. In the next round, we imagine all group firms paying out what they receive from i. The family will receive part of this again through their direct stake in all group firms. However, a smaller portion will again accrue to all group firms based on the cross-shareholding matrix. We can iterate this forward infinitely to arrive at the formula for ultimate ownership of the family in the dollar of dividend paid by firm i.

3.1..2 Position

Almeida et al. (2011) show that a natural extension of the above framework leads to a robust measure of a firm's position in the group relative to the controlling family or the distance between the firm and the family. For a simple pyramidal structure, this is easy to capture. For example, for a structure with the controlling family at the top and two subsequent layers, the firm at the bottom is in *position* 2, and the firm with the direct connection to the family is in *position* 1. For more complex organizational structures with multiple chains between the family and a firm, we cannot simply count the number of intervening firms between the family and a group firm. Almeida et al. (2011) come up with an alternative measure where they weigh each chain between a firm and the family by the cash-flows which the family receives through that chain. Let a dollar of dividend paid by firm i be represented by the vector, d_i, with one in the ith position and zeroes elsewhere. The family's ultimate claim on this dollar of dividend paid by i is given by u_i, the ith position of the vector u. If firm i has a direct connection to the family, then the family receives $f'd_i$ of u_i through this chain. For a connection between the family and i which involves one intervening firm, the family receives $f'Cd_i$ through that chain and so on. Therefore, Almeida et al. (2011) define *position* of i as

$$position_i = \frac{f'd_i}{u_i}.1 + \frac{f'Cd_i}{u_i}.2 + \frac{f'C^2d_i}{u_i}.3.... = \sum_{n=1}^{\infty} \frac{f'C^{n-1}d_i}{u_i}.n \tag{2}$$

This expression simplifies to:

$$position_i = \frac{1}{u_i} f'(I_N - C)^{-2} d_i \tag{3}$$

3.1..3 Loop

We can use the same framework to identify whether a firm is part of a cross-shareholding loop. If a firm, i, that is part of a loop, pays out a dollar of dividends, then a part of that dividend will reappear in firm i. Let

$$loop_i = min[n/n \geq 1 \text{ and } d_i' C^n d_i > 0] \tag{4}$$

Firm i is a part of a loop if and only if $loop_i < \infty$. $loop_i$ gives the number of firms in the shortest loop i is a part of. We create an indicator variable, *Loop* denoting whether a firm is a part of a loop in a particular year. We separate changes in this variable into mutually exclusive partitions – *Add Loop* indicates if *Loop* was 0 in the prior year and 1 in the current year; *Remove Loop* indicates if *Loop* was 1 in the prior year and 0 in the current year. We also create a variable, *Loop size*, to capture $loop_i$. We use this variable to capture more continuous change in a firm's loops. *Add loop-size* captures increases in *Loop size* while *Remove loop-size* captures decreases. We multiply *Remove loop-size* by -1 such that higher values of *Remove loop-size* captures greater reductions in *Loop size*. Finally, we create a variable, *Removal Fraction* to capture the extent of simplification of the overall group's structure. *Removal Fraction* is defined as the ratio of the total number of group firms that had loops removed in a particular year to the total number of firms in that *chaebol* in

that particular year.

3.1..4 Control

Computation of control rights presents an even more challenging exercise for the *chaebols* with their intricate network of ownership ties. To determine whether a group firm is under the family's control, we need to determine the fraction of voting rights held by intermediate firms that the family controls. In order to do that, we need to determine 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 determining a threshold of ownership for control and then identifying chains leading up 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 which are a 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 the effective voting rights in firms controlled by the family through 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 over 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 there are multiple chains of control leading to a firm, adding up the weakest links could imply the family owns more than 100% of the voting rights in the firm. The idea of the weakest link is also not well-defined for firms that are parts of loops because, theoretically, they are parts of infinite chains.

Almeida et al. (2011) introduces a robust way of identifying control and computing voting rights which is agnostic of the structure of the group. We adopt this approach for our purposes. We are required to make two assumptions for this approach: (1) There is a threshold of voting rights, T, which determines whether a firm is under the family's control or not (2) If a family controls a firm, it controls the votes that this firm holds directly in other firms. Then, for a given threshold, T, we

can identify the set of firms controlled by the family as:

$$C(T) = \left\{ i \in N : f_i + \sum_{j \in C(T), j \neq i} c_{ji} \geq T \right\} \tag{5}$$

We compute this set for each group every 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 this set.

*3.1..*5 Voting Rights

Computing the family's effective voting rights in a group firm is relatively simple once we have obtained the set of firms controlled by the family for a particular threshold. For each group firm, we simply add up the direct ownerships of the family and all other group firms which are controlled by the family to arrive at effective voting rights. We label this variable *VR* for our analysis. We subtract *Ultimate ownership* from *VR* to create *Separation* which captures the separation between the family's effective voting rights and ultimate cash-flow rights in a group firm.

*3.1..*6 Centrality

Almeida et al. (2011) introduce two measures of "centrality", i.e., the role played by a group firm in ensuring the family's control over other group firms. We adopt the relatively simpler measure, the aggregate equity stake of group firm, i, in other group firms scaled by i's assets. In the absence of data on private firms, we only consider public group firms while computing our measure of *Centrality*.

[8] Our choice of 30% is relatively conservative compared to some other papers in the literature (e.g., Faccio and Lang, 2002; La Porta et al., 1999). Even with this threshold, the family controls more than 65% of all group firms (public and private) in our sample. In untabulated tests, we verify that our results are robust to other values of the threshold.

3.1..7 Loop dependency

We create an additional measure of group structure, *Loop dependency*, to capture a loop's effect on the difference between effective ownership and direct ownership. Equation (1) shows that the family's direct ownership in any group firm is translated to effective ownership by the $(I_n - C)^{-1}$ matrix. We refer to this matrix as the dependency matrix, D. Elliott et al. (2014) show that for firms that are parts of loops, the diagonal elements of D are necessarily greater than 1. The intuition here is that since loop firms also own themselves, effective ownership in a loop firm is always greater than direct ownership. When a firm is removed from a loop, this value reverts to 1. Therefore, for a group firm, i, we compute *Loop dependency* as the change in D_{ii} from the prior year to the current year, multiplied by 100. For firms that are not parts of loops, this variable is necessarily zero. All else equal, this change will reflect the percentage change in effective ownership when a loop is removed. To the extent that loops obfuscate true ownership, we posit that *Loop dependency* captures the degree of this obfuscation. However, we recognize this proxy only captures a part of the transparency effects of the removal of loops.

3.2. Data Description

To compute the measures of group structure described in the previous section, we rely on ownership data from the Korean Fair Trade Commission (KFTC). A key mandate of the KFTC is restraining the concentration of economic power, especially among a small number of business groups. For that purpose, the KFTC has a special division, called "Business Group Bureau," which regulates *chaebol* activities that include formulating and administering corporate governance policies. Among other regulations, the KFTC requires detailed disclosure of ownership data. KFTC has managed the *Business Group Portal* website as a market monitoring tool since July 2007, where *chaebol* firms are required to disclose their complete ownership data on April 1 of each year. There are two primary datasets: cross-shareholding and insider ownership data. The cross-shareholding dataset captures, both in numbers and in percentage, how much each *chaebol* company owns in

another group company. The insider ownership dataset provides details on how much of a group firm is owned by the controlling family, relatives of the family, affiliates, etc. From the ownership database, we obtain data on all *chaebol* firms for 2011 - 2019. Using this dataset, we compute metrics of group structures for all *chaebol* firms, both public and private.

For accounting and financial data of listed Korean companies, we rely on Datastream and Worldscope, which we manually match with the KFTC data. We match KFTC data from April of a particular year to financial data for the prior fiscal year for our analyses. Our matching procedure yields a sample of approximately 1,850 firm-year observations on public *chaebol* firms between 2011-2019. Finally, we obtain data on related party transactions from the Korean Listed Company's Association database and analyst estimates from IBES.

3.3. Summary Statistics

Table 1 reports summary statistics for accounting and financial variables, as well as variables related to group structure and ownership for the sample of listed *chaebol* firms used in our analyses.

Given data availability, we end up with a sample of around 1,850 firm-years between 2011 and 2019. The difference between the number of observations on variables related to group characteristics and ownership and the financial variables is due to attrition while merging the KFTC data with the Worldscope-Datastream database. The sample with related party transactions, which we obtain from the Korean Listed Companies Association database, is smaller, amounting to 1,576 firm-years. We use this smaller sample only for our analyses in Table 7.

The summary statistics suggest that, in our sample, the family controls the median listed group firm with only 1% direct ownership. The family's direct stake, *Family stake*, in the median firm is only 1%. However, through a mix of pyramids and loops, 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%) is even higher at 33%, which means the family controls the median firm at a threshold of 30% – the median value of *Control* is 1. The average value for *Control* suggests

that at a threshold of 30%, the family controls 54% of listed group firms. *Loop* which indicates the presence of a circular-shareholding in a firm for a particular year, has an average value of 0.16, i.e., over our entire sample, 16% of listed group firms were part of a cross-shareholding loop. Naturally, the prevalence of a loop varies over time as groups unwind their circular cross-shareholdings. The average for *Loop* is 0.27 in 2011, when our sample begins, but decreases significantly to 0.05 in 2019, the last year in our sample.

4. Empirical Analysis

In this section, we test the valuation implications of the removal of cross-shareholding loops. We also examine potential mechanisms behind the valuation effects to describe their relative influence in the data.

4.1. Valuation Effects of Circular-shareholding Changes

In our first set of tests, we estimate the following empirical model to test whether changes in a firm's loop status is associated with future valuation, as measured by Tobin's Q:

$$\begin{aligned} Q_{i,t+1} &= \alpha + \beta_1 \times Add\ Loop_{i,t} + \beta_2 \times Remove\ Loop_{i,t} + \gamma X_{i,t} \\ &+ year_t + group_g + industry_j + \epsilon_{i,t}. \end{aligned} \tag{6}$$

Here the outcome variable is a firm's Tobin Q in the year following changes in circular-shareholding status. *Add Loop* and *Remove Loop* capture these changes, indicating if a firm became a part of a loop or whether it ceased to be part of a pre-existing loop in the current year, respectively. We partition the changes in the circular-shareholding structure into additions and removals, separately, for two main reasons. First, to the extent that addition and removals might have asymmetric effects, this partition allows us to identify better the effect of removal from loops

which directly reflects the phenomenon we are interested in – the transition of Korean *chaebols* to a holding-company structure. Second, instances of loop-additions are significantly fewer than loop-removals.[9] The vector of controls, $X_{i,t}$, includes return-on-assets, log of market capitalization, leverage, and the past 12-month's stock returns. To control for the separation between the family's ownership and voting rights in a group firm, we include other measures of group structure (*Ultimate ownership*, *Control* and *VR*) as controls.[10] Our main empirical specification includes group, time, and industry fixed effects. 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 (SIC) in the US. To alleviate the concern that our results might reflect a general association between loops and valuation, we also test a specification with firm fixed effects. To address the concern that time-varying factors at the group and firm level might confound our inferences, we also test specifications with group-year fixed effects and lagged versions of Tobin's Q as additional controls. We cluster standard errors at the firm level.

The results, reported in Table 2 suggest that the removal of loops, for a particular firm, is associated with lower Tobin's Q in the following year. Column 1 estimates the simplest specification with the indicators for changes in loop-status, group fixed effects, and time fixed effects. The coefficient on *Remove loop* suggests that compared to firms in other *chaebols* in the particular year, as well as firms in its *chaebol*, firms that were extricated from loops experience a statistically significant (at the 1% level) relative decrease in Tobin's Q of 0.115. This effect is economically significant and represents around 10% of the average Tobin's Q of Korean *chaebol* firms in our sample period. Columns 2-5 of report estimates from increasingly robust estimates relative to Column 1. Column 2 introduces industry fixed effects while Column 3 adds controls for contemporaneous financials and measures of group structure. The coefficient on *Remove loop* remains both economically and statistically significant. Column 4 imposes our design's most restrictive fixed effects structure by

[9] There are 28 instances of a public firm becoming a part of a loop relative to 67 instances of a firm being extricated from a loop in the sample for our main analyses

[10] 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.

switching out industry and group fixed effects for firm and group-year fixed effects. The coefficient of -0.071 on *Remove loop*, though somewhat smaller, is still economically meaningful and statistically significant at the 5% level. Finally, Column 5 switches out the firm fixed effects for the contemporaneous and lagged values of Tobin's Q to control for time trends in firm valuation that might be correlated with the removal of loops. The coefficient on *Remove loop* remains stable and statistically significant.[11]

In Table 3 we augment our analyses of Q by documenting a similar association between future stock returns and removal of loops. These results suggest that lower stock returns drive the relatively lower Q for firms that had loops removed. They also alleviate two other concerns — that mismeasurement of Q drive our main results or that Q was already low for firms that had loops removed. The empirical model for the analyses involving returns is the same as in Equation (6) except that we now use stock market returns over the next fiscal year as the outcome variable. As in Table 2, Columns 1 - 4 report results from increasingly robust specifications. Column 1 reports the simplest specification involving the indicator variables of interest and group and year fixed effects, while column 2 introduces industry fixed effects. The coefficients on *Remove Loop* suggests that in the year following the removal of loops, the treated firms experienced stock returns that were relatively lower by approximately 15 percentage points. This effect is statistically significant at the 1% level. Column 3 adds firm controls barring the lagged dependent variable, i.e., stocks returns from the contemporaneous fiscal year. Column 4 includes the full set of firm controls used in Table 2. The coefficient on *Remove Loop* remains negative, economically meaningful at an average of 13.6 percentage points, and statistically significant at the 5% level.

Overall, the results in Tables 2 and 3 suggest that loop firms tend to have relatively lower valuations following the unwinding of loops. We want to stress the relative nature of our results

[11] In untabulated tests, we repeat our analyses using Almeida et al. (2011)'s measure of "*stand-alone Q*". To compute this measure, we remove the value of equity stakes held by a firm in other group firms from the numerator while removing the book value of investments in associates from the denominator of Q. Our results are qualitatively and quantitatively unchanged. This suggests that the effects we observe are not driven by a correlation between loop removal and a mechanical reduction in investments in other group firms.

because the unwinding of loops is unlikely to affect just the firms that were part of loops. If the unwinding of loops reduces opacity surrounding ownership and control, that will extend to other firms in the group.

4.2. Exploring Mechanisms

The results in the previous section document a robust negative association between the removal of loops and future valuations and stock returns. While the unwinding of loops makes it easier to trace the flow of ownership and control within the group, the redesign could also very plausibly induce *actual* changes in the way a group operates. In this section, we examine three channels of real changes which could explain the lower valuation of loop firms following the removal of loops.

*4.2..*1 Changes in Ownership and Control Rights

Our first set of tests in this section suggest that an exacerbation of agency concerns between the family and minority shareholders in the loop firms is unlikely to explain our main result. We test this by examining three outcome variables – *Forward Control*, *Forward Separation*, and *Forward Centrality*. An extensive literature has documented that controlling families use group firms to undertake various activities that transfer wealth from firms where the family has a higher separation between ownership and control to ones where the separation is relatively lower. Consequently, we examine whether a loop firm is more likely to be under the family's control and whether the separation of the family's ownership and control in a loop firm changes following the unwinding of the loop. Almeida et al. (2011) also document 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. They also document that *central* firms tend to trade at lower valuations. It is plausible that in the absence of a loop, firms that were part of the loop become more critical in allowing the family to maintain the same levels of control over group firms which could explain our main result. To examine this possibility, we examine whether the *Centrality* of loop firms changes following the unwinding of

the loop. The empirical tests follow the same design as in our main tests. We regress the outcome variables of interest on *Add Loop*, *Remove Loop* and the same set of controls and fixed effects used for the analyses reported in Column 3 of Table 2.

Table 4 tabulates the results of these analyses. Columns 1, 3, and 5 report results using the respective outcome variables and only financial controls. Columns 2, 4, and 6 augment the specification in the preceding column by adding group-structure controls. Columns 1-6 all report coefficients on *Remove Loop* which are statistically indistinguishable from zero. Interestingly, for all outcome variables, we find a positive and statistically significant coefficient on *Add Loop*. The coefficients on *Add Loop* in Columns 1 and 2 suggest that the likelihood that a group firm is under the family's control goes up by 18-40% of the sample average following the addition to a loop. The coefficient on *Add Loop* in Column 3, which is positive and significant at the 10% level, suggests that the separation of the family's ownership and voting rights in a group firm increases when it becomes part of a loop. The effect is economically meaningful and represents about 36% of average *Separation*. Similarly, the results in Columns 5 and 6 suggest that *Centrality* is meaningfully relatively higher for group firms after they are added to a loop.

Overall, these results suggest that actual changes in agency issues associated with group structure are unlikely to explain our results. Being added to a loop is associated with a potential exacerbation of agency issues between the family and a group firm's minority shareholders. However, the unwinding of loops does not seem to have a discernible effect on the proxies for agency problems. An alternative interpretation of our results might be that the lack of a positive and statistically significant coefficient on *Remove Loop* is indicative of a reversal of the effects captured by the coefficients on *Add Loop*. This alternative interpretation would suggest that agency issues are reduced following the unwinding of loops, suggesting a relative improvement in the value of loop firms. We do not find that to be the case in our main results.[12]

[12]Our analyses for *Forward Control* includes the contemporaneous *Control* as a control variable in Column 2. Column 4 includes the two components of *Separation*, *Ultimate ownership* and *VR* as control variables. If a firm's removal from a loop meant a reversal of the effects of being added to a loop, we would expect to see a negative coefficient on *Remove Loop* in these specifications. In untabulated tests, we include the contemporaneous *Centrality*

4.2..2 Internal Capital Markets

In our next set of tests, we attempt to rule out the possibility that the effects we observe are driven by the unwinding of loops leading to a disruption to internal capital markets within a business group. A large literature (e.g., Gopalan, Nanda, and Seru, 2007; Khanna and Palepu, 2000; Stein, 1997) discusses the role of business groups or conglomerates in internal capital allocation — financially constrained group firms are supported by group firms with excess capital relative to investment opportunities. Almeida, Kim, and Kim (2015) and Baek et al. (2004) also document the beneficial role of internal capital markets within Korean *chaebols*. It is plausible that the reorganization of business groups during the unwinding of loops could impede internal capital markets and thus affect firm value. We attempt to test this possibility by examining how the effect of loop removal varies with financial constraints. The internal capital markets explanation would predict that the loss in value following loop removal should be higher among financially constrained firms.

Table 5 examines the association between *Forward Q* and *Remove Loop* separately for firms with high or low levels of financial constraints. We proxy for financial constraints using the variables *Cash to Assets* and *Debt to CF* defined in Appendix A. We use the cross-sectional median of the proxies to classify firms as being constrained or not. Firms with higher (lower) than median values of *Cash to Assets* (*Debt to CF*) are classified as "Low Constraint" while the converse holds true for firms classified as "High Constraint". Columns 1 and 2 report results of estimating Equation (6) 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 while it is statistically indistinguishable from zero for the "High Constraint" sample. These results contradict the explanation that an impediment to internal capital markets explains our main results. The results in Columns 3 and 4 using *Debt to CF* as the partitioning variable also do not suggest that our results are explained by variation in financing constraints. The coefficient on *Remove Loop*

as a control variable and obtain qualitatively and quantitatively similar results.

is negative and statistically significant for both sub-samples. The point estimate is larger for the sample with lower constraints.

Overall, the results in Table 5 suggest that changes in internal capital markets are not driving our results. Conversely, the observation that our main result is magnified for firms with more cash on their balance sheets points towards an expropriation-based explanation of our main result.

4.2..3 Identifying Agency Issues

In this section, we validate whether an expropriation-based explanation fits our results. We examine this possibility by studying how the effect of loop removal varies with potential conflicts of interest between the family and minority shareholders. We proxy for conflicts of interest using *Separation*. As in the previous analyses, we partition firms using the cross-sectional median of the proxy. Firms with *Separation* higher (lower) than the median for the particular year are assumed to have higher (lower) conflicts of interest.

Table 6 reports results of this analysis. Column 1 reports results of estimating Equation 6 for the subsample with lower than the median values of *Separation* while Column 2 reports results for the sample with values higher than the median. The coefficient on *Remove Loop* is negative and statistically significant (at the 1% level) for the subsample likely to have high conflicts of interest, while it is not statistically distinguishable from zero for the subsample with potentially lower conflicts of interest. In other words, only loop firms with potential conflicts of interest seem to experience relatively lower valuations compared to similar group firms following the removal of loops.

4.2..4 Evidence of Expropriation

In this section, we test if the controlling family used the transactions undertaken to unwind loops to facilitate wealth transfer from loop firms with higher conflicts of interest to other group firms. We attempt to test this explanation by first examining evidence of tunneling following the removal

of loops. An extensive literature (Bertrand et al., 2002, e.g.,) has documented tunneling in business groups, including Korean *chaebols*. We use two measures to capture tunneling – related party sales and profitability. More specifically, we examine the behavior of *Forward RPT to Assets*, *Forward RPT to Sales*, and *Forward ROA* following the removal of loops. Hwang and Kim (2016) document that related party sales are used as a means of financial support between firms in Korean *chaebols* while 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 the loop firms undertaking sub-optimal acquisitions or transactions to the extent they affect profitability in the following year. The empirical model for these tests remains the same as in Column 3 of Table 2 except the choice of outcome variables.

Columns 1 and 2 of Table 7 reports results examining related party transactions scaled by assets and sales, respectively. The coefficient on *Remove Loop* is statistically indistinguishable from zero in both columns suggesting that group firms did not undertake measurably higher or lower amounts of related party transactions following removal of loops. Echoing our results in Table 4, the coefficients on *Add Loop* are positive and statistically significant. The economic magnitude of the coefficient is meaningful, representing around 50% of the average value of the outcome variables in our sample. Columns 3 and 4 report results using *Forward ROA* as the outcome variable in our preferred empirical specification. The results in the two columns vary only in the omission of *ROA* as a control variable in Column 3. The coefficients on *Remove Loop* are again not statistically different from zero in both columns. The coefficients on *Add Loop* are negative but not statistically significant in both columns.

Column 5 examines the possibility that sub-optimal sales or purchases of their shares by group firms, with conflicts of interest, during the unwinding of loops drives our results. We test this indirectly by omitting all firms that experienced a greater than 5% change in their treasury shares from our sample. We replicate the specification used in Column 3 of Table 2 using this truncated sample and find nearly identical results. The coefficient on *Remove Loop* is -0.102 and statistically

significant at the 1% level.

Overall, the results in Table 7 suggest that expropriations by the controlling family during the transition do not explain our results. Taken together with the results in Table 4 they also provide some evidence that agency issues increased following the addition of a firm to a loop, but did not change measurably following the removal of a firm from a loop.

4.3. Variation with Loop Complexity

Thus far, our empirical results suggest that identifying conflicts of interest in loop firms rather than actual expropriation explains the valuation consequences of removing loops. This section attempts to validate this explanation by examining variables more likely to be associated with gradual changes in ownership transparency. Our empirical design follows that of Table 2, but here the explanatory variables of interest we examine are *Add loop-size*, *Remove loop-size*, and *Loop dependency*. As explained in Section 2., the first two explanatory variables capture expansion or reduction in the size of a loop a firm is a part of, while *Loop dependency* attempts to capture a part of the effect of a loop on the disassociation between direct and effective ownership.

Table 8 reports the results of our empirical tests. Column 1 estimates Equation 6 using our original sample, *Add loop-size* and *Remove loop-size* as explanatory variables, and the set of controls used in all our empirical analyses. We find a negative and statistically significant (at the 5% level) coefficient of -0.023 on *Reduce loop-size*. This suggests that larger reductions in the size of a loop resulted in greater relative decreases in the value of loop firms. Column 2 uses the same sample but uses *Loop dependency* as the explanatory variable. We find a negative and statistically significant (at the 1% level) of -0.030 on *Loop dependency*. This suggests that if a loop introduced a 1 percentage point difference between direct and effective ownership in a loop firm, removal of that disassociation resulted in Q being lower by 0.03 or approximately 3%. In Column 3, we use the same specification, but narrow our sample to include only firms which were added to or removed from loops or firms which were still a part of loops. This sample effectively captures the population

of firms where we can observe any changes in *Loop dependency*. As explained in Section 2., *Loop dependency* is necessarily zero for all other firms in our sample. Again, we find a negative and statistically significant (at the 1% level) coefficient of -0.028 on *Loop dependency*. Collectively, these results suggest that greater reductions in the obfuscation of ownership of a group firm were associated with a larger decrease in value relative to other business group firms.

5. Spillover Effects

Our next set of tests examines the value effects of group structure simplification on firms that are *not* parts of loops or did *not* have loops removed. We can think of these firms as "non-loop" (NL) firms. The loops also obfuscate the family's ownership and voting rights in firms connected to loop firms, either directly or through intervening connections. Consequently, any effects of ownership transparency are unlikely to be restricted only to firms that were part of loops. Analyzing the spillover effects of loop removals for NL firms is essential to arriving at a fuller understanding of the phenomenon.

The spillover effects of ownership transparency are likely to vary along two dimensions — (1) the extent to which ownership transparency is improved and (2) what the transparency reveals about potential agency issues in a group firm. We use two proxies to capture the conceptual dimensions described above for our analyses.

We use *Position* to capture the degree to which ownership transparency of a group firm is likely to be affected by the simplification of group structure and *Separation VR* to capture what the ownership structure reveals about potential agency issues in a firm. For complex group structures, it is likely to be easier to discern the family's ownership and control of group firms more directly connected to the family. On the other hand, such a determination is likely to be more difficult for firms deeper in the group, which the family is more likely to control through several group firms. We validate this idea by examining whether the association between future value and the wedge between the family's voting and ownership rights varies for firms located in different parts of the

groups. We partition our sample into two using the median value of *Position* in our overall sample, 2. Within these sub-samples, we document the incremental value effects for *High Separation* firms, i.e., those with higher-than-median separation between the family's control and ownership in group firms. More specifically, we estimate the following empirical model:

$$\begin{aligned} Q_{i,t+1} &= \alpha + \beta_2 \times High\ Separation_{i,t} + \gamma X_{i,t} \\ &+ year_t + firm_i + \epsilon_{i,t}. \end{aligned} \tag{7}$$

We report the results of these empirical tests in columns 1 and 2 of Table 9. Column 1 reports the results of estimating Equation 7 for the sample of NL firms with *Position* greater than or equal to 2, i.e., firms situated relatively lower in the group structure. The coefficient on *High Separation* is statistically indistinguishable from zero. This result suggests that future valuations do not reflect the separation between control and ownership for firms further removed from the controlling family. On the other hand, we document a statistically significant (at the 1% level) coefficient of -0.157 on *High Separation* for firms with *Position* lower than 2. This result is consistent with the idea that the market can better discern the "wedge" for firms more directly connected to the family, which leads to lower future valuations.

We now turn to examine how the simplification of group structure leads to varying consequences among group firms. We introduce a variable, *Removal Fraction*, to capture the extent of group structure simplification. We define this variable at the group-year level as the ratio of the total number of loop removals for a particular group to the total number of firms in the group in that year. We report the results of estimating the following empirical model in columns 3 and 4 of 9:

$$
\begin{aligned}
Q_{i,t+1} &= \alpha + \beta_1 \times Removal\ Fraction_{g,t} + \beta_2 \times High\ Separation_{i,t} \\
&+ \beta_3 \times Removal\ Fraction_{g,t} \times High\ Separation_{i,t} + \gamma X_{i,t} \\
&+ year_t + firm_i + \epsilon_{i,t}. \qquad (8)
\end{aligned}
$$

Given that our variable of interest in this model, *Removal Fraction*, is defined at the group-year level, we cluster standard errors at the same level. Our results suggests that the simplification of group structure had a positive spillover effect on certain NL firms. Column 3 reports the results of estimating Equation 8 for the sample of NL firms with *Position* greater than or equal to 2. We find a positive and statistically significant (at the 5% level) coefficient of 2.04 on *Removal Fraction*. The coefficient value suggests that, for firms deeper in the group structure, a one-standard-deviation increase in the fraction of group firms that had loops removed is associated with an approximately 10% improvement in the value of NL firms with low agency issues. In contrast, we find a negative and statistically significant (at the 1% level) of 3.094 on *Removal Fraction * High Separation*. The cumulative effect for the *High Separation* firms is statistically different from zero but indistinguishable from a negative number. These results are consistent with the idea that the transparency of ownership drives the value effects. As the market learns about ownership patterns for firms deeper in the group, variations in "wedge" are reflected in valuations. The market adjusts a consistent prior discount for firms with low or high agency issues. Firms with lower agency issues no longer face a discount, while firms with higher agency issues likely experience a higher discount.

Column 4 reports the results of estimating Equation 8 for firms higher in the group. As the results in column 2 suggest, the market appears to distinguish among this group's high and low wedge firms. Consequently, the simplification of group structure is likely to reveal less information about ownership patterns. Consistent with this idea, the coefficient for *Removal Fraction* for this

sample is not statistically distinguishable from zero. This result suggests no value effects for the set of firms most likely to have been priced correctly ex-ante — firms with low agency issues higher in the group. However, the cumulative effect for *High Separation* firms is positive and statistically significant (at the 1% level). This result suggests that the revelation of ownership patterns through the *entire* group likely lowers the discount the market was placing on the set of group firms with apparent agency issues. So, while we found negative valuation implications for loop firms following the removal of loops, we provide evidence that the consequences for the overall group are less straightforward. Overall, our results suggest that the improved transparency of ownership structure following the conversion to a more linear holding company structure leads to differential valuation implications depending on potential agency issues each group firm faces.

6. Effects on Earnings Informativeness

The results thus far suggest that the removal of loops and the consequent simplification of the structure of *chaebols* led to increased ownership transparency and better identification of potential agency issues among group firms. We conclude our analyses by examining the implications of the same for the informativeness of earnings. Intuitively, if, following the removal of loops, investors and analysts are better able to trace the flow of earnings between various group firms, earnings reports should become more informative. The revelation of potential agency issues is also likely to make earnings more informative by reducing investors' uncertainty about managers' reporting objectives (e.g., Ferri, Zheng, and Zou, 2018; Fischer and Verrecchia, 2000). We examine how investors' response to annual earnings release changes following the removal of loops and the simplification of group structures. Consistent with our previous analyses, we estimate the following empirical models to study this question:

$$
\begin{aligned}
CAR_{i,t+1} &= \alpha + \beta_1 \times SUE_{i,t+1} + \beta_2 \times Add\ Loop_{i,t} + \beta_3 \times Remove\ Loop_{i,t} \\
&+ \beta_4 \times Add\ Loop_{i,t} \times SUE_{i,t+1} + \beta_5 \times Remove\ Loop_{i,t} \times SUE_{i,t+1} \\
&+ \gamma X_{i,t} + year_t + firm_i + \epsilon_{i,t}. \qquad (9)
\end{aligned}
$$

$$
\begin{aligned}
CAR_{i,t+1} &= \alpha + \beta_1 \times Removal\ Fraction_{g,t} + \beta_2 \times SUE_{i,t+1} \\
&+ \beta_3 \times Removal\ Fraction_{g,t} \times SUE_{i,t+1} + \gamma X_{i,t} \\
&+ year_t + firm_i + \epsilon_{i,t}. \qquad (10)
\end{aligned}
$$

The outcome variable of interest for this analysis is $CAR_{i,t+1}$, the 3-day cumulative abnormal market reaction to the firm's earnings announcement for the next fiscal year. Consistent with prior research, our main regressor for this analysis is a measure of unexpected earnings for the year ahead, $SUE_{i,t+1}$. We measure *SUE* by subtracting the median analyst estimate, obtained from IBES, from the reported earnings, scaled by the firm's stock price at the end of the fiscal year.[13] To estimate the implications of the removal of loops on earnings responses, we interact $SUE_{i,t+1}$ with *Add loop* and *Remove loop* in Equation 9. In Equation 10, we estimate the effects of the simplification of the overall group structure by interacting $SUE_{i,t+1}$ with *Removal Fraction*. All our empirical models include the set of fundamental and ownership characteristics included in previous analyses.

We report the results of these analyses in Table 10. Column 1 reports results of estimating Equation 9 for the sample of *chaebol* firms with data on the median analyst estimate. The coefficient on *Remove Loop * Forward SUE* is positive and statistically significant at the 5% level. The magnitude of 0.095 is economically meaningful relative to the baseline ERC. This result suggests

[13] We choose the earliest 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 release.

that the earnings of loop firms become more informative following the removal of loops. Columns 2, 3, and 4 report results of estimating Equation 10. In all columns, the variable of interest is *Removal Fraction * Forward SUE*, the coefficient on which captures the incremental earnings informativeness associated with the extent of simplification of group structure. Column 2 reports results using all *chaebol* firms with the available data. The coefficient on *Removal Fraction * Forward SUE* is positive but statistically insignificant. In columns 3 and 4, we repeat the analysis by partitioning firms based on *Position* as in Table 9. Column 3 reports results for firms with higher-than-median *Position*, i.e., firms lower in the group structure for whom we would expect the transparency effects to be larger. The coefficient on *Removal Fraction * Forward SUE* is positive and statistically significant at the 5% level. The coefficient value of 0.460 suggests that even at the mean value of *Removal Fraction* of 0.016, *chaebol* firms lower in the group experience a meaningful increase in the informativeness of their earnings reports. For firms higher in the group structure, the ownership structures of which are less likely to be obfuscated by the complexity of the group's overall structure, we do not find an economically or statistically significant increase in earnings informativeness.

Overall, these results provide additional evidence in favor of the transparency hypothesis. Simplifying group structures allows investors to understand better potential agency issues and managerial objectives, which improves the informativeness of earnings. It is important to note that an improvement in earnings informativeness can occur even if investors update their expectations about firm value upwards or downwards based on revelations about the family's control and ownership in a *chaebol* firm.

7. 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 more transparent organizational structures. Our evidence supports one of the ostensive motivations behind this regulatory

push — to improve the transparency of how business groups are structured. We document that the transition to pyramidal structures through the removal of ownership loops had significant value implications even though they did not have any discernible effects on the ability or willingness of controlling families to expropriate from minority shareholders or firms' access to internal capital markets. Firms removed from loops experienced a decline in valuations relative to other group firms (that were never a part of ownership loops), and this effect was due in part to the transparency of ownership rights. The transparency effects for other group firms were nuanced depending on their location within the group structure and potential agency issues. The transparency of ownership rights is also reflected in an improvement in earnings informativeness. Our evidence suggests that ownership transparency allows for a revelation of the differences in group firms' conflict of interests, leading to potentially more informative prices and earnings.

We leave many questions open for future research. While we document differential value effects among group firms, we do not attempt to infer the aggregate value implications of this reform. Moreover, while our findings analyze the short-horizon effects of a reasonably nascent phenomenon, the long-term effects of these structural changes in *chaebol* firms remain to be seen. Such analyses could have important policy implications particularly relevant for economies where complex cross-shareholdings are prevalent. 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 the 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 analyst 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 the year-ahead value while *Lagged* refers to that from the prior year.

Variable	Description	Computation
CAR	3-day cumulative abnormal returns around the date of 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 financial leverage	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

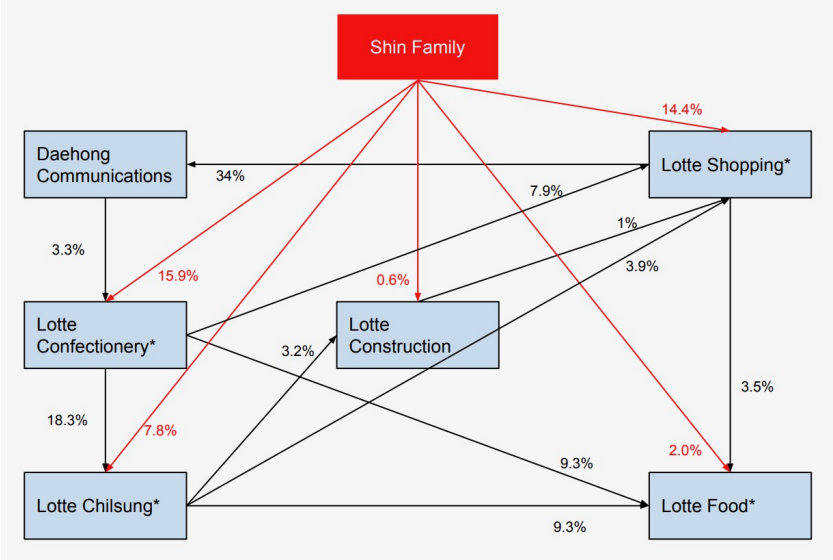

Fig. 1. A partial example of Lotte's ownership structure in 2016

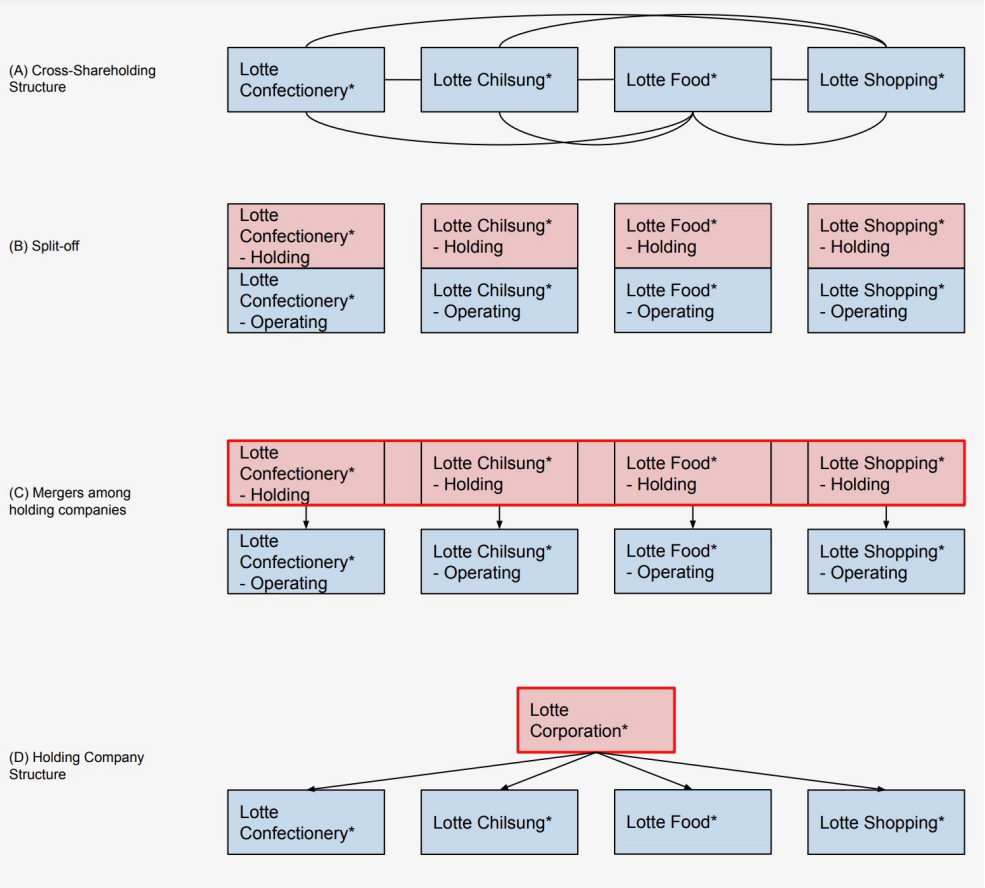

Fig. 2. An example of transition process at Lotte: Split-off and Merge

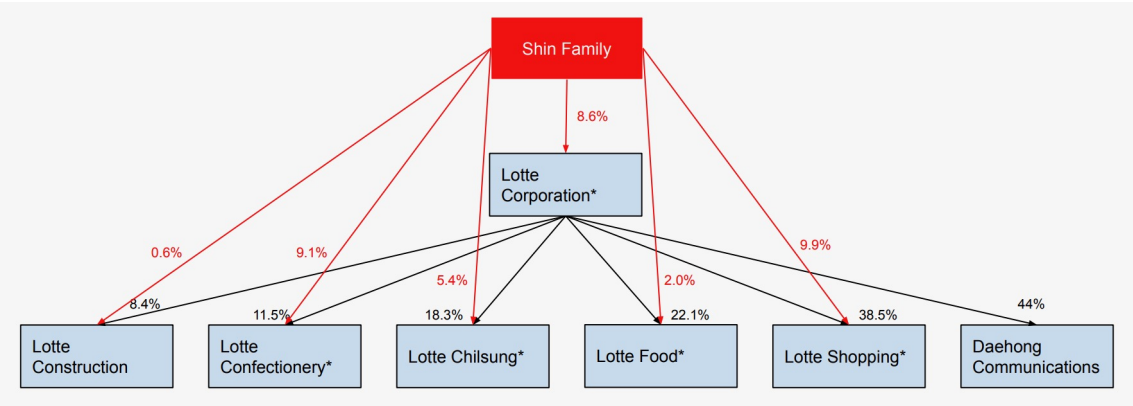

Fig. 3. A partial example of Lotte's ownership structure in 2017

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

Table 1 reports summary statistics on the firm characteristics and ownership variables of publicly listed *chaebol* firms in our sample from 2011 to 2019. 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.

	*p*25	*p*50	*Mean*	*p*75	*p*95	*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 assets	0.02	0.06	0.19	0.20	0.95	0.31	1,577
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
CAR	-0.03	-0.00	-0.00	0.02	0.08	0.05	1,248
SUE	-0.05	-0.02	-0.05	-0.00	0.04	0.15	1,180
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
Loop	0.00	0.00	0.16	0.00	1.00	0.37	1,951

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

Table 2 reports the estimates of linear regressions using *Forward Q* as the dependent variable. *Add Loop* is an indicator variable that evaluates to one for the firms added to a circular loop within a business group. *Remove Loop* is an indicator variable that evaluates to one for the firms removed from a circular loop within a business group. Column 1 reports a baseline specification with time and group fixed effects; Column 2 adds industry-fixed effects, where industry is defined by one-digit SIC industry code; Column 3 adds firm-level controls. Column 4 replaces industry-fixed effects with firm-fixed effects and adds group x time fixed effects; Column 5 adds firm-level contemporaneous Q and lagged Q as controls. 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)	(5)
	Forward Q	*Forward Q*	*Forward Q*	*Forward Q*	*Forward Q*
Add Loop	-0.070	-0.071	-0.045	-0.035	0.030
	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)
Remove Loop	-0.115***	-0.097**	-0.098***	-0.071**	-0.078*
	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
ROA			1.715***	-0.136	-0.272
			(0.59)	(0.32)	(0.22)
Log market-cap			-0.007	0.047	-0.019***
			(0.02)	(0.03)	(0.01)
Log leverage			-0.103	0.156	0.096
			(0.20)	(0.15)	(0.06)
Returns			0.093***	0.076***	0.022
			(0.03)	(0.02)	(0.02)
Ultimate ownership			-0.473**	0.676*	-0.010
			(0.22)	(0.39)	(0.06)
Control			0.000	-0.060	-0.011
			(0.08)	(0.09)	(0.03)
VR			0.057	-0.101	0.007
			(0.20)	(0.17)	(0.05)
Q					0.688***
					(0.06)
Lagged Q					0.192***
					(0.05)
Industry FE	No	Yes	Yes	No	No
Time FE	Yes	Yes	Yes	Yes	No
Firm FE	No	No	No	Yes	No
Group FE	Yes	Yes	Yes	Yes	No
Group x Time FE	No	No	No	Yes	Yes
Observations	1,828	1,828	1,744	1,665	1,697
R-sq	0.3568	0.4105	0.4448	0.8360	0.8073

Table 3. Valuation Effects of Cross-shareholding Changes: Stock Returns

Table 3 reports the estimates of linear regressions using *Forward returns* as the dependent variable. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *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 a baseline specification with time and group fixed effects; Column 2 adds industry-fixed effects, where industry is defined by one-digit SIC industry code; Column 3 adds firm-level controls. Column 4 adds firm-level contemporaneous returns as a control. 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)
	Forward returns	*Forward returns*	*Forward returns*	*Forward returns*
Add Loop	0.073	0.077	0.090	0.128
	(0.17)	(0.17)	(0.17)	(0.17)
Remove Loop	-0.157***	-0.154***	-0.146**	-0.127**
	(0.06)	(0.06)	(0.06)	(0.06)
ROA			0.103	0.379
			(0.57)	(0.60)
Log market-cap			-0.052***	-0.053***
			(0.01)	(0.01)
Log leverage			0.010	0.019
			(0.19)	(0.20)
Returns				-0.071**
				(0.03)
Ultimate ownership			0.134	0.247*
			(0.14)	(0.14)
Control			-0.084	-0.080
			(0.06)	(0.06)
VR			0.151	0.081
			(0.15)	(0.16)
Industry FE	No	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	1,833	1,833	1,810	1,772
R-sq	0.0417	0.0413	0.0411	0.0449

Table 4. Control Effects of Cross-Shareholding Changes

Table 4 reports the estimates of linear regressions estimating the effect of loop addition or removal on a variety of control-related outcomes. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *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 VR*, 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 VR*	*Forward Separation VR*	*Forward Centrality*	*Forward Centrality*
Add Loop	0.221***	0.097***	0.040*	0.012	0.044*	0.048**
	(0.07)	(0.03)	(0.02)	(0.01)	(0.03)	(0.02)
Remove Loop	0.072	0.044	0.011	0.011	0.015	0.011
	(0.05)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
ROA	0.018	0.026	0.194**	0.062*	-0.339***	-0.260***
	(0.25)	(0.11)	(0.08)	(0.04)	(0.11)	(0.08)
Log market-cap	-0.005	-0.004	-0.019***	-0.006***	0.019***	0.012**
	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Log leverage	0.155	0.028	0.083	0.034	-0.211***	-0.185***
	(0.22)	(0.07)	(0.08)	(0.03)	(0.07)	(0.06)
Returns	-0.007	0.005	-0.003	0.000	0.000	-0.001
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Ultimate ownership		0.197***		-0.801***		0.563***
		(0.08)		(0.04)		(0.08)
Control		0.748***		-0.005		-0.018
		(0.04)		(0.01)		(0.02)
VR		-0.078		0.743***		-0.125***
		(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	1,675	1,675	1,675	1,675	1,678	1,678
R-sq	0.5458	0.8003	0.3585	0.7614	0.1958	0.3720

Table 5. Valuation Effects: Variation by Financial Constraints

Table 5 reports the results of regressions estimating the valuation effects by financial constraints, using *Forward Q* as the dependent variable. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *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*), while 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*
Add Loop	-0.073	-0.009	-0.103	-0.014
	(0.14)	(0.08)	(0.14)	(0.06)
Remove Loop	-0.180***	-0.028	-0.149**	-0.096*
	(0.06)	(0.05)	(0.06)	(0.05)
ROA	1.255*	1.932*	1.335**	2.872***
	(0.66)	(1.00)	(0.61)	(1.08)
Log market-cap	-0.023	0.002	0.022	-0.024
	(0.03)	(0.02)	(0.03)	(0.02)
Log leverage	-0.069	-0.012	0.378	-0.008
	(0.36)	(0.26)	(0.29)	(0.30)
Returns	0.095***	0.091***	0.086**	0.114***
	(0.03)	(0.03)	(0.04)	(0.03)
Ultimate ownership	-0.436	-0.649***	-0.518	-0.189
	(0.46)	(0.21)	(0.33)	(0.23)
Control	-0.153	0.122	0.028	0.012
	(0.12)	(0.08)	(0.12)	(0.07)
VR	0.364	-0.009	0.137	-0.117
	(0.42)	(0.17)	(0.32)	(0.16)
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
Observations	812	864	774	850
R-sq	0.5386	0.4197	0.5451	0.4089

Table 6. Valuation Effects: Variation by Conflicts of Interest

Table 6 reports the results of regressions estimating the valuation effects by partitioning the sample based on the wedge between the controlling family's voting and cash flow rights. As in prior analyses, we use *Forward Q* as the dependent variable. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop within a business group. We partition the sample by the cross-sectional median of *Separation VR*, where we estimate equation 6 for the sample with lower *Separation VR* in Column 1 and for the sample with higher *Separation* in Column 2. 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.

	Separation	
	Low Separation	High Separation
	(1)	(2)
	Forward Q	*Forward Q*
Add Loop	0.052	-0.167
	(0.08)	(0.14)
Remove Loop	-0.020	-0.143***
	(0.05)	(0.05)
ROA	0.678	1.941**
	(0.50)	(0.95)
Log market-cap	0.014	-0.015
	(0.02)	(0.03)
Log leverage	-0.020	0.001
	(0.20)	(0.33)
Returns	0.054	0.129***
	(0.04)	(0.04)
Ultimate ownership	2.072**	-0.140
	(0.84)	(0.45)
Control	-0.081	0.036
	(0.09)	(0.13)
VR	-1.940***	-0.082
	(0.65)	(0.40)
Industry FE	Yes	Yes
Time FE	Yes	Yes
Group FE	Yes	Yes
Observations	888	852
R-sq	0.5125	0.5177

Table 7. Expropriation Effects of Cross-Shareholding Changes

Table 7 reports the results of various regressions testing the expropriation effects of cross-shareholding changes. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *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 are *Forward RPT to Assets*, *Forward ROA*, and *Forward Q*, respectively. 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)
	Forward RPT to Assets	*Forward RPT to Sales*	*Forward ROA*	*Forward ROA*	*Forward Q*
Add Loop	0.082**	0.095***	-0.015	-0.007	-0.068
	(0.04)	(0.03)	(0.01)	(0.01)	(0.07)
Remove Loop	0.013	0.008	-0.005	0.001	-0.102**
	(0.03)	(0.03)	(0.01)	(0.01)	(0.04)
ROA	0.685***	0.180		0.591***	1.885***
	(0.24)	(0.18)		(0.04)	(0.72)
Log market-cap	-0.032**	-0.005	0.008***	0.002	0.001
	(0.02)	(0.01)	(0.00)	(0.00)	(0.02)
Log leverage	-0.668***	-0.406***	-0.050**	0.004	-0.063
	(0.21)	(0.15)	(0.03)	(0.02)	(0.22)
Returns	0.005	0.005	0.020***	0.009***	0.086***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.03)
Ultimate ownership	-0.277	-0.104	-0.034	-0.008	-0.541**
	(0.17)	(0.12)	(0.02)	(0.01)	(0.25)
Control	0.061	-0.015	-0.002	-0.001	0.010
	(0.04)	(0.04)	(0.01)	(0.00)	(0.08)
VR	-0.093	0.018	0.021	0.011	0.040
	(0.13)	(0.11)	(0.02)	(0.01)	(0.22)
Industry FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes
Observations	1,291	1,291	1,744	1,739	1,447
R-sq	0.3966	0.2879	0.2432	0.4823	0.4757

Table 8. Valuation Effects: Variation by Loop Complexity

Table 8 reports the results of various regressions testing the effects of cross-shareholding changes on the family's control and ownership of a firm, using *Forward Q* as the dependent variable. In Columns 1 and 2, the main independent variables of interest are *Add loop-size*, which measures an unit increase, and *Remove loop-size*, which measures an unit decrease, in the size of a loop a firm is a part of. *Remove loop-size* is increasing in the reduction of the size of a loop. In Column 3, the main independent variable of interest is *Loop dependency*, which measures, all else equal, a loop's effect on the difference between effective ownership and direct ownership in a loop firm. 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)
	Forward Q	*Forward Q*	*Forward Q*
Add loop-size	-0.003		
	(0.02)		
Reduce loop-size	-0.023**		
	(0.01)		
Loop dependency		-0.030***	-0.028**
		(0.01)	(0.01)
ROA	1.719***	1.928***	2.425***
	(0.59)	(0.59)	(0.63)
Log market-cap	-0.007	-0.007	-0.024
	(0.02)	(0.02)	(0.03)
Log leverage	-0.106	-0.016	0.318
	(0.20)	(0.20)	(0.33)
Returns	0.091***	0.078***	0.060**
	(0.03)	(0.03)	(0.02)
Ultimate ownership	-0.474**	-0.494**	-0.214
	(0.22)	(0.23)	(0.32)
Control	-0.001	0.030	0.177
	(0.08)	(0.07)	(0.13)
VR	0.057	-0.007	-0.231
	(0.20)	(0.19)	(0.31)
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Group FE	Yes	Yes	Yes
Observations	1,744	1,668	352
R-sq	0.4444	0.4574	0.3723

Table 9. Spillover Effects

Table 9 reports the results of regressions testing the spillover of loop removals on the valuation of other group firms. The sample for this test excludes all firms which either had loops removed or are parts of loops. The dependent variable in all columns is *Forward Q*. *Removal Fraction* is measured at the group-year level and is defined as the ratio of the number of firms, in a particular business group in a particular year, which had loops removed to the total number of firms in that group in that year. *High Separation* is an indicator variable that evaluates to 1 if a firm's *Separation VR* is higher than the cross-sectional median. *Removal Fraction * High Separation* represents the interaction of *Removal Fraction* and *High Separation*. We partition our sample by *Position*. Column 1 reports results for estimating Equation 7 for the sample of *chaebol* firms with *Position* greater than or equal to 2, i.e., firms which are lower in a *chaebol*. Column 2 reports results for firms with *Position* less than 2, i.e., for firms which are higher up in a *chaebol*. Column 3 reports results for estimating Equation 8for the sample of *chaebol* firms with *Position* greater than or equal to 2, i.e., firms which are lower in a *chaebol*. Column 2 reports results for firms with *Position* less than 2, i.e., for firms which are higher up in a *chaebol*. All specifications include firm 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.

	Position			
	Lower in Group	Higher in Group	Lower in Group	Higher in Group
	(1) *Forward Q*	(2) *Forward Q*	(3) *Forward Q*	(4) *Forward Q*
High Separation	0.020	-0.157***	0.029	-0.168***
	(0.14)	(0.05)	(0.13)	(0.05)
Removal Fraction			2.040**	-0.071
			(0.94)	(0.12)
*Removal Fraction * High Separation*			-3.094***	1.917***
			(1.15)	(0.66)
ROA	-0.566	0.697	-0.594	0.675
	(0.59)	(0.46)	(0.59)	(0.47)
Log market-cap	0.218**	-0.064	0.222**	-0.060
	(0.10)	(0.04)	(0.10)	(0.05)
Log leverage	-0.252	0.162	-0.282	0.176
	(0.31)	(0.17)	(0.31)	(0.17)
Returns	0.067	0.164***	0.059	0.161***
	(0.09)	(0.04)	(0.09)	(0.05)
Ultimate ownership	0.332	0.024	0.295	0.004
	(0.65)	(0.31)	(0.66)	(0.30)
Control	-0.299**	-0.142**	-0.286**	-0.148**
	(0.15)	(0.07)	(0.14)	(0.07)
VR	0.670	0.344	0.661	0.365
	(0.63)	(0.26)	(0.63)	(0.26)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	653	672	653	672
R-sq	0.7779	0.7946	0.7810	0.7948

Table 10. ERC Effects

Table 10 reports the results of regressions testing the association of loop removal with earnings informativeness. The dependent variable in columns 1–4 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. *Add Loop* is an indicator variable that evaluates to one when a firm is added to a circular loop within a business group. *Remove Loop* is an indicator variable that evaluates to one when a firm is removed from a circular loop within a business group. *Removal Fraction* is measured at the group-year level and is defined as the ratio of the number of firms, in a particular business group, which had loops removed to the total number of firms in that group in that year. *High Separation* is an indicator variable that evaluates to 1 if a firm's *Separation VR* is higher than the cross-sectional median. Columns 1 and 2 report results using the entire sample, while columns 3 and 4 report results for samples partitioned by *Position*. Column 3 reports results for the sample of *chaebol* firms with *Position* greater than or equal to 2, i.e., firms which are lower down in a *chaebol*. Column 4 reports results for firms with *Position* less than 2, i.e., for firms which are higher up in a *chaebol*. All specifications include firm 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. For the specifications in columns 2–4, standard errors are clustered both at the firm and group-year level. Significance levels are indicated by *, **, and *** for 10%, 5%, and 1% respectively.

	Position			
	All	All	Lower in Group	Higher in Group
	(1) *Forward CAR*	(2) *Forward CAR*	(3) *Forward CAR*	(4) *Forward CAR*
Forward SUE	0.025	0.025	0.017	0.029
	(0.02)	(0.02)	(0.02)	(0.03)
Add Loop	-0.005			
	(0.01)			
Remove Loop	0.016			
	(0.01)			
*Add Loop * Forward SUE*	0.022			
	(0.03)			
*Remove Loop * Forward SUE*	0.095**			
	(0.04)			
Removal Fraction		0.044**	0.107**	0.040*
		(0.02)	(0.05)	(0.02)
*Removal Fraction * Forward SUE*		0.131	0.460**	0.040
		(0.10)	(0.18)	(0.13)
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes.	Yes	Yes
Observations	927	927	418	501
R-sq	0.0003	0.0034	0.0025	-0.0028