Product Market Competition and Ownership Structure in Business Groups: Evidence from the Korean *Chaebols*

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Abstract

This paper analyzes the effect of product market competition on controlling family's voting rights and cash flow rights for member firms in business groups. Our results show that member firms in a competitive market have higher direct ownerships by controlling families and lower ownership by affiliates than those in a non-competitive market, thus leading to lower discrepancy between the cash flow right and the control right of the controlling families. This means that product market competition forces the firms to choose an ownership structure that decreases the conflict of interests between the controlling family and minority shareholders. On the other hand, the disciplinary effect of product market competition on ownership structure is mainly observed in older member firms, non-listed member firms, or member firms with lower market shares in their own industry.

JEL Classification Code: G30; G32
Key Words: Product market competition, Business groups, Cash flow right, Control right, Conflict of interests

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1. Introduction

As managers' voting rights exceed their cash flow rights, they tend to have an incentive to pursue private benefit of control rather than to maximize shareholder value, and are likely to decrease firm value and corporate performance (Grossman and Hart, 1988; Harris and Raviv, 1988, 1989). In a broad view, the discrepancy between voting rights and cash flow rights hampers the development of stock markets by reducing investors' incentive to invest in stocks, and it is also regarded as a significant source of the Asian financial crisis (Claessen, Djankov, Fan, and Lang, 2002; Joh, 2003; Dyck and Zingales, 2004).

Nevertheless, discrepancy is still observable in the real world, especially in business groups with many member firms, because controlling families can easily increase their voting rights by the use of cross-holding and pyramidal ownership structure. In this regard, existing literature has focused on analyzing ownership structure in business groups and finding out how controlling families form voting rights and cash flow rights, and maximize their own utility (Chang, 2003; Lim and Kim, 2005; Kang, Park, and Jang, 2006; Kim, Lim, and Sung, 2007; Almeida, Park, Subrahmanyam, and Wolfenzon , 2011). Existing literature shows that the private benefit of control of managers[1] can be increased when they increase their indirect ownership using ownership of affiliates (Lang, Stulz, and Walking, 1991, Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000, Bae, Kang, and Kim, 2002).

This paper examines the effect of product market competition (hereafter, PMC) on the ownership structure of business groups. Demsetz and Lehn (1985) argue that the ownership structure of a firm is considered as an endogenous variable, because managers can change their own stock holding in reaction to the external environment and firm performance. An ownership structure is formed endogenously because it is affected by various firm characteristics[2] as well as the external environment (Durnev and Kim, 2005). In this paper, we consider PMC as another external environmental factor that can affect ownership structure. We conjecture that PMC, which affects firms' long-term survival and profitability, would affect controlling shareholders' decision on their own voting rights and cash flow rights.

On the other hand, PMC as an external control mechanism disciplines managers to maximize shareholder value (Schmidt, 1997; Shleifer and Vishny, 1997; Griffith, 2001). Competitive market increases the bankruptcy risk that accompanies inappropriate investment decisions so that agency problems would be mitigated by decreasing overinvestment incentive of managers (Holmstrom, 1982; Hart, 1983). On the other hand, Jensen and Meckling (1976) show that if a controlling shareholder has more direct ownership, he will have less incentive to pursue private benefit of control because they will have to bear the entire burden of agency costs. Alchian (1950) and Stigler (1958) also argue that firms in competitive market arrange good corporate governance as a bonding mechanism in order to minimize the cost of capital. Therefore, under less competitive market, controlling shareholders would want to decrease their direct ownership and increase their indirect ownership so that the effect of their pursuit of the private benefit of control can be maximized.

Focusing on business groups as the objects of our study is also opportune since their controlling shareholders can easily adjust their direct and indirect ownerships while stand-alone firms do not enjoy such flexibility.

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[1] Transferring corporate resources to member firms by loan guarantees or low internal transfer prices is considered as a controlling family's method of pursuing private benefit of control (Jensen, 1986; Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000).

[2] Crutchley and Hansen (1989) show that managers' ownership is affected by the firm's volatility and size (Bathala, Moon, and Lao, 1994). Holderness, Kroszner, and Sheehan (1999) find that manager ownership increased between the 1990s and the 1930s, and ascribe this result to an improvement of manager's ability to diversify various risks of his firm.

In sum, we hypothesize that in a non-competitive market, a controlling family will lower the level of direct ownership and increase indirect ownership through other member firms to maximize their private benefit of control. On the other hand, in a competitive market, it is more difficult to pursue private benefit of control because the controlling family will face higher bankruptcy risks. In this context, decreasing voting rights and increasing cash flow rights would be an optimal choice for them; they would have a higher degree of direct ownership and lower indirect ownership.

On the other hand, we can also conjecture that PMC would differently affect the ownership structures of member firms in business groups depending on their firm characteristics. For example, firms with a larger market share in their own industry are relatively less affected by the discipline of PMC than are firms with a smaller market share (Greer, 1980; Tirole, 1988; Byun, Lee, and Park, 2011). Therefore, we conjecture that the disciplinary effect of PMC on ownership structure in business groups will be stronger for firms which are more sensitive to competitive threat (i.e. those with a smaller market share), but this effect will disappear or decrease for firms with a larger industry market share. We also consider other features of member firms such as their years in business or whether or not they are listed on the stock exchange.

As far as we are informed, this paper is the first that considers PMC as a determinant of ownership structure in business groups. Existing literature focuses on the disciplinary role of PMC or the interaction between PMC and corporate governance on firm value (Bolton and Scharfstein, 1990; Grullon and Michaely, 2006; Giroud and Mueller, 2011; Kim and Lu, 2010). Guadalupe and P'erez-Gonz'alez (2005) investigate the effect of PMC on voting premium, which is a proxy for the private benefit of control while Karuna (2010) shows that PMC had a non-linear effect on corporate governance such as board characteristics and the protection level of shareholder rights.

The sample firms in our paper are comprised of the Korea *chaebols* (conglomerates). Controlling families in *chaebols* form ownership structure of member firms in such a way as to maximize private benefit of control by cross-holding or pyramid ownership structure (Bae et al., 2002; Baek, Kang, and Lee, 2006; Bae, Cheon, and Kang, 2008). They are also known to abuse their voting rights by expropriating minority shareholders through wealth transfers among member firms and overinvestment in negative NPV projects (Johnson et al., 2000; Baek, Kang, and Park, 2004). On the other hand, some studies have demonstrated that controlling families who have control power over a majority or all of the member firms in *chaebols* will support unprofitable member firms through bond issuing, loan guarantees and the provision of new business opportunities (Friedman, Johnson, and Mitton, 2003; Bae et al., 2008). Although there are many papers that examine the effect of discrepancy between voting rights and cash flow rights on firm value and profitability, there is as yet few analysis of how controlling family arranges ownership structure in *chaebols* (Almaida et. al., 2011).

The Korean economy, where firms in business groups are numerous is a good experimental environment in which to analyze our hypotheses and can provide us with a relatively large number of business group firms where the discrepancy between the cash flow rights and control rights of controlling shareholders become more relevant. Furthermore, in the Korean capital market, other external control mechanisms such as the market for corporate control and the managerial labor market hardly exist, while PMC operates relatively well. (Black, Jang, and Kim, 2006) Therefore, testing our hypotheses with Korean firms mitigates the potential noise which can occur when other external control mechanisms intervene in the relationship between PMC and ownership structure (Byun et al., 2011).

We also examine which member firms in business groups are the most affected by PMC. We consider a firm’s age and whether it is listed in stock exchange or not. The firm’s age is significant as Morck, Shleifer and Vishny (1988) argue that young firms will need support from a controlling family

who has control power over member firms in business groups, because these firms have to be intensively supported by the internal capital market so they can integrate with their industry rapidly (Khanna and Pelepu, 2000). Therefore, we conjecture that the effect of PMC on ownership structure will be mainly observed in older firms which have already established their place in industry. Stock exchange listing, on the other hand, is also relevant because the marginal effect of PMC would be smaller as listed firms are also regulated by related laws and regulations to protect minority shareholders. Moreover, it would be more difficult for public firms to change their ownership structure, because they have a dispersed ownership structure involving many minority shareholders. On the other hand, a controlling family can easily change the ownership structure of a private firm. Therefore, we can expect that the effect of PMC on ownership structure will be mainly observed in private member firms.

To examine the effect of PMC on ownership structure, this paper considers the discrepancy between voting rights and cash flow rights, ownership by affiliates and the controlling family's direct ownership of member firms as dependent variables and regress these variables on PMC indices. In addition, we separate the sample into two groups based on their market share in their own industry and test whether disciplinary effect of PMC on ownership structure in business groups is stronger for firms which are more sensitive to competitive threat. To measure PMC, we use HHI (the Herfindahl-Hirschman Index), and the CR_3 (Concentrate Ratio) as a supplemental measure. To control for firm characteristics which might change the effect of PMC on ownership structure, we divide the sample into two groups based on the firm's age, and whether or not the firm is listed in stock exchange, and then rerun the regressions in each sample.

The empirical results are as follows: firstly, PMC has a significantly negative effect on discrepancy for member firms. This result suggests that in a competitive market, a controlling family prefers higher cash flow rights and lower voting rights. Likewise, ownership by affiliates increases and direct ownership decreases.

Secondly, PMC has different effects depending on firm characteristics. The effect of PMC on ownership structure in business groups is stronger in member firms with a lower market share. It also has a more significant effect on the ownership of older or private member firms.

These results support our prediction and correspond with the argument that PMC disciplines managers to choose an ownership structure better for minority shareholders, but with different level of impacts depending on firm characteristics.

The rest of this paper is organized as follows. Section 2 discusses related literature and develops our hypotheses. Section 3 describes data and methodologies. Section 4 reports the empirical results, and section 5 presents our conclusion.

2. Previous Literature and Hypotheses Development

2.1 Previous Literature

Grossman and Hart (1988) find that as firms deviated from a one-share one-vote ownership structure, potentially corrupt or incompetent managers could take over the firm with increasing ease and pursue private benefit of control, and that the market for corporate control does not operate well. Harris and Raviv (1988) also argue that incompetent incumbent managers can defend themselves from takeover and lower their costs when there are cheap votes available. Even though there is a scholarly consensus about the harmful effect of discrepancy, we can nevertheless observe a large number of real firms with high discrepancy. La Porta, Lopez-de-Silanes, and Shleifer (1999) analyze ownership structure in 17 countries and confirmed that discrepancy, as the main source of agency problems, is commonly observed. Claessen, Djankov, and Lang (2000) argue that discrepancy is high in Asian countries and in business groups, and Faccio and Lang (2002) find similar pattern in European countries.

Firms which operate in conglomerates typically have high discrepancy. They have little direct ownership, but exercise huge control power over member firms using dual-class stock, cross-holding, and a pyramid ownership structure. Wolfenzon (1999) find that controlling families choose pyramid ownership structure because they facilitate developing voting rights over cash flow rights. Kang et al. (2006) show that a controlling family in Korean *chaebols* also choose pyramid ownership to diversify investment risks and to transfer wealth easily among member firms so that maximize the private benefit of control. Attig, Fischer, and Gadhoum (2004) examine the determinants of discrepancy in Canadian firms, and showed that asset size, risk, and the level of free cash flow have a positive effect on discrepancy, but that dividends and leverage have a negative effect on it. Chang (2003) analyze the relation between direct ownership and firm performance, and found that a controlling family increases the direct ownership of profitable member firms. Lim and Kim (2005) similarly demonstrate that the firms with high leverage in business groups tend to be owned directly by the controlling family, whilst firms with a larger size have indirect ownership by controlling shareholder. Kim et al. (2007) also show that a controlling family will increase direct ownership of member firms with control power. Almeida et al. (2011) find that within a business groups, sound firms will acquire unprofitable firms with high premium using the pyramid ownership structure to do so.

Discrepancy will bring a conflict of interest between the controlling family and minority shareholders. Bebchuk, Kraakman and Triantis (1999) show that the controlling family will use high discrepancy to maximize their private benefit of control and to set up various internal control devices to avoid hostile takeover. Johnson et al. (2000) argue that a controlling family which has larger voting rights than it does cash flow rights will generate excessive loan guarantee, set up low transfer prices and transfer assets to member firms. Tunneling activity such as this exploits the wealth of minority shareholders (Claessen et al., 2002; Lemmon and Lin, 2003).

Some papers analyze harmful influence of Korean business groups, *chaebols*. Joh (2003) shows that discrepancy has negative effect on profitability and this brings about financial crisis to Korea. Beak et al. (2004) present that during financial crisis, high discrepancy severely lower firm value of member firms in *chaebols*. Bae et al. (2002) show that controlling shareholder in *chaebols* diversifies business recklessly by M&A for maximizing the private benefit of control. Baek et al. (2006) find that controlling shareholder exploits wealth of minority shareholder in affiliates by acquiring or issuing equity of affiliates.

On the other hand, there are papers that find advantages of existence of controlling shareholder in business groups to corporate management. Under information asymmetry, affiliates with growth opportunity could get concentrated financial support from internal capital market which is controlled by controlling shareholder. (Harris and Raviv, 1996; Merton and Bodies, 1992; Stein, 1997) Khanna and Pelepu (2000) find that such internal capital market plays an important role in emerging market where external capital market has not fully developed. Almeida and Wolfenzon (2006) demonstrate that firms use the internal capital market in a pyramid ownership structure in emerging countries. They also showed that in countries with low levels of investor protection, controlling families choose pyramid ownership structure to raise funds easily using the internal capital market. Bae et al. (2008) show that when some firms in *chaebols* disclose large positive earning, the stock return of other affiliates in the same business groups also increases simultaneously. In sum of these existing literatures, there is no consensus of function of controlling shareholder in business groups. We analyze how they arrange ownership structure of business groups.

This paper considers PMC as being one of determinants of ownership structure. It is well-known that PMC has an important effect on firm performance. Competitive threat increases managements' turnover sensitivity to performance and leads them to focus efforts on maximizing shareholder wealth (Hart, 1983; Schmidt, 1997; Griffith, 2001). Furthermore, in a competitive market, managers have a

strong incentive to disclose high quality information for minimizing the cost of capital. (Holmstrom, 1982; Hart, 1983) In the long term, PMC leads managers who want to lower transaction costs and get a competitive edge to arrange the optimal corporate governance structure (Alchian, 1950; Stigler, 1958). Guadalupe and P'erez-Gonz'alez (2005) present a negative effect of PMC on voting premium. Karuna (2010) find that PMC has a non-linear effect on internal corporate governance. Based on these studies, we can propose that PMC has a significant effect on corporate governance and ownership structure as well as on firm value and management activities.

PMC also influence management activities. La Porta et al. (2000) find that in a competitive market, managers facing high bankruptcy risks will prefer retaining earnings to paying dividends, while in a non-competitive market managers will prefer paying dividends or repurchasing stocks so as to signal the firms' reputation and overcome information asymmetry. Bolton and Scharfstein (1990), Grullon and Michaely (2006) find that in non-competitive market managers prefer to retain earnings rather than pay dividends so as to defend the competitive pressure that is generated by potential rival firms. Schumpeter (1943) shows that firms which have market power over a certain level are more likely to invest actively. Fellner (1951) and Scherer (1980) argue that PMC has a positive effect on investment expenditure because in a competitive market, firms have a strong incentive to develop new products.

PMC has an effect on firm value and other corporate governance mechanisms. Giroud and Mueller (2011) find that the trading strategy which entails long stocks in firms with good corporate governance and short stocks in firms with weak corporate governance has a significantly positive abnormal return only in a non-competitive market. Kim and Lu (2010) use management ownership as a proxy for internal corporate governance and argued that the average level of management ownership substitutes for PMC in maximizing firm value. Yet there is no study that examines how PMC affect on ownership structure in business groups.

2.2 Hypotheses Development

This paper examines whether a controlling family will change their voting rights and cash flow rights for member firms considering PMC in a way that will maximize the economic value derived from direct ownership and private benefit of control. Typically, a controlling family has the strong incentive to pursue their private benefit of control using a high discrepancy. However, such incentive decreases in a competitive market because competitive pressure induces high investment risks and bankruptcy costs. On the other hand, in a non-competitive market the controlling family has a strong incentive to expand discrepancy and maximize the private benefit of control. Therefore, we suggest that PMC will have a negative effect on the discrepancy between voting rights and cash flow rights for firms who are a member of a business groups, e.g. a *chaebols*.

Hypothesis 1: PMC has a negative effect on the discrepancy between cash-flow rights and control rights

Hypothesis 1 is influenced by the changes in ownership of affiliates and direct ownership. In a non-competitive market, if the direct ownership of the controlling family is 100%, they do not have any incentive to pursue a private benefit of control (Jensen and Meckling, 1976). They will thus prefer to decrease direct ownership and to increase voting rights through ownership of affiliates, provided the market is non-competitive.

We analyze the relationship between PMC and ownership of affiliates so as to explore the way through which a controlling family can change their overall ownership structure. Cross-holding and pyramid ownership are the typical ways that a controlling family can achieve excessive voting rights

(Johnson et al., 2000). We further propose that a controlling family will prefer to increase ownership of affiliates to expand voting rights in a non-competitive market, but to decrease it in a competitive market.

Hypothesis 2: PMC has a negative effect on other member firms' ownership

To pursue private benefit of control, a controlling family will decrease direct ownership in a non-competitive market, while they will increase it in competitive market. This prediction is based on the existing literature which demonstrates that PMC disciplines management into arranging optimal ownership structure that will improve the efficiency of firms (Alchian, 1950; Stigler, 1958). Furthermore, because a controlling family does not want to risk agency problems in a competitive market, they will increase their direct ownership as a bonding mechanism. We therefore propose that PMC has a positive effect on controlling family's direct ownership.

Hypothesis 3: PMC has a positive effect on controlling family's direct ownership

Hypothesis 1, 2, and 3 may not be true for whole firms in each industry, because firms with higher market shares in their own industry will be less exposed to competitive pressure (Greer, 1980; Tirole, 1988; Byun, Lee, and Park, 2011). The disciplinary effect of PMC would therefore decrease in firms with a high market share. In contrast, firms with a lower market share will be strongly disciplined by competitive threat. Therefore, Hypothesis 1, 2, and 3 should be mainly supported in firms with a lower market share rather than in firms with a higher market share.

Hypothesis 4: The relationship between PMC and ownership structure is stronger in firms with a lower market share

Additionally, this paper analyzes which firm characteristics affect the relationship between PMC and ownership structure. In an early stage of a business's development, it is beneficial for member firms to use their internal capital market to raise capital (Morck et al., 1988; Khanna and Pelepu, 2000). To use the internal capital market, the controlling family should have concentrated authority over managerial decision-making. For instance, controlling families may support unprofitable young member firms in their business groups through the internal capital market during a financial crisis (Friedman et al., 2003). Therefore, the controlling family needs a certain level of control power and is less likely to change ownership structure because of PMC. On the other hand, older firms with stable profits will have a stronger relation between PMC and ownership structure. We therefore propose that Hypothesis 1, 2, and 3 will be mainly observed in older member firms.

Hypothesis 5: The relationship between PMC and ownership structure is stronger in older, better-established member firms.

We also consider whether or not a firm is publicly listed. Since firms listed in the stock exchange are disciplined by external control mechanisms such as regulation and the market for corporate control, the effect of PMC on ownership structure could decrease in these firms. Moreover, listed firms tend to be owned by dispersed shareholders, so a controlling family cannot easily change their ownership based on PMC. On the other hand, as unlisted firms are not exposed to other control devices and tend to be owned by fewer shareholders, here the controlling family can easily change the ownership. It is documented that controlling families secure their control power over all the member

firms in their business groups by owning private firms.[3] Therefore, we expect Hypothesis 1, 2, and 3 to be more strongly observed in private member firms.

Hypothesis 6: The relationship between PMC and ownership structure is stronger in private member firms

3. Data and methodology

3.1 Data

Our sample consists of Korean *chaebols* member firms from 2001 to 2009. Our dataset contains 65 conglomerates and 488 firms. We excluded state-owned enterprises, because in these there is no controlling family. We only used business groups that were managed by a controlling family.[4] We obtained our financial data from the TS-2000, which is a dataset compiled by the Korea Listed Companies Association (KLCA). The final sample comprises 4,359 firm-years.

The ownership data is taken from the Korean Fair Trade Commission[5] (KFTC), which contains detailed information about intra-group shareholdings. The KFTC annually reports on conglomerates, showing the controlling family's level of power over the member firms and their asset size and further discloses the controlling family's degree of direct ownership, the level of discrepancy, and ownership of affiliates.[6] Because this database contains the data for both private and public firms, we can test our hypotheses more efficiently. Due to this advantage, existing literature that has investigated the formation of business groups has commonly used this database (Kim et al., 2007; Almeida et al., 2011). The controlling family's direct ownership (cash flow rights) is calculated as the sum of the ownership of controlling shareholder and their relatives. Discrepancy is *de facto* control power exercised by a controlling family through the excessive voting rights over cash flow rights. The controlling family's degree of voting rights is computed as being the sum of the controlling family's ownership, that of the affiliates, the senior managers of the firm, and the non-profit organizations owned by the controlling family. Discrepancy is computed by calculating the controlling family's voting rights minus their direct ownership for each member firm.

Table 1 shows the year-on-year trends of the controlling family's discrepancy, direct ownership levels, and ownership of affiliates in the *chaebols*. The discrepancy averages 0.51 over the sample period. This number implies that controlling families who do not have direct ownership exercise about 50% of voting rights. In other words, they have *de facto* control power over group firms. This result is similar to that found in Kim et al. (2007), which was a value of 0.47. Therefore, the *chaebols* with a large discrepancy provide a good empirical sample for analyzing the changes in a controlling family's incentives based on PMC. Direct ownership by a controlling family for member firms averages 0.18, similar to the finding in Almeida et al (2011) which was 0.21. Ownership of affiliates averages 0.49, meaning that the controlling family has voting rights gained mainly through its significant ownership of affiliates.

[Insert Table 1 here]

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[3] A typical example is the ownership structure of Samsung, which is the largest business group in Korea. 'Kun Hee Lee' as the controlling shareholder has a control power over member firms by owning 'Everland' as a private member firm. He has tried to pass on this control power to his son 'Jae Yong Lee' by giving his share in Everland illegally.

[4] This criteria is used in Kim et al. (2007) and Almeida et al. (2011)

[5] KTFC was founded in 1981 to monitor conglomerate activity in the national economy. The main purpose of this government institution is establishing a fair trade policy and monitoring unfair transactions. This data is also used in Kim et al. (2007) and Almeida et al. (2011).

[6] Detailed descriptions of ownership data in this paper refers to Table 1 of Kim et al. (2007), Figure 1 of Almeida et al. (2011) and http://groupopni.ftc.go.kr

Our measure of PMC is the HHI (Herfindahl-Hirschman Index). This measure is calculated as follows:

$$\boldsymbol{HHI_{jt} = \sum_{i=1}^{n} s_{ijt}^2}$$

Here, s_{ijt} is the market share of firm i in industry j in year t. Market shares are calculated using the sales data of firms in the TS2000. The HHI is computed by the sum of squared market shares in each industry.[7] To classify industries, we assigned each company to an industry by matching it to a 3-digit Korea Standard Industry Code (KSIC).[8] The number of industries is 237. Market shares are computed using sales of firms.

When computing the HHI, we include not only listed companies but private firms with large assets who have considerable power in their industry. Private firms with assets of more than 7,000 million won are subject to external audit, and are regulated by the Act on External Audits. Since we include private firms in our measure of the HHI, this measure is more complete compared with those studies that calculated using only listed firms or high market share firms (Grullon and Michaely, 2006; Giroud and Mueller, 2011). As a high HHI reflects non-competitive industries and a low HHI reflects competitive industries, we employ 1-HHI as a variable representing PMC. We also use a CR_3 (Concentration Ratio) as a supplemental measure of PMC.[9] CR_3 is calculated by the sum of the market shares of three biggest market share firms. High CR_3 means that the firm is in a non-competitive market, so we also use 1-CR_3 as a proxy for the level of PMC.

Table 2 shows the sample distribution based on HHI. Sample distribution of member firms in *chaebols* based on HHI (column 6) is similar to that of total firms (column 3). 63.73% and 67.98% of *chaebols* firms and total firms are in highly competitive market, respectively. This result means that our result is not exposed to sample selection problem which occurs if controlling families decide the entry of member firms considering the level of PMC. In other words, it is not the case that controlling shareholder chooses to enter only in non-competitive market in order to pursue the private benefit of control.

[Insert Table 2 here]

3.2 Methodology

To examine the effect that PMC has on ownership structure, we estimate the following pooled OLS regression.[10] In order to alleviate any interpersonal/intragroup correlation in residuals, and likewise to avoid serial correlation and heteroscedasticity in panel data, we use robust standard errors in testing for the significance of coefficients.

$$\begin{aligned}\boldsymbol{Ownership_{it} =\ & \beta_0 + \beta_1(1 - HHI)_{it} + \beta_2(1 - CR_3)_{it} + \beta_4 Market\ Share_{it} + \beta_5 Size_{it} \\ & + \beta_6 Leverage_{it} + \beta_7 Profit + \beta_8 Cash_{it} + \beta_9 Volatility_{it} + \beta_{10} Financial_{it} \\ & + \beta_{11} \#\ Affiliates_{it} + \beta_{12} Year_{it} + e_{it}}\end{aligned}$$

Ownership$_{it}$ here denotes discrepancy, ownership of affiliates, or the controlling family's direct

[7] The HHI is commonly used in economic literature, e.g., Tirole (1988) and corporate finance literatures, e.g., Grullon and Michealy (2006), Giroud and Mueller (2011) etc. Also this measure is routinely used by government agency like horizontal merger guideline in U.S.

[8] The results in using KSICS with 2-digit are similar to reported results.

[9] Since this measure rules out the effect of the number of firms on market structure, it has a limitation.

[10] Considering statistical distribution of ownership, estimation result using median regression is similar to reported results using an OLS regression. In order to check the robustness of our empirical results, we also run Fama and MacBeth (1973) cross-sectional regressions and find similar results.

ownership of member firm *i* in year *t*. *1-HHI* and $1\text{-}CR_3$ as main independent variables are proxies for the level of PMC. We control firm specific variables such as market share (*Market Share*), asset size (*Size)*, debt ratio (*Leverage*), profitability (*Profit*), cash reserves (*Cash*), volatility (*Volatility*), dummy variables that take the value of one if the firm is a financial institution (*Financial*), and the number of *chaebols* member firms (*# Affiliates*) as in Kim et al. (2007) and Almeida et al. (2011). Managers will arrange corporate governance structures relative to their firm's position in the industry (Black, Jang, and Kim, 2006). To control for this effect, we include the market share of firms in their specific industry, computed as the sales of the firm divided by the sales of the industry. We include a natural log of total assets to control for size effect. As the firms' asset size increases, the management will need more funds to secure corporate control and burden the higher risks that occur in undiversified investment. Thus, a firm's asset size has a negative effect on the ownership of a controlling family (Jensen, Solberg, and Zorn., 1992; Bathala et al., 1994). Since an increase in debt dilutes ownership, we include a leverage ratio calculated by the total debt divided by the total assets. In profitable firms, controlling families prefer to increases their direct ownership (Chang, 2003; Kim et al., 2007), so the sum of returns on assets over the past three years is included in our analysis. In order to control for the effect of firm growth, we contain the sales growth rate as compared with previous year. In firms with a high free cash flow, the controlling family can use extra funds for self-dealing activities and will have a strong incentive to pursue their private benefit of control (Jensen, 1986; Harford, 1999). Thus, we can include cash reserves, computed by cashable assets divided by total assets. As the uncertainty of firms decreases management ownership because of a tendency towards risk aversion (Fama and Jensen, 1983), we also contain the past three years' standard deviations in return on assets as a proxy for a firm's volatility. Since financial firms are exposed to different regulations, we include a dummy that takes the value of one if a firm is financial institution. The controlling family's power is proportional to the number of member firms in their business groups, because they can maintain their control in various ways. To control for this effect, we contain the natural log of the number of member firms. We also control for year fixed effects.[11]

[Insert Table 3 here]

Since firms with higher market power are less affected by competitive pressure, the relationship between PMC and ownership structure in business groups is stronger in firms with a lower market share. Therefore, we divided our sample into two groups based on their market share, and re-estimated the same analysis for each divided sample. For robustness of this prediction, we additionally separated the sample into two groups based on whether the firm has the largest market share (dominant firms) in its own industry or not (non-dominant firms) and then re-estimated the relationship between PMC and ownership structure in *chaebols*.

In order to confirm the Hypothesis 5 and 6, we also divided our sample into two groups based on the median of the firm's age and conducted the same calculations for the purposes of re-estimation. Likewise, we divided our sample into two groups based on whether they were listed (public firms) or not (private firms) and re-estimated the relationship between PMC and ownership structure based on this.

4. Empirical results

4.1 Descriptive statistics

[11] To control the endogeneity problem between ownership structure in business group and product market competition, we estimate the same empirical model using firm-fixed effect analysis (Himmelberg, Hubbard and Palia, 1999) and get the similar results as reported. Therefore, we can confirm that the effect of endogeneity problem on our hypotheses is not crucial.

Table 4 shows descriptive statistics related to our variables. The discrepancy averages 0.5054 (0.5000 median) and ownership of affiliates averages 0.4787 (median 0.4784). The direct ownership of the controlling family averages 0.1750 (0.0000 median). As a proxy for level of PMC, the *1-HHI* averages 0.8852 (0.9278 median). This is similar to U.S. figures reported in Grullon and Michealy (2006). $1\text{-}CR_3$ averages 0.5805 (0.6152 median). The market share averages 0.0619 (median 0.0144) meaning that all *chaebols* firms do not have substantial market power in their product market. Their economic size averages 1,311 million won. It is well-established that the huge leverage in *chaebols* was the main source of the Asian financial crisis (Beak et al., 2004) but leverage in our sample averages 0.5448 (0.5462 median) showing that it has considerably decreased since the time of the financial crisis. Profitability averages 0.0848 (0.0931 median) and sales growth averages 0.1601 (0.0826 median). Cash reserves averages 0.1508 (median 0.0672) and volatility, as a proxy for firm's risk, averages 0.0658 (0.0294 median). About 8% of the sample firms in our paper are financial institutions. The number of member firms in a *chaebols* averages about 33.

[Insert Table 4 here]

4.2 Univariate tests

Table 5 shows univariate test results. In order to investigate the relationship between PMC and ownership structure, we divide the total sample into two groups based on the median of the *1-HHI*. We calculate the difference in the average of discrepancy, ownership of affiliates, and direct ownership between each sample and then estimate statistical significance using t-statistics. In panel A, the difference in discrepancy, ownership of affiliates, and direct ownership between firms in competitive and non-competitive market are all statistically insignificant. Since the exposure level of firms to PMC is changed by their market power, namely the market share in their own industry, we also divided the whole sample into two groups based on the median of the market share of firms and retried the same test.

Panel B shows the results of this re-test for higher market share firms. The difference in discrepancy, ownership of affiliates, and direct ownership between firms in competitive and non-competitive market was still found to be statistically insignificant. These results may be because firms with higher market shares are less exposed to competitive pressure. The results therefore support Hypothesis 4.

Panel C shows results for lower market share firms. The average of discrepancy is higher in the non-competitive market than it is in the competitive market. The differences of the average (p-value=0.0000) and the median (p-value=0.0000) are statistically significant. This result implies that a controlling family will increase their control power in a favorable environment, non-competitive market, to maximize the private benefit of control. Ownership of affiliates is also higher in non-competitive market than in competitive market for lower-market share firms. The differences of the average (p-value=0.0000) and the median (p-value=0.0001) are statistically significant. Thus it can be suggested that controlling families increases their control power by owning affiliates in a non-competitive market. On the other hand, direct family ownership is higher in the competitive market than it is in the non-competitive market. The differences of the average (p-value=0.0003) and the median (p-value=0.0010) are statistically significant. This result suggests that families decrease their level of direct ownership to pursue the private benefit of control in non-competitive market, especially, in member firms with lower market share. This is consistent with Hypothesis 4.

[Insert Table 5 here]

4.3 Multivariate tests

4.3.1 Impact of PMC on discrepancy

Table 6 shows the effect of PMC on discrepancy after controlling for firm characteristics. In Models (1) and (2) using the total sample, the *1-HHI* as a proxy for PMC has a significantly negative effect on discrepancy (t=-4.08) at 1% confidence level. This result means controlling families increase their control power to pursue a private benefit of control in the non-competitive market, an environment in which there are inherently fewer risks. This supports Hypothesis 1. Unlike for the results of univariate tests, the reason that the *1-HHI* has a significant effect on discrepancy in the total sample is that we include market share (Market share) as a control variable. Used as a supplemental measure for PMC, $1\text{-}CR_3$ also has a significantly negative effect on discrepancy (t=-2.35) at 5% confidence level.

As control variables, *Size* has a significantly negative effect on discrepancy which implies that in large firms, a controlling family needs more resources in order to maintain their control power. *Leverage* and *Financial* both have a positively significant effect on discrepancy. The number of affiliates also has a significantly positive effect. This is because a controlling family in a business groups with many member firms can increase voting rights and discrepancy by various ways, depending on the firms involved.

In Models (3) and (4) we look at firms with higher market shares, and here *1-HHI* and $1\text{-}CR_3$ do not have a significant effect on discrepancy. Firms with higher market power are less affected by the competitive pressure (Greer, 1980; Tirole, 1988; Byun, Lee, and Park, 2011). This supports Hypothesis 4. On the other hand, in Models (5) and (6) using firms with lower market share, *1-HHI* has a significantly negative effect on discrepancy (t=-4.02) at 1% confidence level and the coefficient of *1-HHI* is higher than that found in Model (1). Therefore, the effect of PMC on discrepancy is stronger for those firms that are more exposed to competitive pressure, which supports our Hypothesis 4. $1\text{-}CR_3$ also has a significantly negative effect on discrepancy (t=-2.88) at 1% confidence level.

[Insert Table 6 here]

4.3.2 Impact of PMC on ownership of affiliates

In Table 7, we use ownership of affiliates as a dependent variable. As with the results of Table 6, in Models (1) and (2) using the total sample *1-HHI* has a significantly negative effect on the degree of ownership of affiliates (t=-4.99) at 1% confidence level. This result suggests that a controlling family will increase their control power using ownership of affiliates in a non-competitive market (Johnson et al., 2000), and supports Hypothesis 2. Used as a supplemental measure for PMC, $1\text{-}CR_3$ also has a significantly negative effect on the ownership of affiliates (t=-2.78) at 1% confidence level. The coefficient of other control variables is similar to the results found in Table 6.

In Models (3) and (4), looking at firms with higher market share, *1-HHI* and $1\text{-}CR_3$ do not have a significant effect on ownership of affiliates, while in Model (5) and (6) using firms with lower market share, *1-HHI* has a significantly negative effect on discrepancy (t=-5.10) at 1% confidence level. $1\text{-}CR_3$ also has a significantly negative effect on ownership of affiliates (t=-3.20) at 1% confidence level. These results support Hypothesis 4.

[Insert Table 7 here]

4.3.3 Impact of PMC on direct ownership

Table 8 shows the effect of PMC on direct ownership by the controlling family. In Models (1) and (2) using the total sample, *1-HHI* has a significantly positive effect on direct ownership (t=1.69) at 10% confidence level, but the coefficient of $1\text{-}CR_3$ is statistically insignificant. We divided the sample into two groups based on their market shares and re-estimated the effect for each separated sample. In Models (3) and (4), looking at firms with a higher market share, *1-HHI* and $1\text{-}CR_3$ do not have a

significant effect on direct ownership, but in Models (5) and (6) for lower market share firms, *1-HHI* has a significantly positive effect on direct ownership (t=2.01) at 5% confidence level. $1\text{-}CR_3$ as a supplemental measure for PMC also has a significantly positive effect on direct ownership (t=2.12) at 5% confidence level. These results suggest that a controlling family decreases direct ownership to maximize their private benefit of control in a non-competitive market where they can easily generate agency problems. On the other hand, in a competitive market with higher competitive pressure they will increase their direct ownership as a bonding mechanism. This supports Hypothesis 3 and 4. Eventually, PMC will discipline the controlling family to arrange an optimal ownership structure (Jensen and Meckling, 1976).

As a control variable, *Leverage* has a significantly negative effect on direct ownership. This implies that controlling families increase direct ownership in firms with low bankruptcy risks. *Profit* has a significantly positive effect on direct ownership, suggesting that there is higher direct ownership in profitable firms to increase the economic value of cash flow rights (Chang, 2003; Kim et al., 2007). *Financial* variable has a significantly negative effect on direct ownership. The number of affiliates also has a significantly negative effect on direct ownership, because of the capital constraints that are likely to exist for a controlling family.

[Insert Table 8 here]

4.3.4 Alternative specification of market power

In Table 9, we divide whole sample into two groups based on whether firms have the largest market share (dominant firms) in their own industry or not (non-dominant firms) and re-analysis each separated sample to test the robustness of Hypothesis 4. In Models (1)-(3) using the sample of dominant firms, *1-HHI* has a statistically insignificant effect on discrepancy, ownership of affiliates, and on direct ownership. On the other hand, in Models (4)-(6) using non-dominant firms, *1-HHI* has a significantly negative effect on discrepancy (t=-4.24) and ownership of affiliates (t=-5.02), respectively, at 1% confidence level, while it has a positive effect on direct ownership (t=2.26) at 5% confidence level. These results also support Hypothesis 4.

[Insert Table 9 here]

4.4 Impact of PMC on ownership structure in business groups: young vs. old firms

This paper analyzes firm characteristics that affect the relationship between PMC and ownership structure. We divide our sample into two groups based on the median of the firm age and re-estimate the relationship between PMC and ownership structure in light of this characteristic.

Models (1)-(3) in Table 10 show the results of the effect of PMC on ownership structure in young firms (that is, under the median firm age of the total sample). Here, *1-HHI* has a statistically insignificant effect on discrepancy, ownership of affiliates and direct ownership. Since young firms need the intervention of the controlling family and the use of an internal capital market, it is reasonable to conclude that they do not change the ownership structure of member firms based on PMC in order to maximize the private benefit of control (Morck et al., 1988).

On the other hand, in Models (4)-(6) for older firms, *1-HHI* has a significantly negative effect on discrepancy (t=-6.31) and ownership of affiliates (t=-7.08), respectively, at 1% confidence level, while it has a positive effect on direct ownership (t=3.04) at 1% confidence level. These results are consistent with Hypothesis 5.[12]

[12] If there are correlations among market share, firm age, and whether firm is listed, we cannot identify which firm characteristics mainly lead to the relationship between PMC and ownership structure. Therefore, we divide our sample of firms with lower market share based on the firm age and whether firm is listed or not, and then re-

[Insert Table 10 here]

4.5 Impact of PMC on ownership structure in business groups: public vs. private firms

We also divide our sample into two groups based on whether or not they are listed in stock exchange, and re-estimate the relationship between PMC and ownership structure in light of this characteristic. Models (1)-(3) in Table 11 show the effect of PMC on ownership structure in public firms. *1-HHI* has a significantly negative effect on discrepancy (t=-2.08) at 5% confidence level and ownership of affiliates (t=-3.10) at 1% confidence level, but unlike our prediction, the effect on direct ownership is insignificant. These results suggest that for listed firms which are affected by other external control mechanisms, PMC disciplines the controlling family not to pursue their private benefit of control. However, due to dispersive ownership structure, the controlling family cannot easily change the direct ownership structure.

In Models (4)-(6) using the sample of private firms, PMC has a significantly negative effect on discrepancy (t=-2.14) at 5% confidence level and ownership of affiliates (t=-2.70) at 1% confidence level, while it has a positive effect on direct ownership (t=2.28) at 5% confidence level. These results are consistent with Hypothesis 6.

[Insert Table 11 here]

5. Conclusion

This paper firstly examines the effect of PMC on the ownership structure of member firms in business groups, specifically Korean *chaebols*. We analyze the effect of PMC on ownership structure to find how these are formed and the reasons for which a controlling family can have, and wish to have, excessive voting rights.

We confirm that a controlling family increases discrepancy and its ownership of affiliates to maximize their private benefit of control in a non-competitive market. However, they decrease and direct ownership increases in a competitive market, where there are high bankruptcy risks and a need to focus on performance. These results suggest that PMC disciplines a controlling family to arrange an optimal ownership structure to maximize shareholder value. These results are mainly observed in the sample of firms with lower market shares that are more affected by competitive pressure.

Additionally, we analyze how firm characteristics influence the relationship between PMC and ownership structure. The relationship is mainly observed in the sample of longer-established member firms which have less need for an internal capital market and private member firms which are not applied by the law and regulation.

These results support our prediction and correspond with the argument that PMC disciplines managers to choose an ownership structure better for minority shareholders, but with different level of impacts depending on firm characteristics. In order word, PMC disciplines managers to arrange an optimal ownership structure.

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estimate this relationship. In this sample, the effect of PMC on ownership structure is statistically significant only in old member firms and private member firms. Therefore, we can re-confirm that market share, firm age, and whether firm is listed or not do have significant effect on the relationship between PMC and ownership structure.

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<Table 1> Ownership structure in Korean Business Groups (*Chaebol*)

This table shows the year-on-year average of discrepancy, ownership of affiliates, and direct ownership in Korean business groups. Discrepancy is computed by the controlling family's voting rights minus direct ownership (cash flow rights), for each member firm. Direct ownership means the sum of ownership of controlling shareholder and their relatives. Voting rights are computed as the sum of ownership of the controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. The numbers in square brackets indicate the median.

year	N (Groups)	Discrepancy	Ownership of affiliates	Direct ownership
2001	259 (30)	0.4508 [0.4384]	0.4288 [0.3977]	0.1365 [0.0087]
2002	326 (33)	0.4967 [0.4944]	0.4742 [0.4657]	0.1432 [0.0052]
2003	445 (40)	0.4767 [0.4880]	0.4492 [0.4500]	0.1854 [0.0102]
2004	449 (43)	0.4721 [0.4874]	0.4482 [0.4600]	0.1863 [0.0065]
2005	493 (44)	0.4765 [0.4885]	0.4601 [0.4600]	0.1930 [0.0065]
2006	589 (50)	0.4788 [0.4769]	0.4611 [0.4500]	0.2057 [0.0021]
2007	662 (53)	0.4976 [0.5000]	0.4803 [0.4926]	0.1980 [0.0000]
2008	528 (33)	0.5418 [0.5100]	0.5243 [0.5010]	0.1518 [0.0000]
2009	608 (38)	0.6048 [0.6488]	0.5375 [0.5096]	0.1436 [0.0000]
Total	488 (65)	0.5054 [0.5000]	0.4787 [0.4784]	0.1750 [0.0000]

<Table 2> Product Market Competition Level in Korean Economy

This table shows product market competition (PMC) level in Korean economy. As a proxy for product market competition, the HHI (Herfindahl-Hirschman Index) is computed by sum of squared market shares in each industry. To classify industries, we assign all of public and private company to an industry by matching 3-digit Korea Standard Industry Code (KSIC). Market shares are computed using sales of firms. We divide whole sample based on the HHI and compute the number of firms, weights, average of HHI in separated groups.

PMC level	Whole firms			*Chaebol* firms		
	Number of firms (firm-year)	%	Mean	Number of firms (firm-year)	%	Mean
Less competitive (HHI>0.9)	17,516	11.57	0.0177	11	0.25	0.0226
0.9≥HHI>0.8	97	0.06	0.1598	6	0.14	0.1528
0.8≥HHI>0.7	130	0.09	0.2546	1	0.02	0.2934
0.7≥HHI>0.6	349	0.23	0.3527	7	0.16	0.3566
0.6≥HHI>0.5	829	0.55	0.4369	39	0.89	0.4479
0.5≥HHI>0.4	3,168	2.09	0.5571	157	3.60	0.5643
0.4≥HHI>0.3	2,377	1.57	0.6498	115	2.64	0.6567
0.3≥HHI>0.2	4,516	2.98	0.7601	281	6.45	0.7620
0.2≥HHI>0.1	19,494	12.88	0.8574	964	22.12	0.8542
More competitive (0.1≥HHI)	102,928	67.98	0.9612	2,778	63.73	0.9487
Total	151,404	100	0.9163	4,359	100	0.8852

<Table 3> Definitions of Variables

Variable names	Definitions
Discrepancy	Discrepancy is computed as the controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in a business group. Direct ownership is the sum of ownership of the controlling shareholder and their relatives. Voting rights is the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family.
Ownership of affiliates	Ownership of other member firms within a business groups.
Direct ownership	The sum of ownership of controlling shareholder and their relatives.
1-HHI	The one minus Herfindahl-Hirschman Index proxy for PMC. The HHI is computed by the sum of squared market shares in each industry. To classify industries, we assigned all of the public and private company to an industry by matching them to the 3-digit Korea Standard Industry Code (KSIC). Market shares are computed using sales of firms.
1-CR_3	The one minus Concentration Ratio is another proxy for PMC. CR_3 is computed as the sum of the highly ranked thee firms' market share matched to a 3-digit Korea Standard Industry Code (KSIC). Market shares are computed using sales of firms.
Market share	Market shares computed using sales of firms.
Size	The natural log of total assets.
Leverage	Total debt divided by total assets.
Profit	Sum of return on assets in the past three years.
Growth	The sales growth rate compared to previous year.
Cash	Cashable assets divided by total assets.
Volatility	The past three years' standard deviation of return on assets.
Financial	A dummy that takes the value of one if the firm is a financial institution.
# Affiliates	The natural log of number of affiliates in a business group.

<Table 4> Summary Statistics

This table shows summary statistics of variables. Discrepancy is computed by controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in business groups. Direct ownership is sum of ownership of controlling shareholder and their relatives. Voting rights is computed by sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is the ownership of affiliates within a business group. 1-HHI as proxy for PMC is one minus the Herfindahl-Hirschman Index computed by sum of squared market shares in each industry. 1-CR_3 is one minus Concentration Ratio computed by sum of three largest market shares firms' market shares in each industry. The market share is the market share in the firm's own industry computed using sales data. Size refers to total firm assets. Leverage is the total debt divided by the total assets. Profit is sum of return on assets in the past three years. Growth is sales growth rate compared to the previous year. Cash is the cashable assets divided by total assets. Volatility is the past three years' standard deviation of returns on assets. Financial is a dummy that takes the value of one if the firm is a financial institution. #affiliates is the number of affiliates in a business group.

Variables	N	MEAN	MEDIAN	STD DEV	MIN	MAX
Discrepancy	4,359	0.5054	0.5000	0.3519	0.0000	1.0000
Ownership of affiliates	4,359	0.4787	0.4784	0.3525	0.0000	1.0000
Direct ownership	4,359	0.1750	0.0000	0.2904	0.0000	1.0000
1-HHI	4,359	0.8852	0.9278	0.1199	0.0084	0.9945
1-CR_3	4,359	0.5805	0.6152	0.2024	0.0001	0.9319
Market share	4,359	0.0619	0.0144	0.1228	0.0000	0.9958
Size (million won)	4,359	1,311	139	4,294	0.3296	86,024
Leverage	4,359	0.5448	0.5462	0.2887	0.0015	3.9080
Profit	4,359	0.0848	0.0931	0.2798	-2.7497	4.1992
Growth	4,359	0.1601	0.0826	0.5533	-1.0000	5.9855
Cash	4,359	0.1508	0.0672	1.0017	-26.6827	28.7373
Volatility	4,359	0.0658	0.0294	0.1857	0.0001	8.7665
Financial	4,359	0.0833	0.0000	0.2763	0.0000	1.0000
# Affiliates	4,359	32.6999	30.0000	18.3145	1.0000	77.0000

<Table 5> Impact of PMC on ownership structure in business groups: Univariate Tests

This table shows results for univariate tests. In order to examine the relationship between PMC and ownership structure, we divide total sample into two groups based on the median of 1-HHI. We calculate the difference of averages of discrepancy, ownership of affiliates, and direct ownership between two samples and estimate statistical significance using t-statistics. Panel A represent results using whole sample. Panel B shows results using firms with high market share. Panel C indicates the results using firms with low market share. Discrepancy is computed by controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in business groups. Direct ownership is the sum of ownership of controlling shareholder and their relatives. Voting rights is computed by the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is ownership of affiliates within a business group. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Variables	Non-competitive market	Competitive market	p-value in difference	
				t-statistic	Wilcoxon
Panel A: Whole sample					
		[N=2,184]	[N=2,175]		
	Discrepancy	0.5074	0.5033	0.6984	0.6430
Total	Ownership of affiliates	0.4769	0.4805	0.7338	0.7360
	Direct ownership	0.1659	0.1842	0.0380**	0.8469
Panel B: Sample for firms with high market share					
		[N=1,322]	[N=854]		
High	Discrepancy	0.4443	0.4662	0.1445	0.1019
market	Ownership of affiliates	0.4043	0.4327	0.0540*	0.0459*
share	Direct ownership	0.1751	0.1583	0.1896	0.0565*
Panel C: Sample for firms with low market share					
		[N=852]	[N=1,321]		
Low	Discrepancy	0.6062	0.5273	0.0000***	0.0000***
market	Ownership of affiliates	0.5904	0.5115	0.0000***	0.0001***
share	Direct ownership	0.1531	0.2009	0.0003***	0.0010***

<Table 6> Impact of PMC on discrepancy

This table shows results of OLS regressions. The dependent variable is discrepancy and explanatory variable is PMC. Model (1) and (2) are results using whole sample. Model (3) and (4) are results using firms with high market share. Model (5) and (6) are results using firms with low market share. Discrepancy is computed by controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in business groups. Direct ownership is the sum of ownership of controlling shareholder and their relatives. Voting rights is computed by the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is ownership of affiliates within a business group. 1-HHI as proxy for PMC is one minus Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. 1-CR_3 is one minus Concentration Ratio computed by the sum of three largest market shares firms' market shares in each industry. Market share is market share in the own industry computed using sales of firms. Size is total assets. Leverage is total debt divided by total assets. Profit is the sum of returns on assets over the past three years. Growth is the sales growth rate compared to previous year. Cash is cashable assets divided by total assets. Volatility is the past three year standard deviation of return on asset. Financial is dummy that takes value of one if the firm is financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistic computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Discrepancy					
	Whole sample	Whole sample	High market share sample	High market share sample	Low market share sample	Low market share sample
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	1.2583***	1.1415***	1.3260***	1.2977***	0.8410***	0.6588***
	[13.78]	[13.42]	[9.88]	[10.42]	[4.54]	[3.83]
1-HHI	-0.2162***		-0.0287		-0.2839***	
	[-4.08]		[-0.37]		[-4.02]	
1-CR_3		-0.0691**		0.0175		-0.1106***
		[-2.35]		[0.39]		[-2.88]
Market share	-0.2907***	-0.2190***	-0.1019	-0.0721	6.7876***	6.8209***
	[-5.34]	[-4.50]	[-1.50]	[-1.33]	[3.67]	[3.69]
Size	-0.0354***	-0.0371***	-0.0486***	-0.0489***	-0.0168**	-0.0173***
	[-11.70]	[-12.32]	[-11.33]	[-11.56]	[-2.55]	[-2.63]
Leverage	0.1644***	0.1656***	0.2245***	0.2235***	0.1367***	0.1406***
	[7.99]	[8.00]	[6.21]	[6.16]	[5.34]	[5.46]
Profit	-0.0112	-0.0120	0.0055	0.0043	-0.0338	-0.0347
	[-0.62]	[-0.66]	[0.19]	[0.15]	[-1.47]	[-1.51]
Cash	0.0008	0.0008	-0.0061	-0.0060	0.0024	0.0025
	[0.18]	[0.18]	[-0.68]	[-0.66]	[0.43]	[0.45]
Volatility	0.0223	0.0270	0.0474***	0.0500***	0.0438	0.0392
	[0.98]	[1.12]	[2.97]	[3.20]	[0.69]	[0.62]
Financial	0.0785***	0.0806***	0.0254	0.0264	0.1150***	0.1160***
	[4.35]	[4.46]	[0.91]	[0.95]	[4.73]	[4.76]
# Affiliates	0.0701***	0.0713***	0.0757***	0.0754***	0.0709***	0.0732***
	[9.20]	[9.35]	[7.95]	[7.92]	[5.82]	[6.01]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	4,359	4,359	2,186	2,186	2,173	2,173
Adj-R^2	0.1105	0.1079	0.1707	0.1708	0.0546	0.0505

<Table 7> Impact of PMC on ownership of affiliates

This table shows results of OLS regressions. The dependent variable is ownership of affiliates, and the explanatory variable is PMC. Models (1) and (2) show results using the whole sample. Models (3) and (4) show results using firms with a high market share. Models (5) and (6) show results using firms with a low market share. Ownership of affiliates is the ownership of affiliates within a business group. 1-HHI acts as proxy for PMC and is the one minus Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. 1-CR_3 is one minus Concentration Ratio computed by the sum of three largest market shares firms' market shares in each industry. Market share is the market share in the firm's own industry computed using sales data of firms. Size is the total assets. Leverage is the total debt divided by total assets. Profit is the sum of returns on assets over the past three years. Growth is the sales growth rate compared to the previous year. Cash is the cashable assets divided by the total assets. Volatility is the past three years' standard deviation of returns on asset. Financial is a dummy variable that takes the value of one if the firm is financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistics computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Ownership of affiliates					
	Whole sample	Whole sample	High market share sample	High market share sample	Low market share sample	Low market share sample
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	1.3914***	1.2624***	1.5304***	1.5036***	0.8486***	0.6372***
	[15.93]	[15.29]	[12.06]	[12.68]	[4.55]	[3.65]
1-HHI	-0.2419***		-0.0321		-0.3232***	
	[-4.99]		[-0.43]		[-5.10]	
1-CR_3		-0.0799***		0.0090		-0.1217***
		[-2.78]		[0.21]		[-3.20]
Market share	-0.3286***	-0.2502***	-0.1112*	0.0855*	7.9910***	8.0214***
	[-6.53]	[-5.63]	[-1.72]	[-1.70]	[4.26]	[4.27]
Size	-0.0436***	-0.0454***	-0.0604***	-0.0607***	-0.0201***	-0.0205***
	[-14.93]	[-15.71]	[-15.10]	[-15.43]	[-3.00]	[-3.07]
Leverage	0.1820***	0.1835***	0.2679***	0.2672***	0.1367***	0.1407***
	[8.44]	[8.45]	[7.10]	[7.08]	[5.12]	[5.22]
Profit	-0.0260	-0.0268	-0.0212	-0.0221	-0.0430*	-0.0443*
	[-1.47]	[-1.50]	[-0.76]	[-0.79]	[-1.89]	[-1.95]
Cash	-0.0002	-0.0002	-0.0148	-0.0148	0.0029	0.0030
	[-0.04]	[-0.05]	[-1.49]	[-1.47]	[0.52]	[0.54]
Volatility	0.0217	0.0269	0.0419**	0.0442**	0.0547	0.0496
	[0.96]	[1.12]	[2.39]	[2.56]	[0.86]	[0.78]
Financial	0.0888***	0.0911***	0.0301	0.0309	0.1258***	0.1270***
	[5.03]	[5.16]	[1.08]	[1.11]	[5.20]	[5.25]
# Affiliates	0.0928***	0.0941***	0.0991***	0.0990***	0.0946***	0.0973***
	[12.61]	[12.76]	[11.23]	[11.19]	[7.86]	[8.09]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	4,359	4,359	2,186	2,186	2,173	2,173
Adj-R^2	0.1482	0.1450	0.2104	0.2103	0.0757	0.0704

<Table 8> Impact of PMC on direct ownership

This table shows results of OLS regressions. The dependent variable is direct ownership, and the explanatory variable is PMC. Models (1) and (2) show results using the whole sample. Models (3) and (4) show results using firms with high market share. Models (5) and (6) show results using firms with low market share. Direct ownership is the sum of ownership of controlling shareholder and their relatives. 1-HHI as proxy for PMC is one minus the Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. 1-CR_3 is one minus the Concentration Ratio computed by the sum of three largest market shares firms' market shares in each industry. Market share is the market share in the firm's own industry computed using sales data for firms. Size is the total assets. Leverage is the total debt divided by the total assets. Profit is the sum of return on assets over the past three years. Growth is the sales growth rate compared to that of the previous year. Cash is the cashable assets divided by the total assets. Volatility is the past three years' standard deviation of returns on assets. Financial is dummy variable that takes the value of one if the firm is a financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistics computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Direct ownership					
	Whole sample	Whole sample	High market share sample	High market share sample	Low market share sample	Low market share sample
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.5852***	0.6348***	0.9213***	0.9434***	0.3012**	0.3597**
	[8.11]	[9.11]	[7.72]	[8.35]	[2.01]	[2.52]
1-HHI	0.0653*		-0.0234		0.1227**	
	[1.69]		[-0.38]		[2.01]	
1-CR_3		-0.0008		-0.0857**		0.0691**
		[-0.03]		[-2.31]		[2.12]
Market share	-0.0625	-0.0994***	-0.1198**	-0.1675***	-2.5404*	-2.5918*
	[-1.61]	[-2.87]	[-2.29]	[-3.97]	[-1.65]	[-1.68]
Size	-0.0098***	-0.0094***	-0.0179***	-0.0178***	-0.0010	-0.0005
	[-3.99]	[-3.87]	[-4.74]	[-4.78]	[-0.19]	[-0.09]
Leverage	-0.0969***	-0.0955***	-0.0571**	-0.0535**	-0.1234***	-0.1271***
	[-5.89]	[-5.76]	[-2.35]	[-2.20]	[-5.64]	[-5.76]
Profit	0.0659***	0.0674***	0.1344***	0.1377***	0.0315*	0.0307*
	[5.20]	[5.28]	[5.80]	[5.92]	[1.90]	[1.85]
Cash	0.0006	0.0005	0.0057	0.0053	-0.0002	-0.0001
	[0.17]	[0.14]	[1.09]	[1.05]	[-0.04]	[-0.02]
Volatility	-0.0228	-0.0251	-0.0105	-0.0137	-0.0464	-0.0438
	[-1.42]	[-1.59]	[-0.60]	[-0.79]	[-0.99]	[-0.93]
Financial	-0.0475***	-0.0485***	-0.0027	-0.0046	-0.0760***	-0.0762***
	[-3.55]	[-3.62]	[-0.13]	[-0.22]	[-4.17]	[-4.18]
# Affiliates	-0.0561***	-0.0565***	-0.0645***	-0.0634***	-0.0496***	-0.0501***
	[-8.55]	[-8.60]	[-7.21]	[-7.02]	[-4.92]	[-4.97]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	4,359	4,359	2,186	2,186	2,173	2,173
Adj-R^2	0.0474	0.0469	0.0605	0.0629	0.0453	0.0453

<Table 9> Impact of PMC on ownership structure in business groups: Alternative specification of market power

This table shows results of OLS regressions with divided sample based on whether firm has the largest market share in their own industry or not. Dependent variable is ownership structure, and explanatory variable is PMC. Model (1)-(3) show results using dominant firms and Model (4)-(6) show results using non-dominant firms. Discrepancy is computed by controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in business groups. Direct ownership is the sum of ownership of controlling shareholder and their relatives. Voting rights is computed by the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is ownership of affiliates within a business group. 1-HHI as proxy for PMC is one minus Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. Market share is market share in the own industry computed using sales of firms. Size is total assets. Leverage is total debt divided by total assets. Profit is the sum of return on assets in the past three years. Growth is sales growth rate compared to previous year. Cash is cashable assets divided by total assets. Volatility is the past three year standard deviation of return on asset. Financial is dummy that takes value of one if the firm is financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistic computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dominant firms			Non-dominant firms		
	Discrepancy	Ownership of affiliates	Direct ownership	Discrepancy	Ownership of affiliates	Direct ownership
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	2.3137***	2.6047***	0.0761	0.9798***	1.0700***	0.6587***
	[5.48]	[7.35]	[0.28]	[8.69]	[9.86]	[6.99]
1-HHI	0.2252	0.2019	-0.1491	-0.2437***	-0.2650***	0.0970**
	[0.79]	[0.82]	[-0.96]	[-4.24]	[-5.02]	[2.26]
Market share	0.1679	0.1366	-0.1894	-0.8973***	-0.9605***	0.1655
	[0.57]	[0.52]	[-1.20]	[-6.07]	[-7.53]	[1.38]
Size	-0.0887***	-0.1000***	0.0076	-0.0234***	-0.0304***	-0.0132***
	[-10.88]	[-14.10]	[1.27]	[-6.20]	[-8.35]	[-4.06]
Leverage	0.1076	0.1286	0.0838*	0.1688***	0.1856***	-0.1057***
	[1.10]	[1.34]	[1.80]	[7.99]	[8.36]	[-6.10]
Profit	-0.0095	-0.0090	0.0616	0.0150	-0.0285	0.0688***
	[-0.10]	[-0.11]	[0.90]	[-0.81]	[-1.58]	[5.26]
Cash	0.0303	-0.1079	-0.0531	0.0014	0.0008	0.0004
	[0.30]	[-1.13]	[-1.21]	[0.30]	[0.18]	[0.12]
Volatility	0.0022	0.0993	0.1003	0.0285	0.0292	-0.0255
	[0.01]	[0.48]	[0.45]	[1.33]	[1.37]	[-1.50]
Financial	-0.0542	-0.0362	-0.1151***	0.0765***	0.0848***	-0.0449***
	[-1.01]	[-0.81]	[-4.56]	[4.08]	[4.61]	[-3.16]
# Affiliates	0.0593***	0.0706***	-0.0242*	0.0758***	0.1010***	-0.0603***
	[3.62]	[4.86]	[-1.74]	[9.10]	[12.50]	[-8.31]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	458	458	458	3,901	3,901	3,901
Adj-R^2	0.2728	-0.0027	0.3042	0.0938	0.0490	0.1268

<Table 10> Impact of PMC on ownership structure in business groups: Young vs. Old firms

This table shows results of OLS regressions with divided sample based on median of age of firms. The dependent variable is ownership structure, and the explanatory variable is PMC. Models (1)-(3) show results using young firms and Models (4)-(6) show results using old firms. Discrepancy is computed by controlling for the family's voting rights minus the direct ownership (cash flow rights), for each member firm in a business group. Direct ownership is the sum of ownership of the controlling shareholder and their relatives. Voting rights is computed by the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is the ownership of affiliates within a business group. 1-HHI acts as proxy for PMC and is the one minus Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. 1-CR_3 is one minus Concentration Ratio computed by the sum of three largest market shares firms' market shares in each industry. Market share is the market share in the firm's own industry computed using sales data of firms. Size is the total assets. Leverage is the total debt divided by total assets. Profit is the sum of returns on assets over the past three years. Growth is the sales growth rate compared to the previous year. Cash is the cashable assets divided by the total assets. Volatility is the past three years' standard deviation of returns on asset. Financial is a dummy variable that takes the value of one if the firm is financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistics computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Young firms			Old firms		
	Discrepancy	Ownership of affiliates	Direct ownership	Discrepancy	Ownership of affiliates	Direct ownership
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.4290***	0.3470**	0.6313***	1.5357***	1.7119***	0.7646***
	[3.05]	[2.54]	[5.37]	[11.61]	[13.56]	[7.39]
1-HHI	0.0360	0.0346	-0.0151	-0.4211***	-0.4546***	0.1407***
	[0.49]	[0.50]	[-0.25]	[-6.31]	[-7.08]	[3.04]
Market share	-0.2186**	-0.2269***	-0.0028	-0.3281***	-0.3635***	-0.0288
	[-2.21]	[-2.59]	[-0.03]	[-4.78]	[-5.45]	[-0.62]
Size	-0.0108**	-0.0117**	-0.0082**	-0.0396***	-0.0485***	-0.0199***
	[-2.21]	[-2.47]	[-2.04]	[-8.70]	[-10.91]	[-5.18]
Leverage	0.0993***	0.0916***	-0.0630***	0.2350***	0.2682***	-0.1388***
	[3.79]	[3.43]	[-3.05]	[6.87]	[7.29]	[-5.14]
Profit	-0.0914***	-0.1144***	0.0981***	0.1430***	0.1407***	-0.0457
	[-4.00]	[-5.10]	[6.09]	[4.19]	[4.08]	[-1.58]
Cash	0.0002	-0.0009	0.0013	0.0002	-0.0018	0.0011
	[0.03]	[-0.15]	[0.41]	[0.02]	[-0.21]	[0.15]
Volatility	0.0017	-0.0014	0.0079	0.1987***	0.2042***	-0.2283***
	[0.05]	[-0.04]	[0.37]	[3.25]	[3.27]	[-5.20]
Financial	0.1337***	0.1415***	-0.0771***	0.0126	0.0223	-0.0013
	[5.35]	[5.82]	[-3.86]	[0.51]	[0.91]	[-0.07]
# Affiliates	0.0977***	0.1276***	-0.0752***	0.0447***	0.0606***	-0.0328***
	[9.01]	[12.47]	[-8.07]	[4.15]	[5.85]	[-3.38]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	2,142	2,142	2,142	2,209	2,209	2,209
Adj-R^2	0.0706	0.1058	0.0490	0.1584	0.1684	0.0675

<Table 11> Impact of PMC on ownership structure in business groups: Public vs. Private firms

This table shows results of OLS regressions with divided sample based on whether firm is listed or not. Dependent variable is ownership structure, and explanatory variable is PMC. Model (1)-(3) show results using public firms and Model (4)-(6) show results using private firms. Discrepancy is computed by controlling family's voting rights minus direct ownership (cash flow rights), for each member firm in business groups. Direct ownership is the sum of ownership of controlling shareholder and their relatives. Voting rights is computed by the sum of ownership of controlling family, affiliates, senior managers of the firm, and non-profit organizations controlled by controlling family. Ownership of affiliates is the ownership of affiliates within a business group. 1-HHI acts as proxy for PMC and is the one minus Herfindahl-Hirschman Index computed by the sum of squared market shares in each industry. 1-CR_3 is one minus Concentration Ratio computed by the sum of three largest market shares firms' market shares in each industry. Market share is the market share in the firm's own industry computed using sales data of firms. Size is the total assets. Leverage is the total debt divided by total assets. Profit is the sum of returns on assets over the past three years. Growth is the sales growth rate compared to the previous year. Cash is the cashable assets divided by the total assets. Volatility is the past three years' standard deviation of returns on asset. Financial is a dummy variable that takes the value of one if the firm is financial institution. # Affiliates is the number of affiliates in a business group. The numbers in square brackets are t-statistics computed by robust standard error. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Public firms			Private firms		
	Discrepancy	Ownership of affiliates	Direct ownership	Discrepancy	Ownership of affiliates	Direct ownership
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.9730***	0.9037***	0.2000**	0.4484***	0.5112***	0.6091***
	[8.35]	[9.27]	[2.56]	[3.31]	[3.81]	[5.10]
1-HHI	-0.1494**	-0.1814***	-0.0535	-0.1389**	-0.1608***	0.1198**
	[-2.08]	[-3.10]	[-1.12]	[-2.14]	[-2.70]	[2.28]
Market share	-0.2435***	-0.3239***	-0.1435***	-0.0030	0.0094	-0.0837
	[-3.84]	[-6.09]	[-3.21]	[-0.04]	[0.12]	[-1.20]
Size	-0.0256***	-0.0240***	0.0073***	-0.0030	-0.0093*	-0.0102**
	[-6.64]	[-7.17]	[2.83]	[-0.63]	[-1.93]	[-2.41]
Leverage	0.0395	0.0600**	-0.0743***	0.1819***	0.1897***	-0.1121***
	[1.25]	[2.06]	[-3.49]	[7.23]	[7.18]	[-5.28]
Profit	0.0122	0.0106	0.0866***	-0.0604***	-0.0860***	0.0566***
	[0.41]	[0.38]	[3.99]	[-2.82]	[-4.27]	[3.32]
Cash	-0.0060	-0.0097	-0.0161	0.0021	0.0016	0.0009
	[-0.24]	[-0.44]	[-1.29]	[0.46]	[0.35]	[0.21]
Volatility	0.0259	0.0207	0.0418	0.0372**	0.0391**	-0.0396*
	[0.44]	[0.36]	[0.83]	[2.02]	[2.18]	[-1.74]
Financial	-0.0015	-0.0028	-0.0308**	0.1255***	0.1367***	-0.0718***
	[-0.07]	[-0.14]	[-2.20]	[5.50]	[6.15]	[-3.55]
# Affiliates	0.0538***	0.0621***	-0.0572***	0.0772***	0.1052***	-0.0630***
	[6.16]	[8.13]	[-7.46]	[7.19]	[9.92]	[-6.49]
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1,603	1,603	1,603	2,767	2,767	2,767
Adj-R^2	0.2043	0.1257	0.0613	0.0577	0.0856	0.0465