Family Feud: Succession Tournaments and Risk-taking in Family Firms[†]

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Abstract

We study the impact of succession tournaments on risk-taking in family firms. More sons (less daughters) in controlling families are associated with higher income volatility and lower performance – especially, in opaque private firms with pyramidal ownership structure. Contestants exhibit managerial myopia such as higher dividend payouts and less R&D investments. Overall, succession tournaments induce risk-taking and managerial myopia among sons, but positive externalities through marriages (sons-in-law) mitigate these concerns. Using the sudden death of a chairman as an exogenous shock to a succession tournament, we confirm a causal link between increased competition among succession contestants and corporate risk-taking.

JEL Codes: G30;
Keywords: succession tournaments, business group, risk shifting, family composition, sons, daughters, sons-in-law.

1 Introduction

Around the world, family firms are prevalent and comprise a large portion of the economy. La Porta, Lopez-de-Silanes, and Shleifer (1999) document that, except for in a few advanced economies with strong investor protection, firms are often controlled by families. Even in the United States, family firms contribute 57% of the GDP (Annual Family Business Survey) and employ 63% of the workforce in the country (Family Enterprise USA, 2011).[1] Reflecting their importance in the world economy, family firms have attracted attention in the recent literature. Many papers describe various aspects of family firms. However, studies that examine potential conflicts within a family during succession processes are relatively rare. Specifically, the literature has not fully explored the cultural and institutional factors that determine how succession tournaments are played out within a family, or how these tournaments affect corporate outcomes in family-run business organizations. We fill this void in this paper.

We examine whether succession tournaments in a family business group induce risk-taking behavior in the heirs of the business group. To determine whether the risks taken are excessive in the short run, we also study their performance consequences.[2] We answer these key questions using Korean family business group data, which provide an interesting laboratory to empirically test our key research questions. First, the standard prescriptions for remedy, such as optimal financial contracting arrangements, often do not work well in Korea because exogenous, unalterable factors such as bloodline, gender, or seniority within a family play important roles in determining the successor of a business group. The long-standing Confucian culture in Korea

[1] Family Enterprise USA, "Annual Family Business Survey: General Results and Conclusions." 2011.
[2] Our hypothesis is based on a zero-effort, noisy tournament equilibrium, which leads to excess risk-taking (Hvide, 2002). However, our data are a 2004 cross-section, and therefore we are limited in our ability to analyze the long-run consequences of such risk-taking. We can only show that risk-taking activity increases and performance decreases, at least in the short run.

implies that succession tournaments in family business groups are primarily between male, direct bloodline heirs rather than female heirs or any male family members who join the family through adoption or marriage. Understanding the impact of these innate factors on firms is a first step towards finding solutions to steer family firms back to profit maximization. Second, succession tournaments are more likely in Korean business groups because the controlling stakes within a group are interconnected by a web of cross-ownership among the member firms, making it strategically important to control several key firms, rather than just owning stakes in many firms within the business group. Typically, a tournament winner is endowed with the controlling stakes in those key firms, through which the winner controls the whole business group. This steep option-like payoff structure in the succession process in Korean family business groups implies strong tournament incentives among the heirs of the business groups.

While this paper takes a special situation in Korea as its empirical setup, sibling rivalry is a widespread phenomenon among human families (Sulloway, 2001); its origin goes back to the Darwinian theory, which suggests that most offspring have to compete for parental favor and investment. Therefore, understanding potential outcomes of this sibling infighting could have broad and important implications for family firms in various economies around the globe. The findings of this paper can also shed light on succession in public firms run by professional managers, where an incumbent CEO or controlling shareholder favors a particular divisional manager. Becoming the next CEO is then considered by other divisional managers as a far out-of-the-money option, which could create incentives for risk taking among them.[3] In the case of U.S. public firms, financial data at the division level are rather limited, and therefore our study,

[3] For example, Ajit Jain and Greg Abel are competing to succeed Warren Buffet at Berkshire Hathaway. Greg Abel, who is a relatively young and new contender, focuses on riskier strategies such as acquisitions (Das, Anupreeta, "Berkshire Hathaway's Vice Chairman Offers Hint of Warren Buffett Successor; Ajit Jain or Greg Abel could be candidates, Charles Munger suggest," Wall Street Journal, February 15, 2015).

which uses more detailed Korean market data, could serve as useful guidance on the forces at work during general CEO promotion processes in dispersed shareholder owned U.S. public firms.

Using a cross-section of firms within the Korean family business groups known as chaebols and detailed information on their family trees and marital histories as of 2004, we find higher cash flow volatility in member firms of a chaebol when the controlling family of the chaebol has a large number of sons in the generation immediately following the current chair's generation (chair+1 generation). For example, a one standard deviation increase in the number of sons in the chair+1 generation is associated with a 5.39% higher income volatility. This effect is concentrated in chaebols where the age gap between sons is narrow and deep pyramidal ownership chains are present. Interestingly, the income volatility decreases as the number of daughters in the business group increases, and this daughter effect is especially strong when the daughters are married. These findings suggest that risk shifting among sons in a succession tournament decreases when a married daughter could bring in an external quality standard through her spouse and discipline the sons' potentially value-destroying excessive risk-taking incentives. Conditional tests reveal that the increasing income volatility effect of sons is stronger for unregulated private firms (as opposed to regulated public firms), for business groups whose founders are the current chairs, and for recent marriages to other powerful chaebols (as opposed to old, non-chaebol marriages).

Next we examine the performance consequences of these risk-taking practices in Korean chaebol families. Consistent with the notion that excess risk-taking destroys value in the short run, we find that firm performance decreases as the number of sons increases. For a one standard deviation increase in the number of sons (3.98), we find that return on assets (ROA) decreases by

1.29% (=0.32477*3.98). This is a 21.54% reduction in ROA from its sample average (6%). However, we find that sons-in-law mitigate this performance inefficiency.

We further examine ownership, managerial participation (measured by board positions), and myopia (measured by payout ratio and R&D expenses) among family members within each chaebol. While ownership by sons/daughters increases with the number of sons/daughters, ownership by sons-in-law does not. Also, board positions held by sons/sons-in-law increases when their ownership increases, but we find no managerial participation by daughters, even if they own some of the company. These results suggest that daughters engage more through ownership stakes, while sons-in-law are mainly contributing though managerial talent. Also, consistent with managerial myopia induced by succession tournaments, firms owned by sons in the chair+1 generation tend to pay more dividends but invest less in long-term R&D projects.

Finally, we investigate whether the positive relation between the number of succession contestants (i.e., the number of adult sons) and firm volatility is causal. A Hyundai group chairman unexpectedly committed suicide in his fifth year in office. Using this exogenous shock to Hyundai's succession tournament, which suddenly reopened to the deceased chair's old rivals, his brothers, we confirm that increased competition in the succession tournament (changes in the number of adult male succession contenders) leads to an increase in firms' income volatility. The effect is indeed concentrated in firms controlled by the chair's brothers, while insignificant in firms controlled by his uncles in the founder's generation, who are less likely (or indirectly) to be involved in the suddenly reopened succession tournament. Our results are robust to potential restructuring effects upon the chairman's sudden death. We further rule out a possibility that *reactions* of Hyundai affiliates' suppliers and customers rather than the *actions* by the deceased

chair's brothers could drive our results: we provide direct evidence on the "empire building" actions by the deceased chair's old rivals.

Our work relates to the literature on succession in family firms. Our focus is on risk-taking incentives among heirs during succession tournaments, whereas prior work focuses on the impact of successions on firm performance. For example, Perez-Gonzalez (2006) and Bennedsen, Nielsen, Perez-Gonzalez, and Wolfenzon (2007) document that family CEOs perform worse than non-family CEOs. Mehrotra, Morck, Shim, and Wiwattanakantang (2013) also show that non-consanguineous-heir-run firms outperform heir-run and professional-manager-run firms. Bunkanwanicha, Fan, and Wiwattanakantang (2013) show that a network marriage between a controlling family member and a member of a prominent business or political family is followed by increasing stock prices. Tsoutsoura (2015) shows the impact of succession taxes on firm investment decisions and transfer of control. Bertrand, Johnson, Samphantharak, and Schoar (2008), in a work closely related to ours, also focus on performance inefficiency in 586 firms in Thai business groups where sons "race to the bottom" in tunneling resources out of group firms following a founder's death. Our work differs from these studies as we focus on corporate risk-taking, one of the most widely studied corporate policies, as a specific channel that affects performance inefficiency. None of the aforementioned studies directly test this corporate risk implication of succession tournaments as an important background risk of family-run organizations. We show that firms with severe succession games tend to have riskier cash flows, which is consistent with (potentially excessive, value-decreasing) risk-taking behavior among succession game contestants. We also show evidence of managerial myopia that stems from succession tournaments. We provide causal evidence on these succession tournament effects

using a quasi-natural experiment based on the sudden death of a Hyundai chairman, which is also a novel contribution to the literature on succession in family firms.

Our work also relates to the gender and corporate finance literature. Adhikari, Agrawal, and Malm (2015), Cronqvist and Yu (2015), Faccio, Marchica, and Mura (2015), and Nguyen (2015) find differences in corporate decision-making outcomes based on the gender of CEOs and the CEOs' children. Ongena and Popov (2015) show differences in access to the credit market based on the gender of companies' CEOs. Our work shows the importance of gender within a family in explaining corporate risk-taking outcomes: daughters are crucial to mitigating risk-taking incentives in tournament games. Our results emphasize that it is not biological gender differences that lead to such outcomes, but rather different social roles within a family: sons and sons-in-law have opposing effects on corporate risk-taking.

We also apply messages from the tournament and risk-taking literature to the family firm literature. Theories on tournaments and risk-taking incentives (Lazear and Rosen, 1981, Nalebuff and Stiglitz, 1983, Hvide, 2002, Cabral, 2003, Anderson and Cabral, 2007, Taylor, 2003, and Goel and Thakor, 2008, among others) are extensively applied to mutual funds (Brown, Harlow, and Starks, 1996, Chevalier and Ellison, 1997, and Kempf and Ruenzi, 2008, among others) and U.S. stand-alone corporation analyses (Kini and Williams, 2012, among others). However, investigation of the implications for family business groups around the globe is rare. We are the first to use tournament theories to understand risk-taking incentives in family-run business organizations.

Finally, our work extends the literature on chaebols. Existing studies (Bae, Kang, and Kim, 2002; Joh, 2003; Baek, Kang, and Lee, 2006; Almeida, Park, Subrahmanyam, and Wolfenzon, 2011) mainly focus on the prevailing pyramidal control structure and/or resulting

agency problems, such as resource tunneling. Our approach differs from theirs, as we introduce potential succession tournaments within a family that arise due to the option-like payoff structure to heirs when deep ownership pyramids are present. Our work also explains how cultural factors shape and affect the scope of these succession games. Our results indicate that these cultural considerations are important keys to understanding the "family" side of business group operations.

Our paper is organized as follows: in Section 2, we provide background on Korean business groups and develop hypotheses. In Section 3, we describe the sample and variables used in our test. Section 4 discusses our main results and robustness tests. In Section 5, we conclude.

2. Institutional Background and Hypothesis Development

2.1 Institutional Background

One of the predominant business organization models in Korea is the chaebol, a family-run business group that consists of multiple independent legal entities. Since 1960, chaebols have emerged under a series of government-driven economic development plans and expanded; they now control more than 57% of Korean national wealth (Economic Reform Research Institute, Feb 11, 2014).[4]

While chaebols have grown economically, one of the central concerns to a controlling family has been the succession of the business group's leadership to the next generations. To economize on succession costs (e.g., inheritance taxes), in many chaebols, families control the whole group of affiliates through miniscule control stakes in several key entities known as

[4] "The concentration of economic power in large corporations and conglomerates and their dynamic change analysis (1987 – 2012)." Economic Reform Research Institute Report, Feb 11, 2014.

"central" firms (Almeida et al., 2011). Such a concentrated control structure extensively uses a complex pyramidal ownership web that often also accompanies circular ownership links. Group succession has occurred exclusively within the direct bloodline of a chaebol family, and, as of 2015, most chaebol families are preparing for succession to their third generation (Nikkei Asian Review, Aug 20, 2015).[5]

Although smooth and efficient transition of group control to the next generation is a common interest for a chaebol family, significant within-family conflicts may arise from different incentives among heirs. The highly concentrated control structure of a chaebol implies a steep option-like payoff that can induce a succession tournament (among the heirs), where the winner takes all – i.e., ultimate control over the entire business group.[6]

Chaebol succession tournaments have recently received substantial attention as the media popularize the brutal succession battle between two sons of the Lotte group, the fourth-largest Korean chaebol, whose market capitalization amounts to $96 billion. In this infighting situation, the younger brother has dismissed his father, the founder of the Lotte group, from group chairmanship, and is engaging in a legal battle over group control against his elder brother, who insists he is the next chairman, approved by their father. This on-going succession debate is costly to their shareholders; the group's key company, Lotte Shopping, lost 8% of its market capitalization in just over a week following the announcement of the family feud by the media

[5] Ogura, Kentaro, "Hereditary Succession Rankles 'Chaebol' Investors, Public." Nikkei Asian Review, Aug 20, 2015.

[6] Some of the competing sons who lose in the succession tournament may still keep their management position in a group, but some others are eventually excluded from family management. For example, Cho, Hyun Moon, the second son of Hyosung, recently sold all of his shares and left his family in the middle of succession game. He made a complaint to prosecutors accusing his family and executives of suspected breach of trust and embezzlement of company funds ("Hyosung president may face probe." The Korea Times, Oct 23, 2014). Similar cases are found for Park, Yong Oh, of the Doosan group (Pressian, Nov 4, 2009).

(CNBC, Aug 5, 2015).[7] Rivalries over inheritance are not uncommon in chaebols. According to Chaebul.com, which tracks chaebol inheritance issues, roughly half of the top 40 chaebols have been embroiled in disputes over founders' succession plans (Economist, Aug 15, 2015).[8]

The scope and design of succession tournaments are influenced by both family and non-family factors. On the one hand, sibling rivalry, whose origin may be explained by the Darwinian theory that most offspring have to compete for parental favor and investment, is widespread among human families (Sulloway, 2001). The desire to "getting ahead of the Joneses" (Roussanov, 2010) within a family is common and tends to be severe when the age gap between siblings is narrow.[9] In the family firm context, Bertrand and Schoar (2006) document an unintended consequence of severe sibling rivalry in a succession that ended in a brutal siblicide in a Thai family business group.

In addition to sibling rivalry, there are also several important cultural factors that affect how the succession game is played in chaebols. Through the social norms established by a long tradition of Confucian culture in Korea, preferences for male, more senior, and direct bloodline heirs, i.e., male-preference cognatic primogeniture, are widely perceived as key norms in Korean culture, and these cultural factors suggest that succession tournaments in Korea tend to be driven by male family members – in particular, by sons.[10]

Strict preference for heirs from direct bloodlines suggests the unique role played by daughters and their spouses in chaebol succession games. Sons-in-law cannot rule over the whole group, even if they possess strong managerial talents; they can only partially engage in the

[7] Nyshka Chandran, "Vicious South Korean family feud exposes chaebol peril." CNBC Aug 5, 2015.
[8] Economist, "A Whole Lotte Drama: a fraternal feud over inheritance fires up South Koreans and regulators." Aug 15, 2015.
[9] Lawrence Kutner, "Parent & Child." New York Times Aug 31 1989.
[10] We only consider direct bloodline sons from the same mother. Adopted sons and stepsons are rare in Korean families. Divorces were also rare in chaebol families in 2004 when our data were collected.

family's business as professional managers (Burkart et al., 2003). Anecdotal evidence suggests that daughters own group firms, while sons-in-law manage them, often without ownership (The Korean Herald, April 21, 2014).[11] Through this separation between ownership and management, daughters' marital status can indirectly influence the mode of a succession tournament by setting a higher managerial quality standard for the winner of the tournament.[12] If the winner of the succession tournament cannot prove that he has superior managerial talent compared to external family members, his victory would be bittersweet. This notion of chaebol marriage is in line with Mehrotra et al. (2013) and Bunkanwanicha et al. (2013), who document adopted heirs and marriages to other renowned families as ways a founding family can overcome the human capital risk that originates from the cultural guidelines on who can inherit the corporate empire.

Based on the discussions above, we make the following three assumptions about the chaebol succession game:

A1: Succession tournaments exist exclusively among sons in the generation that immediately follows the generation of the current group chairman. For natural reasons, tournament intensity is higher when the age gap among sons is narrow.

A2: Daughters own group affiliates but tend to not manage them.

A3: Sons-in-law can manage group affiliates but do not own them. They cannot receive family benefits that are exclusively available to those in the direct bloodline. Therefore, they do not compete against sons in succession tournaments.

[11] Korean Herald, "Superrich Sons-in-law." April 21, 2014.
[12] We provide the anecdotal evidence on high quality sons-in-law who successfully manage several chaebol affiliates in our Appendix B.

2.2 Hypothesis Development

In this section, we hypothesize about how family composition factors, such as gender, age, and marital status, affect corporate risk-taking in a family business group as an outcome of a succession tournament.

Main Hypothesis

H1: A succession tournament induces excessive risk-taking by sons, which could result in performance inefficiency. The greater the number of sons within a family, the more pervasive excessive risk-taking is in group-affiliated entities.

To illustrate the key point in **H1**, let's consider the following stylized version of Hvide's (2002) two-son tournament game; the results can easily be generalized to hold for an arbitrary number of sons by pairing them. We consider a father and his two sons, 1 and 2, all of whom are risk-neutral. If a son i=1,2 chooses the effort level of μ_i for a unit of his initial capital, then a stochastic outcome, Y_i, is achieved with an i.i.d. standard normal performance shock of ϵ_i , i.e., $Y_i = \mu_i + \epsilon_i$ where $E[\epsilon_i] = 0, E[\epsilon_i^2] = \sigma_i^2$. Hence, $\epsilon_i$is an unpriced risk, while the priced risk is normalized to be zero. Effort is costly, with a quadratic cost function of $\frac{c}{2}\mu^2$ where c>0. The initial wealth of son 1 is $k \geq 1$, where son 2's is normalized to be 1. The father sets the tournament rules such that the son with the greater end of period performance wins the tournament, and the winner receives the group control benefit, W, while the loser receives nothing. Hence W is the marginal payoff to the tournament winner, which is assumed to be substantial. With no tournament reward (W=0), we assume that sons behave as if they were profit maximizers.

Son 1 maximizes $\mathrm{U}_1 = W \cdot P - \frac{\mathrm{c}}{2}\mu_1^2$ over μ_1 and σ_1, and son 2 maximizes $\mathrm{U}_2 = W \cdot (1-P) - \frac{\mathrm{c}}{2}\mu_2^2$ over μ_2 and σ_2, where $\mathrm{P} = \Pr(\mathrm{k} \cdot \mathrm{Y}_1 > Y_2) = \Phi\left(\frac{k\cdot\mu_1-\mu_2}{\sqrt{(k^2\cdot\sigma_1^2+\sigma_2^2)}}\right)$ and Φ is the c.d.f of a standard normal distribution. From the first order condition (FOC), $\mu_1 = \frac{k}{c\sqrt{(k^2\cdot\sigma_1^2+\sigma_2^2)}} \cdot W \cdot \phi\left(\frac{k\cdot\mu_1-\mu_2}{\sqrt{(k^2\cdot\sigma_1^2+\sigma_2^2)}}\right)$ and $\mu_2 = \frac{1}{c\sqrt{(k^2\cdot\sigma_1^2+\sigma_2^2)}} \cdot W \cdot \phi\left(\frac{k\cdot\mu_1-\mu_2}{\sqrt{(k^2\cdot\sigma_1^2+\sigma_2^2)}}\right)$, where ϕ is the p.d.f. of a standard normal distribution. The FOC implies $\mu_1 = k\mu_2$.

Proposition 1: When risk-taking is unlimited (i.e., $\sigma_\mathrm{i} \in [0, \infty]$ for $\forall \mathrm{i} = 1,2$) and for a finite $\mathrm{k} \geq 1$, excessive risk-taking ($\sigma_1 = \sigma_2 = \infty$) with no effort ($\mu_1 = \mu_2 = 0$) is a unique Nash equilibrium.

Proof: In a symmetric tournament ($\mathrm{k} = 1$), see the proof in Hvide (2002). For an asymmetric tournament with a finite $\mathrm{k} > 1$, son 1, the leader, tries to exert more effort (μ_1) and minimize the risk (σ_1) to ensure his current leading status in the succession game. However, the best response of the laggard son 2 is to increase his risk to infinite with no effort, thereby nullifying any disadvantage in his initial wealth. Given this best response of son 2, which effectively equalizes the winning probability of each son to ½ irrespective of son 1's effort, son 1's best response is also zero effort ($\mu_1 = 0$) with infinite risk-taking ($\sigma_1 = \sigma_2 = \infty$). It should be noted that zero effort with finite risk-taking by son 1 doesn't lead to a Nash equilibrium, as it induces an incentive for son 2 to increase his effort from zero while reducing his risk to further improve his winning probability from ½. ■

Proposition 1 constructs **H1**, the lazy, excessively risky equilibrium in the succession tournament. The intuition of this proposition is that when effort is costly and when the tournament outcome is eventually random, the sons don't work hard but rather increase the noise in their performances to win the tournament by luck. In terms of performance efficiency, this

equilibrium is inferior to the one with the first best level effort of each son, i.e., $\mu_1 = \mu_2 = \frac{1}{c} > 0$, where the sons maximize their net outputs without tournament concerns.

Effects of Marriage

From our assumption **A3**, sons-in-law maximize a chaebol's profits because they are external male family members who are excluded from the succession tournament. High quality sons-in-law whose marginal costs of effort are small could outperform even the winning son of the tournament, which in turn implies significant reputation damage to the direct bloodline heir as a formal successor of a renowned chaebol family with superior managerial talent.

The primary component of the tournament reward (W), exclusively available to the winning son, could be this reputational value, because any diverted corporate resources could also be enjoyed by external family members (Burkart et al., 2003), however, the family reputation is only available to direct bloodline heirs. Without the reputational reward of the succession tournament, sons' ex ante incentives to pursue lazy, excessively risky tournament strategies would greatly decrease.

H2: Daughters' marriages to high quality sons-in-law could mitigate excessive risk-taking by sons in a succession tournament.

Biological Gender Effects versus Different Social Roles within a Family

One could argue that biological gender effects, e.g., "males take greater risks than females" (Faccio et al. 2015, among others), could explain **H1** and **H2**. To sharpen our identification, we further hypothesize the following:

H1-1: Only male family members who are eligible for the succession tournament drive the lazy, excessively risky tournament equilibrium. Sons who are younger than 15, male relatives in the same generation as the current group chairman, and, most importantly, sons-in-law should not drive our tournament results.

H1-2: Daughter effects that mitigate sons' excess risk-taking would be evident for married daughters. With higher quality sons-in-law, risk mitigation will be greater. Moreover, the more recent the marriages, the greater the disciplining effects on sons' excess risk-taking, due in part to the reduced likelihood of coalitions between sons and sons-in-law.

Succession Tournaments and Managerial Myopia

A succession tournament in a chaebol would hurt the "family" value of a business group that is known to set up long-term managerial goals that could facilitate, for example, technological developments and innovations (Bertrand and Schoar, 2006). When a succession tournament is active in a family business group, these long-term-oriented family benefits could disappear (Cabral, 2003). Instead of investing corporate resources into long-term research and development (R&D) projects, sons in a tournament are tempted to cash out corporate resources as dividends and use them to build up their own control stakes in key firms to be better prepared for the succession tournament. This leads to our final hypothesis:

H3: Sons in succession tournaments show managerial myopia. They pay out dividends more aggressively in the firms they own, while cutting down on long-term R&D expenses.

3 Data

The main sample of our study consists of a cross-section of family firms as of 2004.[13] To build family trees for chaebols, we start with a publication by the Institute for Participatory Society, *The Chaebol of Korea: The Management Structure and Personal Network of Korean Chaebol* (2005). This book covers the family trees of the 30 largest Korean chaebols based on their total assets in 2004. We merge 16 large Korean chaebols controlled by 20 families from this list with ownership information from the Korean Fair Trade Commission (KFTC, a Korean anti-trust authority) in 2004.[14] The total amount of assets controlled by these chaebols represents more than 56% of the nominal GDP of the Korean economy in 2004 (778.4 trillion KRW).

A family tree starts with the founder's parents and includes the founder him/herself, their siblings and their spouses and all direct and indirect (via marriage) descendants of the founder and the founder's siblings, and their spouses. Family members who are younger than 15 years as of 2004 are excluded, as they are not legally eligible to work in Korea. The generation of the founder's parents is coded as generation zero, the founder's as generation one, and so on. We allocate a unique ID to each family member in the family tree and collect detailed information on birth order, gender, direct or indirect (via marriage) descendants, marital status, father's ID, and presence (dead or living). From this family tree, we define sons [daughters, sons-in-law, and daughters-in-law] of the current chair and the chair's siblings as sons [daughters, sons-in-law, and daughters-in-law] in the current chair +1 (c+1) generation. *The Chaebol of Korea: The*

[13] A key reason for focusing on the cross-section as of 2004 is limitation of comprehensive data on family tree and personal records (e.g., marriage dates), which we obtain from the reference mentioned above.

[14] Our classification of business groups is based on family roots. So, for example, the pan-Samsung group includes all of the Samsung, Shinsaegae, CJ, and Hansol groups, which have the same founder but are separately classified by the KFTC. Our sample includes only family-run business groups in Korea in the year 2004. Several business groups are co-founded and controlled by multiple families (for example, LG group was co-founded by Gu and Huh families), which results in the smaller number of business groups (16) than the number of controlling families (20) in our sample.

Management Structure and Personal Network of Korean Chaebol does not provide full coverage of specific marriage year information. We therefore manually collect the relevant information. From Korean news articles, we secure marriage year information for 70% of the (c+1)-generations. For the remaining 30%, we extrapolate the marriage years from the birth year of the marriage's first child.

Our family tree and marriage data are then merged with firm-level financial, individual family members' ownership, and board position data from companies' annual reports submitted to the Financial Services Commission and Korea Exchange (equivalent to 10-K filings in the U.S.). Any listed or unlisted corporation obligated to have an external audit under Article 2 of the decree of the Act on External Audit of Stock Companies is legally mandated to submit a comprehensive summary annual report containing information such as ownership, board positions, and financial performance. In 2004, the 16 largest family business groups in our sample had 580 firms in total as group-affiliated entities. Among them, we could collect financial data for 287 firms using Data Guide Pro, a database managed by the leading Korean financial data provider, FnGuide.[15] We obtain information on individual ownership and board position data for these 287 firms from the repository of Korea's corporate filings called DART (Data Analysis, Retrieval, and Transfer System) operated by the Financial Supervisory Service in Korea. We collect additional background information on education and careers for individual family members who have ownership or a board position. We find that chaebol family members directly own only 90 out of the 287 firms, which indicates the popular use of deep ownership

[15] The information in this database is approximately equivalent to the information reported in CRSP and Compustat for U.S. firms. Among the 580 firms that belong to the 16 chaebols in our sample, all 140 public firms and 147 out of the 440 private firms submitted annual reports in 2004.

pyramids in Korean chaebols. With disproportionately small key control stakes, the family controls the entire group of firms.

To more clearly identify the degree of such a concentrated control structure in each business group, we collect aggregate family-level ownership data from the KFTC, which, since the mid-1990s, has required the top Korean chaebols to report extremely detailed ownership status information. These types of public data are generally unavailable in most countries. Our final dataset consists of 16 large Korean business groups from 20 chaebol families with 287 firms (90 directly owned by the families) as of 2004. The Appendix A provides the details of our variable definitions.

[Table 1 around here]

Table 1 is an overview of the 16 large Korean business groups from the 20 chaebol families in our sample. As indicated in Panel A, the average family has 54.35 members; there is substantial cross-sectional variation in family size due to the variation in the number of family generations. The majority of the current chairs belong to the second generation, and the average numbers of male and female family members are 27.4 and 24.7, respectively. In the current chair+1 (c+1) generation, there are, on average, 6.85 sons, 5.40 daughters, 2.30 sons-in-law, and 2.05 daughters-in-law.[16] We observed four chaebol families whose founders are alive as of 2004.

[16] Following prior literature such as Bertrand et al. (2008), we measure the intensity of succession tournaments by the number of contestants directly involved in the succession tournaments. For the case of family firms in Thailand, it is measured by the number of sons of current chairman (e.g., Bertrand et. al., 2008). For the case of family firms in Korea, the family members in the (c+1) generation include the children and their spouses of the current chair and the chair's siblings. Among them, we consider direct bloodline males in the (c+1) generation as potential heirs of a business group. *Ex ante*, we cannot rule out a possibility that the current chairman unexpectedly dies and is replaced with his/her siblings. Doosan is also a case where the current chair's nephew instead of son inherited the business group.

Panels B and C of Table 1 respectively show involvement in equity ownership and board positions across different family members. We summarize the statistics separately for the current chair+1 and current chair generations. In Panel B, where we report ownership involvement by different family members, we find that, on average, 20.8 family members own stakes in at least one firm within the group. For the current chair+1 generation, 4 sons on average hold 20% of the total family stakes, while 1.75 daughters hold just 3%. In-laws in the chair+1 generation rarely own the controlling stakes of the family. For the current chair generation, similar male dominance in equity ownership is found, and it should be noted that the fraction of family ownership held by external (i.e., married in) male members (5%) exceeds the average fraction held by internal female members (4%). In Panel C of the same table, we find similar tendencies in involvement in board positions ─ the dominant presence of direct bloodline male heirs in the current chair+1 generation.

[Table 2 around here]

In Table 2, we summarize financial characteristics (Panel A) and ownership structure metrics (Panel B) for our sample firms. As shown in Panel A, as our sample comprehensively covers chaebol member firms in 2004, their financial characteristics are similar to those reported in existing studies that also focused on large listed firms in Korea (Bae et al., 2002, Almeida et al., 2011). ROA, dividends paid, and cash holding on assets are 6%, 1%, and 7% respectively for both our sample and those used in the other studies. Operating income volatility, sales volatility, and cash-flow volatility are 67%, 40%, and 60%, respectively. See our Appendix A for the details of these variable definitions. Panel A also reports that 99 out of the 287 firms in our sample are public firms (34%), and that the average age of our sample firms is 21.32 years.

Looking at the ownership structures of Korean business groups, in Panel B we find that public firms are, on average, a distance of 1.91 away from the controlling family. The average position of private firms is 2.23.[17] These average positions imply that public (private) firms are more (less) likely to be directly owned by the controlling family. The maximal pyramidal depth of a group is 5.05, and the average discrepancy between cash-flow right and voting right is 28.36% for public firms, whereas it is 69.85% for private firms. These ownership metrics confirm that there is typically a highly concentrated control structure in chaebols (Almeida et al., 2011), where small stakes in one or two key companies allow the owner of the stakes to be the ultimate controller of the entire business group.

[Table 3 around here]

Finally, we summarize the correlations between our main variables in Table 3. The number of sons is positively correlated with operating income volatility, whereas the correlation coefficients for the number of daughters and sons-in-law are close to zero. These univariate results are largely in line with our predictions. The number of sons is also negatively correlated with ROA (-0.13), which is consistent with the key findings in Bertrand et al. (2008).

4 Results

4.1 Succession Tournaments and Risk-taking in Korean Chaebols

In Table 4, using firm-level cross-sectional regressions, we show the results of testing our **H1** to discover how succession tournaments among sons affect corporate risk-taking in chaebols.

[17] Position refers to the distance between the family and a firm in a group. A value of 1 indicates that the firm is directly controlled by founding family. See Almeida et al. (2011) for more details of our ownership metrics.

In Column 1 of the table, we regress each firm's income volatility measured over a seven-year window around 2004 on the number of sons in the chair+1 generation of the business group that the firm belongs to.[18] Following Bertrand et al. (2008), we control for the log of total assets and group age and cluster the standard errors at the business group level. The estimated effect of sons' succession tournaments is both economically and statistically significant. Column 1 shows that for a one standard deviation increase in the number of sons in the chair+1 generation, the risks of group-affiliated entities increase by 5.39% (5.39=1.35395*3.98). In Columns 2 and 3, we repeat the same analysis using different corporate risk proxies ─ sales and cash flow volatility; we find similar 8.18% to 9.35% impacts on these alternative risk measures. In both columns, the number of sons in a chaebol family significantly increases corporate risks at least at the 5% statistical significance level.[19]

[Table 4 around here]

Columns 4 and 5 show the results of several placebo and identification tests of our underlying economic stories. We count the sons who are not eligible for the succession games: (1) sons below age 15, who cannot legally work in Korea, and (2) male relatives in the current chair generation whose succession tournaments are officially over as of 2004. We find that the presence of these sons reduces rather than increases corporate risks. For example, in Column 4, where we use the number of sons younger than 15, sons' effects on risks are negative (-6.07218). Similar negative effects (-0.09311) are found in Column 5 for bloodline male relatives in the

[18] It should be noted that this seven-year window is an estimation window we choose for our volatility measures. Alternative estimation windows such as five years around 2004 work equally well.

[19] All our results are robust to various alternative specification tests, including the use of residual volatility from SIC one-digit-level industry-fixed effect regressions, scaling the measured volatilities by total assets, and dropping the largest family outliers such as Hyundai and Samsung from our testing sample, among others. For the last concern on the outlier effects of Hyundai and Samsung firms, see our Appendix Table A1.1 – A1.3.

chair generation. These results confirm that the results shown in Columns 1 to 3 are not driven by sons who are uninvolved in the succession tournaments. Moreover, the Column 5 result effectively eliminates the possibility that the results in Columns 1 to 3 are driven by any background risk defined at the current chair generation, i.e., the father's effects, not the sons'.

In the remaining columns of Table 4, we conduct several conditional tests that are based on the "tournament" view of chaebol succession. Tournament incentives are high when players are symmetric in their competitive positions (Hvide, 2002). Sibling rivalry is also high when the age gap between children is narrow (Sulloway, 2001; see also our **A1**). In general, the more convex the payoff structure of the tournament reward is, the more severe the competitions are among contestants. In Columns 6 to 8, we test these general predictions based on tournament theories. When the age gap between sons is small, corporate risks increase sharply with the number of sons in the family (Column 6). Deep ownership pyramids imply a steep, option-like payoff for the winner of the succession tournament. Column 7 confirms greater risk-taking incentives for the sons of highly pyramidal family business groups; the pyramidal depth of a business group is measured as the difference between the maximum and minimum position values of group member firms. Lastly, in Column 8, we find severe risk-taking in highly reputable chaebols whose total assets belong to the top one-third of our sample. This result is consistent with the notion that succession tournaments are more intense when sons compete for the higher reputation value of the renowned business family.

4.2 Marriage Effects

To examine the effects of family composition and a daughter's marriage on corporate

risk-taking, we extend our baseline model, shown in Column 1 of Table 4. We add variables related to family composition in the chair+1 generation to the right-hand-side (RHS) of our regression: (1) the number of daughters (married and unmarried), (2) the number of sons-in-law, and (3) a marriage dummy.

[Table 5 around here]

As shown in Column 1 of Table 5, we first add the number of daughters in the chair+1 generation to the RHS of our baseline regression. We find that income volatility decreases as the number of daughters in a business group increases, whereas we find that the number of sons still significantly increases income volatility. The point estimates of the sons' (2.72425) and daughters' (-1.34747) effects on risks are both statistically significant at the 1% level.

Next, shown in Column 2 of Table 5, we decompose the number of daughters into unmarried and married daughters (these two variables are standardized to have zero means and a standard deviation of one). We find that married daughters' effects dominate unmarried daughters' effects both economically and statistically. The economic magnitude of the number of married daughters is almost twice as large as that of the number of unmarried daughters. As we hypothesize in **H2**, this could be a result of the positive externalities that sons-in-law potentially bring to the family. When we directly test the effects of sons-in-law in Column 3, we consistently find that they reduce corporate income volatility. This conclusion holds when we further control for the stand-alone marriage effect, as shown in Column 4. We add a marriage dummy that takes the value of 1 if a given chaebol has at least one son-in-law in the chair+1 generation to the RHS of our regression.

Finally, in Column 5 of Table 5, we test whether daughters' marriages could discipline the risk-shifting behaviors of sons in the chair+1 generation. In Column 5, we interact the number of sons with the daughters' marriage dummy. The point estimate of the interaction term (-1.87041) implies that sons' risk-taking incentives reduce by a net 66% (= -1.87041/2.82592) when new sons-in-law join the family. The interaction effect is statistically significant at the 10% level.

4.3 Performance

In Table 6, we report the correlations between family composition and operating performance. Based on the tournament theory described in Section 2.2 and our risk-taking results from Tables 4 and 5, we expect that higher corporate risks are likely to be associated with excessive, unpriced risks. As a result, we also expect negative performance consequences of the number of sons in succession tournaments and positive impacts for the number of daughters and sons-in-law.

[Table 6 around here]

In Column 1 of Table 6, we show the results of regressing each firm's ROA on the number of sons in the chair+1 generation of the business group the firm belongs to. As with our corporate risk regressions, standard errors are clustered at the business group level, and we also control for the log of total assets and group age. The point estimate of the number of sons is -0.32477, which is statistically significant at the 5% level. All other variables being at their means, the estimate implies a 1.29% (=0.32477*3.98) decrease in operating performance when

the number of sons in the chair+1 generation increases by one standard deviation from its mean. This Column 1 result is consistent with Bertrand et al. (2008), who find similar operating inefficiency in Thai family business groups when founders have many sons. We supplement and extend their proposition of "race to the bottom" effects by providing evidence on a specific channel that affects performance ─ the (at least in the short run) excessive risk-taking by sons in succession tournaments.

In Columns 2 and 3 of Table 6, we continue to examine whether our earlier risk-taking results for the number of daughters and sons-in-law consistently explain group performance. In both columns, we find positive, statistically significant performance effects for daughters (0.37396) and sons-in-law (0.30189) in the current chair+1 generation. In Column 4 of the same table, we further provide evidence that a daughter's marriage mitigates the performance inefficiency induced by sons in succession tournaments. A statistically significant, positive point estimate of the interaction term, Number of Sons × Daughters' marriages, suggests that performance inefficiency could reduce by a net 69% (=0.51788/0.75254) when new sons-in-law join the family. This is an economically significant effect.

In Columns 5 to 8 of Table 6, we repeat the analyses from Columns 1-4 using the residual ROA, where the variable is measured as the difference between the original ROA and the one-digit SIC average of ROAs for all Korean firms in our full 2004 financial dataset. We show results that are largely consistent with our earlier results.

4.4 Who Owns and Manages Chaebols?

In this section, we validate our key assumptions, **A1** to **A3**. To this end, we examine who owns and manages family business groups. Heirs who participate in succession tournaments are likely to have both ownership and managerial positions in certain group firms, although those heirs can indirectly influence the managerial decisions of other group firms that are controlled by professional managers who ally with them in succession tournaments. To define the roles each family member plays in succession tournaments, we analyze the ownership and board positions held by sons, daughters, and sons-in-law in the chair+1 generation. The variable of interest is the proportion of family ownership (or board positions) held by sons [daughters and sons-in-law] in the chair+1 generation. It is defined as the ratio of ownership (or the number of board positions) held by sons [daughters and sons-in-law] in the chair+1 generation divided by the entire ownership (or the number of board positions) held by all family members in a particular firm of a business group. We control for the number of generations to address family supply-side effects on ownership and board positions. We cluster the standard errors at the business group level.

[Table 7 around here]

Table 7 reports the results. In Column 1 of Panel A, we find that family size is negatively related to the number of family members with ownership, which is possibly due to the deep pyramidal structure of a Korean chaebol, where the controlling family owns only small direct stakes in several key firms. Column 2 of Panel A shows that, when we control for total family size, the proportion of sons' ownership increases with the number of sons. The estimated coefficient of 2.49003 implies a marginal 2.5% higher group ownership for every marginal son added to the family. This value is around 10 times bigger than the same value for daughters (0.25%

in Column 3). Interestingly, Column 4 shows no significant relation between the number of sons-in-law and their proportional ownership.

In Panel B, we examine family board positions. In Column 1, we show that family size is positively related to the number of family members with a board position, implying that the family's control influence goes beyond their ownership level. Column 2 of Panel B shows that when we control for total family size, the proportion of sons' board positions increases sharply with the number of sons. The point estimate of 2.32067 implies that with one extra son in the family, 2.3% more board positions are held by sons. Columns 3 (and 4) of the same panel report no significant relation between the number of daughters (sons-in-law) and their proportional board positions. However, in Panel C, we find a positive relation between the number of family owners and the number of family members with a board position, and male family members such as sons and sons-in-law have a strong positive relation between their proportion of ownership and their board positions. However, we still find no such evidence for daughters; their ownership does not lead to the managerial participation.

Summing up, we confirm in Table 7 that sons both own and manage the family business (**A1**). Daughters have ownership yet do not hold managerial positions commensurate with their ownership (**A2**), whereas external male members like sons-in-law are tapped for managerial positions despite their lack of ownership (**A3**). When they participate in the family business, they do seem to own some of the business, though. The fact that sons-in-law show a strong relation between ownership and managerial participation implies that sons-in-law whose ownership is supplemented by their wife's ownership may put pressure on the laggard sons in succession tournaments. Such external disciplining effects on the laggard heirs could spill over to the

leading sons in the tournaments, thereby mitigating excess risk-taking by sons in succession tournaments. Our results in Table 7, taken together, suggest the strong influence of Confucian culture in Korea on the business and succession practices employed by chaebol families.

4.5 Succession Tournaments and Managerial Myopia

Tournaments by definition are more likely in a finite-period game. However, Cabral (2003) shows that even in an infinite period game, a sufficiently small discount factor guarantees tournament incentives spill over to longer time periods. If true, in every period, contestants in the tournament exhibit myopia in their decisions. In Table 8, we investigate this possibility (our **H3**). We expect sons in the chair+1 generation to prefer short-term wealth gains to long-term investment commitments. Those sons can cash out corporate resources quickly from the firms in which they already have high ownership stakes, and then spend the money to accumulate stakes in other strategically important group member firms.[20] We do not necessarily expect the same behavior for the male relatives in the current chair generation, whose succession tournaments are officially over.

[Table 8 around here]

Table 8 reports our results. Short-term wealth gains are measured by payout ratio. We use long-term R&D expenses as a proxy for long-term investment commitments. We create a dummy variable for firms at least partly owned by a son and test whether sons exhibit managerial myopia in those firms. Regression specifications are similar to our other regressions.

[20] Hwang and Kim (2014) also indicate similar payout incentives of chaebol member firms when heirs become major shareholders.

In Column 1, we show that the number of sons in the chair+1 generation has a negative correlation with payout ratio. In Column 2, however, where the son's ownership dummy variable is interacted with the number of sons variable, we find a positive, statistically significant point estimate of 3.75937 at the 5% level. In Columns 3 and 4, where we repeat the analyses from Columns 1 and 2 for male bloodline relatives in the current chair generation, we do not find such short-term payout preferences.

When we test sons' long-term R&D investment behaviors, in Columns 5 and 6, we find negative point estimates for both the number of sons in the chair+1 generation and its interaction term with the son's ownership dummy. The point estimate of the interaction term (-52.17473) is statistically significant at the 1% level, which indicates that sons in the chair+1 generation avoid long-term investment commitments when their tournament outcomes are still uncertain. In Columns 7 and 8, we find no similar, significant trend of cutting R&D expenses among male relatives in the current chair's generation. R&D results seem more likely to be concerns for the heir generation.

4.6 Other Conditional Tests

In Table 9, we present the results of several conditional tests conducted to further ensure that our results identify the effects of succession tournaments. Risk-taking is relatively more limited in public firms than in private firms due to regulatory requirements. Thus we expect greater tournament effects on risk-taking in a group's private firms. In Columns 1 and 2 of Table 9, we split the sample into public and private firms and re-run our analysis. We find that sons are

more likely to take extra risks in less-regulated private firms where a substantial degree of managerial discretion is allowed with relatively low disclosure requirements.

[Table 9 around here]

We also expect sons' risk-taking behaviors to be reduced over generations, because the gap between leader and laggards loosens over time as the family tree expands in the horizontal dimension. Moreover, it could be that an heir selected by the founder of the corporate empire receives the greatest reputational reward. We split the sample into groups that have their founder as the current chair and groups that do not. Columns 3 and 4 of Table 9 show that the number of sons has the most positive relation with corporate risks when the founder is the current group chairperson.

In Columns 5 to 8 of the same table, we examine how different types of marriages affect sons' risk-taking incentives. Columns 5 and 6 compare a powerful chaebol marriage (Bunkanwanicha et al., 2013) to a non-chaebol marriage. The chaebol marriage dummy equals one if a particular business group has at least one son-in-law from a chaebol family in the current chair+1 generation. The results, presented in Columns 5 and 6, show that a daughter's chaebol marriage more effectively mitigates sons' risk-taking behavior than a non-chaebol marriage. Sons tend to suffer reputation damage when sons-in-law from rival chaebols outperform them managerially. In Columns 7 and 8, we further compare a recent marriage (one that took place in the five years prior to 2004) to an older marriage (one that occurred more than five years before 2004). We find that a recent marriage more effectively reduces corporate risks, which is consistent with the notion that the disciplining effect of sons-in-law on sons in tournaments is

greater for a newly joined son-in-law, as he is less likely to have formed a coalition with a son in the succession tournament.

4.7. Natural Experiment: The Sudden Death of a Hyundai Chairman

One concern arising from our previous tests is whether the positive relation between the number of succession contestants (i.e., the number of adult sons) and firm volatility is causal. In order to address this issue, we examine changes in firms' riskiness surrounding the sudden death of a group chairman. We examine the effects of the death of Mong-hun Chung, who became the chairman of the Hyundai Group in 1998 and committed suicide on August 4th, 2003. Upon his death, succession tournaments exogenously reopened to the c-generation male relatives, i.e., Mong-hun's brothers (See our Appendix C for more details on this event). Using this exogenous increase in the number of sons in the Hyundai succession tournament, we estimate the causal impact of succession competition on corporate risk-taking using a difference in difference in differences (DiDiD) test setup.[21]

The dependent variable of our regression is the change in a firm's riskiness, for which we use change in income volatility, measured by the difference of five-year income volatility before and after the chairman's death.[22] We exclude the year 2004, as well as the firms that were directly controlled by the chairman who died suddenly, to avoid any confounding effect, namely

[21] For convenience, we denote it as a DiDiD, but this is not strictly accurate. To be technically exact, we decompose our DiD estimate into two parts, one associated with strong contenders, the other with weak ones. We do this decomposition to isolate any common effects of the chairman's sudden death on all Hyundai affiliates.

[22] Because Mong-hun Chung became the group chairman in 1998, we use the five-year window before and after Mong-hun's death in 2003 for our volatility estimation. Our results are virtually unchanged when we instead use the seven-year estimation window as we did in our earlier analyses.

the increasing business uncertainty around the CEO's sudden death. We cluster standard errors at the business group level.

[Table 10 around here]

In Columns 1 and 2 of Table 10, we assume that, following Mong-hun's suicide, chair generation (i.e., Mong-hun's generation) bloodline male relatives are back in the succession tournament. The variable – Number of New Sons in Tournament (add c-generation) – is zero for all groups but Hyundai. For the Hyundai Group, the variable is the number of sons in the current chair generation (= the total number of sons in the current chair and current chair+1 generations − the number of sons in the current chair+1 generation). When the number of sons in the tournament exogenously increases, group entities' risk increases. In Column 1, we show that the economic magnitude of this increasing competition effect is 0.78378% for every marginal increase in the number of sons who newly join this reopened succession tournament. In Column 2, we further control for the change in the five-year average log of total assets before and after Mong-hun's death on the RHS, and find similar results.

To further tease out the succession tournament effects within the Hyundai Group, in Column 3, we partition the Hyundai affiliates into (1) firms controlled by the brothers of Mong-hun, the chairman who died suddenly, and (2) firms controlled by Mong-hun's uncles, who are in the same generation as the founder, Chung, Ju-young, Mong-hun's father. When Mong-hun was appointed as group chairman, his brothers were strong competitors (Asiaweek, June 16, 2000).[23] For them, Mong-hun's death was a second chance, with a realistic possibility of winning the succession game as the official successor of his father, Chung, Ju-young, who founded the

[23] Laxmi Nakarmi, "Of Father and Sons." Asiaweek, June 16 2000.

Hyundai Group. However, the (c-1) generation males were less likely (or indirectly) to be involved in the suddenly reopened succession tournaments after Mong-hun's death because they were in the same generation as the founder, Chung, Ju-young.[24]

Using this additional layer of difference, we run a DiDiD regression. The variable, Number of New Sons in Tournament (add c-generation), is now decomposed into (1) Number of New Sons in Tournament (add c) × Strong Contender and (2) Number of New Sons in Tournament (add c) × Weak Contender. Strong Contender is an indicator for the Hyundai firms controlled by Mong-hun's brothers in the c-generation, whereas Weak Contender indicates the Hyundai firms controlled by Mong-hun's uncles in the (c-1) generation who are likely to act like regents rather than contestants. This within-Hyundai-Group analysis shows that increasing the number of sons in the succession tournament increases corporate risks, particularly for the group entities managed by Mong-hun's brothers. This DiDiD effect of Number of New Sons in Tournament (add c) × Strong Contender (0.89004) is statistically significant at the 1% level, whereas we find insignificant income volatility change for Hyundai-affiliated firms managed by the founder's brothers (0.24085). This result sharply identifies succession effects on corporate risk-taking in Korean chaebols.

In Columns 4 to 6, we repeat the same analysis with a different assumption, that the chair generation male relatives replace sons in the c+1 generation. That means we take the difference

[24] We carefully exclude the year-2004 observations as well as the firms formerly run by the deceased chairman, Mong-hun, from our test sample. Hence our results are *unrelated* to any temporary confounding event in 2004 including the event where KCC Corp. led by Chung, Sang-young (Mong-hun's uncle) acquired stake in Hyundai Elevator Co. Ltd, a company formerly run by Mong-hun, in order to block the firm's succession to Hyun, Jung-eun (Mong-hun's wife). Sang-young is known to indirectly support Mong-hun's brothers as a formal successor of the Hyundai Group rather than Mong-hun's wife (Deuk-jin Cho, "Hyundai Must Be Inherited by the Chung Family," Kyunghyang Weekly, April 8 2008). See our Appendix C for more details on the Hyundai succession tournaments. It should also be noted that our results exclude any direct effects of Mong-hun's death on the firms formerly under his control because we exclude those firms from our test.

in the numbers of sons in the c and c+1 generations, and use it as an exogenous variation in the number of sons in succession tournaments. Both difference in differences (DiD) (Columns 4 and 5) and DiDiD (Column 6) tests confirm our earlier findings shown in Columns 1- 3. In Columns 7 to 9, we simply use a Hyundai Event indicator as an alternative explanatory variable and re-run the DiD and DiDiD analyses. Our results are robust to this alternative specification.

Overall, our findings in Table 10 suggest that the sudden death of the Hyundai Group chairman, which exogenously increases the competition in the succession tournament (i.e., family feuds), results in significant increase in corporate risks. This effect is likely causal.

Potential Channels of Sons' Risk-taking

What are the potential channels of risk-taking by sons in succession tournaments? It is important to identify whether our main results reflect sons' risk-taking actions, or reactions by the firm's stakeholders such as its suppliers and customers who are concerned about business uncertainty around family feuds. Corporate risks could increase (or reduce) in various ways that may or may not be directly observable. One potential risk-taking channel that is both observable and relevant to earlier performance inefficiency results (Table 6) is overinvestment or empire-building by sons, which could, to a certain extent, to be reflected in massive merger and acquisition (M&A) attempts. It is difficult to define overinvestment without knowing the optimal level of investment; however, to examine the possibility that sons in succession tournaments could behave like risk-seeking empire-builders, we investigate their M&A transactions in Table 11. We retrieve M&A data from Thomson Reuters SDC Platinum.

[Table 11 around here]

We employ the same empirical specification as in Table 10 based on the sudden death of Hyundai Group Chairman Chung, Mong-hun. We test whether newly joining contestants in this exogenously reopened succession tournament show empire-building incentives. We use the change in the total amount of M&A transactions in the five years before and after Mong-hun's death in 2003 as a dependent variable (Panel A), or the change in the five-year average number of M&A transactions before and after his death (Panel B). We focus only on large deals with transaction amounts that exceed 50 million US dollars. One could argue that our earlier findings on the increasing corporate risk in Hyundai firms could simply reflect restructuring efforts of the entities formerly run by the dead chairman. To be cautious on this important concern, we exclude in our analyses any intra-group acquisitions involving those entities that were formerly under Mong-hun's control.[25]

Panels A and B of Table 11 show that the exogenous increase in the number of sons in the Hyundai succession tournament leads to increased M&A transactions in terms of both deal amounts and frequency. The trends are primarily driven by Mong-hun's brothers, who are strong contenders in this newly-open Hyundai succession tournament. For instance, in Column 9 of Panel A, we find that the DiDiD effect of Hyundai Event × Strong Contender is 257.38688 million US dollars. In contrast, we find a significant decrease in total M&A transaction amounts over the same period for group firms managed by Mong-hun's uncles (-94.75856). A similar tendency can be observed in Panel B, where we analyze the number of M&A transactions; in Column 9, we find that in firms managed by Mong-hun's brothers, the annual average number of

[25] Regarding these restructuring effect concerns, we further conduct a falsification test using year-2000 as a random event time to show that a Hyundai-group event known as the "War of Princes" in year-2000 does not drive our results. For more details of the "War of Princes,", see our Appendix C. The results in our Appendix Table A2.1 and A2.2 confirm that any potential group restructuring effects since the 2000 "War of Princes" cannot explain our findings in Table 10 and 11.

large M&A transactions increases by 0.42203 (i.e., approximately 2 more large M&A transactions in the post-five year period), whereas fewer transactions are initiated by his uncles' firms (-0.25103).

In summary, we find a significant increase in the operating risk of firms managed by Strong Contenders (i.e., Mong-hun's brothers) in Hyundai Group following the group chair's death (Table 10), which coincides with the expansionary investment policies of his brothers. These connections could indicate how the primary risk-taking moves are potentially played by sons who are suddenly re-invited to the group succession tournament due to a brother's death. Importantly, the results are not driven by any restructuring-motivated mergers or acquisitions associated with Hyundai-affiliated companies formerly under the control of the group's dead chairman, Chung Mong-hun.

4.8. Additional Robustness Checks

This section presents a series of robustness checks to our main findings:

[Table 12 around here]

We first test whether corporate risks monotonically increase along with the number of sons in the succession tournament, or whether they instead show a non-monotonic relation with the number of sons, such as a rapid increase in risk with the first two sons and then a gradually decaying shape of risk as we consider additional sons in the succession tournament. From Proposition 1, one could argue that a laggard son has significant risk spillovers to all other sons in the succession tournament who are paired with him in the relative performance game. This

implies that the shape of risk in its relation to the number of sons (c+1 generation) could be concave.[26] We test this shape of risk and show the results in Column 1 of Table 12. We run a piecewise linear regression where we divide the number of sons (c+1 generation) variable into high and low groups based on its median. In that column we find the concave shape of risk in the number of sons (c+1 generation) variable. As we move from a business group with a smaller number of sons to a group with a greater number of sons, the sensitivity of corporate risk to the number of sons in the succession tournament significantly reduces by a net 24% (=2.75375/3.61997-1).

In Column 2 of Table 12, we show the results of our examination of whether a current chairman who is the first male child of the controlling family is less likely to put his sons through a succession competition. Our prior is that a family with a tradition of appointing their first-born male child as the next group chairman is less likely to run succession "tournaments."[27] In Column 2 of Table 12, we show that sons have greater risk-taking incentives when the current chairperson is not the family's first-born male child (1.57578). The effect is statistically significant at the 5% level. In contrast, no significant effects are found when the current chairman is the first-born male child of the family.

Another important concern is the globalization effect – a parallel trend that could be associated with our chaebol case study. Globalization begets the dissolution of chaebols, especially the favorable cross-subsidizing and general financing arrangements within the traditional chaebol structure. This implies growing external financing needs that would give chaebol families greater incentives to invest in governance-improving technologies (Shleifer and

[26] This would be the case unless the number of firms under sons' control increases rapidly in a highly convex way.
[27] Reflecting Korean cultural customs of succession, about 60% of successors are eldest sons in our sample.

Wolfenzon, 2002; Doidge, Karolyi, and Stulz, 2004, 2007). However, this kind of governance reformation could cause extra turmoil in a chaebol's succession planning events. Doidge, Karolyi, and Stulz (2004, 2007) show that cross-listing shares on the major U.S. exchanges is one of the governance-improving mechanisms that help firms boost their share values. Lee, Naranjo, and Sirmans (2015) find similar evidence from corporate credit prices when firms cross-list their shares in the U.S. This governance improving policy, however, could result in greater corporate risks.

To alleviate this concern, in Columns 3 to 6 of Table 12, we re-ran our baseline analyses from Column 1 of Table 4 and Columns 1 to 3 of Table 10, excluding firms with cross-listed shares.[28] As we show in Table 12, our results are robust to this important potential confounding factor. Even after we exclude firms that are more likely to be exposed to globalization effects, we still find significant evidence that competition in succession tournaments induces greater risk-taking in chaebol-affiliated entities.

5 Conclusion

We study the impact of succession tournaments on risk-taking incentives in Korean family business groups. Consistent with theories documented in the tournament and risk-taking literature, we find that business groups whose controlling families have more sons tend to have higher income volatility. In contrast, business groups whose controlling families have more daughters tend to have lower income volatility. We show that these risks are (at least in the short run) excessive and unpriced; a greater number of sons (daughters) in a family leads to lower

[28] See Appendix Table A3.1 and A3.2 for our full results from the Tables 4 and 10 analyses using this subsample.

(higher) performance outcomes. These effects are strongest in opaque business groups with a highly concentrated equity control structure. We also find evidence consistent with managerial myopia in tournament contestants. We show that firms owned by sons in succession tournaments have greater dividend payouts but invest less in long-term investment projects. Overall, our findings are consistent with the notion that succession tournaments lead to risk-shifting behaviors that may be mitigated by the externalities that outside family members (sons-in-law) could bring to the family.

Our results emphasize the importance of human capital risk in family firms. In particular, negative externalities among potential heirs could have large social costs, as these family firms represent a substantial part of the world's wealth. Indexing heirs' performance to a higher external standard could be a way to regulate succession-related managerial dysfunctions. We show that the cross-sectional expansion of a wealthy family through marriages is one way to overcome temporal family succession problems. However, ultimately, the goal of our economic deliberation is to design an optimal succession plan for the family business from the perspective of maximizing shareholders' value. The plan will create appropriate managerial incentives for the heirs of these socially, politically, and economically important business organizations around the world. As these firms are controlled by "families," our work further emphasizes the cultural aspects that must be considered when such optimal succession plans are discussed.

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Table 1: Family Summary Statistics

The sample consists of Korea's top 16 large business groups run by 20 chaebol families designated by the Korean Fair Trade Commission (KFTC) as of 2004. The number for observation is 20 families for Panel A and 16 business groups for Panels B and C, except for a small fraction of family board positions, as three chaebol families do not hold any board positions in their business group. Each variable is computed as the arithmetic average across firms in a business group.

Panel A: Family size refers to the total number of direct and indirect descendants of the parents of a founder of a business group and the founder's parents themselves. Family size includes the founder's siblings and descendants of the founder's siblings, and their spouses. Family members who are younger than 15 as of 2004 are excluded. The number of generations refers to the distance between the founder (generation 1) and the most recent generation that is included in family size. The generation of the founder's parents (generation 0) is excluded. The current chair's generation refers to the generation to which the current chairman of a business group belongs. Current chair tenure refers to the number of years the current chair of each business group has held the chairmanship since he was officially appointed, as of 2004. The number of male family members refers to the total number of direct and indirect male family members in a business group. The number of female family members refers to the total number of direct and indirect female family members in a business group. The number of sons [daughters, sons-in-law, and daughters-in-law] in the current chair+1 generation (c+1 generation) refers to the total number of sons [daughters, sons-in-law, and daughters-in-law] of the current chair and the chair's siblings. Founder dead is an indicator variable that equals one if the founder is dead as of 2004, and zero otherwise.

Panels B and C: The number of family members with ownership (board positions) refers to the total number of family members that directly own (hold at least one board position in) a particular firm of a business group. Current chair+1 generation refers to the generation following the current chair's. For the current chair+1 generation, the number of sons [daughters, sons-in-law, and daughters-in-law] with ownership (board positions) is the total number of sons [daughters, sons-in-law, and daughters-in-law] of the current chair and his/her siblings with ownership of (board positions in) at least one of the group firms. The proportion of family ownership (board positions) held by sons [daughters, members] refers to the ratio of ownership (the number of board positions) held by sons [daughters, family members] of the current chair and his/her siblings divided by the entire ownership (number of board positions) held by family members in a particular firm in a business group. For the current chair generation, male [female, married male, married female] family members indicate the current chair and the chair's brothers [chair's sisters, chair's brothers-in-law, chair's sisters-in-law]. In that generation, the number of male [female, married male, and married female] family members with ownership (board positions) refers to the total number of male [female, married male, and married female] family members with ownership (board positions) in at least one of the group firms. The proportion of family ownership (board positions) held by male [female, married male, and married female] family members refers to the ratio of ownership (the number of board positions) held by male [female, married male, and married female] family members in the current chair and his/her siblings generation divided by the entire ownership (number of board positions) held by family members in a particular firm in a business group.

Panel A: Family characteristics	N	Mean	Std. Dev	Min	Median	Max
Family size	20	54.35	32.22	15	48	143
Number of generation	20	3.05	0.60	2	3	4
Current chair generation	20	1.85	0.67	1	2	3
Current chair tenure (years)	20	13.75	10.96	0	10	38
Number of male family members	20	27.40	15.21	7	28	69
Number of female family members	20	24.70	16.07	7	20	74
Number of sons (c+1 generation)	20	6.85	3.98	0	6	15
Number of daughters (c+1 generation)	20	5.40	4.06	0	4	16
Number of sons in law (c+1 generation)	20	2.30	3.50	0	1	11
Number of daughters in law (c+1 generation)	20	2.05	3.05	0	0	9
Founder dead	20	0.80	0.41	0	1	1

Panel B: Involvement in ownership						
	N	Mean	Std. Dev	Min	Median	Max
Number of family members with ownership	16	20.8	13.0	2	20	51
Current chair+1 generation						
Number of sons with ownership	16	4.00	5.20	0	3	19
Number of daugeters with ownership	16	1.75	1.95	0	2	7
Number of sons in law with ownership	16	0.31	0.87	0	0	3
Number of daugeters in law with ownership	16	0.38	1.50	0	0	6
Fraction of family ownership held by sons	16	0.20	0.26	0	0	0.7
Fraction of family ownership held by daughters	16	0.03	0.04	0	0	0.1
Fraction of family ownership held by sons in law	16	0.002	0.007	0	0	0.029
Fraction of family ownership held by daughters in law	16	0.001	0.003	0	0	0.011
Current chair generation						
Number of male family members with ownership	16	6.94	4.49	1	7	15
Number of female family members with ownership	16	1.50	1.86	0	1	5
Number of married male members with ownership	16	1.13	1.82	0	0	6
Number of married female members with ownership	16	0.94	1.44	0	0	4
Fraction of family ownership held by male family member	16	0.51	0.27	0	0	1.0
Fraction of family ownership held by female family member	16	0.04	0.10	0	0	0.4
Fraction of family ownership held by married male member	16	0.05	0.15	0	0	0.6
Fraction of family ownership held by married female member	16	0.02	0.04	0	0	0.1

Panel C: Involvement in board position						
	N	Mean	Std. Dev	Min	Median	Max
Number of family members with board position	16	3.88	3.12	0.00	3	11.00
Current chair+1 generation						
Number of sons with board position	16	0.63	1.15	0	0	4
Number of daughters with board position	16	0.13	0.50	0	0	2
Number of sons in law with board position	16	0.06	0.25	0	0	1
Number of daughters in law with board position	16	0.00	0.00	0	0	0
Fraction of family board position held by sons	13	0.16	0.25	0	0	1
Fraction of family board position held by daughters	13	0.02	0.06	0	0	0.2
Fraction of family board position held by sons in law	13	0.01	0.03	0	0	0.1
Fraction of family board position held by daugeters in law	13	0.00	0.00	0	0	0
Current chair generation						
Number of male family member with board position	16	2.44	2.28	0	3	7
Number of female family member with board position	16	0.06	0.25	0	0	1
Number of married male member with board position	16	0.13	0.34	0	0	1
Number of married female member with board position	16	0.06	0.25	0	0	1
Fraction of family board position held by male family member	13	0.63	0.30	0	1	1
Fraction of family board position held by female family member	13	0.02	0.07	0	0	0.3
Fraction of family board position held by married male member	13	0.03	0.09	0	0	0.3
Fraction of family board position held by married female member	13	0.04	0.14	0	0	1

Table 2: Firm Summary Statistics

The sample consists of 287 firms that are legally required to submit a comprehensive summary report of their performance (equivalent to 10-K filings in the U.S.) and complete shareholder ownership from 16 large Korean business groups designated by the Korean Fair Trade Commission (KFTC) as of 2004. Analysis is based on data compiled as of the year-end of 2004. In Panel A, log of total assets refers to the logarithm of a firm's total assets in millions of KRW. Log of sales refers to the logarithm of a firm's total sales in millions of KRW. Leverage refers to a debt ratio calculated as a firm's total debt divided by its total equity. ROA refers to the ratio of a firm's earnings before interest and tax (EBIT) divided by its total assets. Operating income volatility refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. Sales volatility refers to the standard deviation of the logarithm of a firm's annual sales from t-3 to t+3 periods. Cash-flow volatility refers to the standard deviation of the logarithm of a firm's annual net operating cash flow from t-3 to t+3 periods. Public firm is an indicator variable that equals one if a firm is listed on the KOSPI or KOSDAQ exchange, and zero otherwise. Firm age is the age of a firm in a business group as of 2004. Panel B shows the ownership structure of sample firms based on KFTC reports. Group chair ownership refers to the average percentage of direct ownership held by a group chairperson in a business group. Family ownership refers to the average percentage of direct ownership held by founding family members besides the chairperson in a business group. Subsidiary ownership refers to the average percentage of direct ownership held by subsidiaries in a business group. Position refers to the distance between the family and a firm in a business group; a value of 1 indicates that the firm is directly controlled by the founding family. Cash-flow right refers to the sum of direct equity ownership held by the founding family after excluding treasury stocks and cross shareholdings. Voting right refers to the ratio of the maximum number of stocks that founding family members can exercise for voting divided by the total number of the group's outstanding stocks. Discrepancy between ownership and control refers to the gap between cash-flow rights and voting rights.

Panel A: Financial characteristics

	Number of firms	Mean	Std. Dev	Min	Median	Max
Log of total assets	287	12.72	2.15	7.43	13	17.88
Log of sales	279	12.55	2.28	5.11	12	17.79
Leverage	287	0.56	0.24	0.01	1	1.13
ROA	284	0.06	0.09	-0.29	0.06	0.57
Dividend paid/Total asset	287	0.01	0.03	0	0	0.29
Cash holding/Total asset	287	0.07	0.10	0	0.04	0.52
Operating income volatility (t-3~t+3)	286	0.67	0.51	0	0.51	3.06
Sales volatility (t-3~t+3)	285	0.40	0.40	0	0.29	3.33
Cashflow volatility (t-3~t+3)	282	0.60	0.41	0	0.49	2.40
Public firm (dummy)	287	0.34	0.48	0	0	1
Firm age	287	21.32	15.37	1	18	72

Panel B: Ownership structure

	Number of firms	Mean	Std. Dev	Min	Median	Max
Group chair ownership (%)	287	2.83	8.36	0	0	89.80
Public	99	3.59	6.95	0	0	46.21
Private	188	2.43	9.00	0	0	89.80
Family ownership (%)	287	9.13	16.89	0	0	100
Public	99	9.47	12.66	0	2.88	52.08
Private	188	8.95	18.77	0	0	100
Subsidiary ownership (%)	287	53.71	32.63	0	50	100
Public	99	25.55	19.76	0	23.73	75.27
Private	188	68.53	27.99	0	70.81	100
Position	272	2.12	0.83	1	2	5.05
Public	92	1.91	0.86	1	1.78	5.05
Private	180	2.23	0.79	1	2	4.53
Cash-flow right (%)	287	9.40	17.23	0	0	100
Public	99	10.22	13.84	0	3.05	52.08
Private	188	8.97	18.80	0	0	100
Voting right (%)	287	64.94	29.43	0	66.31	100
Public	99	38.58	19.45	0	35.01	100
Private	188	78.81	23.77	0	88.77	100
Discrepancy (%)	287	55.53	31.96	0	50	100
Public	99	28.36	21.01	0	26.90	99.17
Private	188	69.85	27.09	0	72.11	100

Table 3: Correlation

Table 3 reports correlations among the main variables summarized in the previous tables for all our sample firms. Family size refers to the total number of direct and indirect descendants of the parents of the founder of a business group and the founder's parents themselves. Family size includes the founder's siblings and descendants of the founder's siblings, and their spouses. Family members who are younger than 15 as of 2004 are excluded. The number of descendants here refers to the current chair+1 generation, the generation following that of the current chairperson. The number of sons [daughters and sons-in-law] refers to the total number of sons [daughters and sons-in-law] of the current chair and his/her siblings. Group age refers to the number of years since the year of incorporation of a business group as of 2004. Operating income volatility refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. Log of sales refers to the logarithm of a firm's total sales in millions of KRW. ROA refers to the ratio of a firm's earnings before interest and tax (EBIT) divided by its total assets. Payout ratio refers to the ratio of a firm's net dividends paid divided by its net income.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	Family size	1.00								
(2)	Number of sons	0.42	1.00							
(3)	Number of daughters	0.65	0.74	1.00						
(4)	Number of sons in law	0.47	0.66	0.92	1.00					
(5)	Group age	0.08	0.14	0.15	0.30	1.00				
(6)	Operating Income (t-3~t+3) Volatility (× 100)	-0.04	0.09	0.00	0.01	0.01	1.00			
(7)	Log of total assets	0.04	0.01	0.00	-0.03	0.04	-0.11	1.00		
(8)	ROA	-0.02	-0.13	-0.01	-0.03	-0.04	-0.25	-0.05	1.00	
(9)	Payout ratio	-0.11	-0.15	-0.14	-0.08	0.14	-0.15	0.04	0.17	1.00

Table 4: Tournaments among Sons and Corporate Risk-taking in Family Business Groups

Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1) and (4)-(8), the dependent variable is operating income volatility, which refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. For Column (2), sales volatility refers to the standard deviation of the logarithm of a firm's annual sales from t-3 to t+3 periods. For Column (3), cash-flow volatility refers to the standard deviation of the logarithm of a firm's annual net operating cash flow from t-3 to t+3 periods. Columns (1)-(3) and (6)-(8) use the number of sons in the current chair+1 generation as an explanatory variable, which refers to the total number of sons of the current chair and the chair's siblings. Column (4) uses the number of sons in the current chair+1 generation whose ages are below 15 as an explanatory variable. Column (5) uses the number of males in the current chair generation as an explanatory variable, which refers to the number of brothers of the current chair and the chairman himself. In Column (6), age gap low (dummy) is an indicator that equals one if the difference of the eldest and youngest son's age in the current chair+1 generation is smaller than the median value of age difference, and zero otherwise. In Column (7), pyramidal depth is the difference between the maximum value of position and the minimum value of position. In Column (8), reputable group (dummy) is an indicator that equals one if the total asset size of a group is in the top tercile of groups and zero otherwise. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of year 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Income (t-3~t+3) Volatility (× 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables		Sales Volatility	CF Volatility	Sons below age 15	Sons in c-generatior	Son's age gap	Pyramidal depth	Reputable group
Number of sons (c+1 generation)	1.35395**	2.05450**	2.34986***	-6.07218***	-0.09311	0.91094	-0.70450	0.88010
	[0.508]	[0.844]	[0.782]	[1.386]	[0.214]	[0.581]	[0.950]	[0.543]
Number of sons (c+1 gen.) x Age gap low						2.19219**		
						[0.943]		
Age gap low (dummy)						-10.00719		
						[9.930]		
Number of sons (c+1 gen.) x Pyramidal depth							0.61212**	
							[0.261]	
Pyramidal depth							-9.32298***	
							[2.357]	
Number of Sons (c+1 gen.) x Reputable group								1.73863*
								[0.966]
Reputable group (dummy)								-10.26824
								[8.810]
Log total assets	-2.26369*	-2.10943	-2.78809**	-2.10619	-2.21222	-2.27209	-2.28543	-2.21890
	[1.279]	[1.275]	[1.052]	[1.383]	[1.314]	[1.333]	[1.353]	[1.329]
Group age	0.04057	-0.32180	-0.27958	0.22788*	0.09164	0.04844	0.20407	0.06912
	[0.182]	[0.261]	[0.250]	[0.109]	[0.154]	[0.155]	[0.136]	[0.167]
Constant	82.31033***	68.02715**	91.77584***	88.46039***	91.26098***	84.81790***	107.34586***	83.79638***
	[22.939]	[26.281]	[24.426]	[20.989]	[23.536]	[20.681]	[23.483]	[21.366]
Observations	275	285	282	275	275	275	273	275
R-squared	0.017	0.046	0.062	0.024	0.010	0.023	0.026	0.020

Table 5: Tournaments by Sons, Daughters' Marriages, and Risk Reduction

Each column reports the coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. Operating income volatility is computed as the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. Number of sons (c+1 generation) refers to the total number of sons of the current chair and his/her siblings. Number of daughters (c+1 generation) refers to the total number of daughters of the current chair and the chair's siblings. In Column (2), the number of daughters (c+1 generation) is decomposed into unmarried daughters and married daughters in the chair+1 generation. The number of married daughters (c+1 generation) is equivalent to the number of sons-in-law (c+1 generation), which refers to the number of indirect (married in) male descendants of the chair and his/her siblings. All explanatory variables in Column (2) are standardized, and therefore their point estimates represent the economic magnitudes of their effects. Daughter's marriage is a dummy that equals one if a particular business group has at least one son-in-law in the current chair +1 generation, and zero otherwise. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Income (t-3~t+3) Volatility (× 100)				
Variables	(1)	(2)	(3)	(4)	(5)
Number of sons (c+1 generation)	2.72425***	9.57604***	2.23375***	2.66236***	2.82592***
	[0.575]	[1.953]	[0.592]	[0.576]	[0.764]
Number of daughters (c+1 generation)	-1.34747***				
	[0.378]				
Number of unmarried daughters (c+1 gen., standardized)		-3.22696**			
		[1.206]			
Number of married daughters (c+1 gen., standardized)		-5.69444***			
		[1.806]			
Number of sons-in-law (c+1 generation)			-1.04936**	-1.94624***	
			[0.444]	[0.531]	
Number of sons × Daughters' marriage					-1.87041*
					[0.888]
Daughters' marriage (c+1 generation)				7.72676	10.83726
				[5.429]	[8.183]
Log total assets	-2.26652	-4.81643	-2.33335	-2.31612	-2.19301
	[1.335]	[2.901]	[1.354]	[1.373]	[1.359]
Group age	0.06722	0.51762	0.12737	0.17125	0.07564
	[0.142]	[2.194]	[0.168]	[0.124]	[0.177]
Constant	80.13925***	67.39359***	75.63567***	68.46488***	71.04144**
	[21.224]	[1.591]	[20.659]	[19.615]	[24.116]
Observations	275	275	275	275	275
R-squared	0.024	0.024	0.022	0.023	0.021

Table 6: Family Composition and Operating Performance

Each column reports the coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1)-(4), the dependent variable is ROA, which refers to the ratio of returns, calculated as a firm's earnings before interest and tax (EBIT) divided by its total assets. For Columns (5)-(8), the dependent variable is the alternative ROA measure, residual ROA, which refers to the difference between ROA and the one-digit SIC average ROA for all firms in the full sample. The number of sons [daughters and sons-in-law] in c+1 generation refers to the total number of sons [daughters and sons-in-law] of the current chair and his/her siblings. Daughter's marriage is an indicator that equals one if a particular business group has at least one son-in-law in the current chair +1 generation, and zero otherwise. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of year 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable							
	ROA (×100)				Residual ROA (×100)			
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of sons (c+1 generation)	-0.32477**	-0.70656***	-0.57790***	-0.75254***	-0.28835**	-0.66893***	-0.53124**	-0.71798***
	[0.126]	[0.151]	[0.187]	[0.226]	[0.114]	[0.152]	[0.200]	[0.241]
Number of daughters (c+1 generation)		0.37396***				0.37278***		
		[0.112]				[0.116]		
Number of sons-in-law (c+1 generation)			0.30189*				0.28968	
			[0.154]				[0.170]	
Number of sons × Daughters' marriage				0.51788*				0.53108*
				[0.251]				[0.258]
Daughters' marriage (c+1 generation)				-2.40291				-2.67202*
				[1.736]				[1.461]
Log total assets	0.06383	0.06886	0.08677	0.05181	-0.03878	-0.03376	-0.01676	-0.05319
	[0.295]	[0.309]	[0.312]	[0.301]	[0.309]	[0.327]	[0.330]	[0.320]
Group age	-0.00202	-0.00961	-0.02709	-0.01410	-0.02313	-0.03069	-0.04719	-0.03477
	[0.049]	[0.036]	[0.040]	[0.043]	[0.046]	[0.032]	[0 .035]	[0.038]
Constant	8.44023	9.00611*	10.32913**	11.38151**	4.27631	4.84039	6.08879	7.33230
	[4.903]	[4.383]	[4.264]	[4.346]	[5.084]	[4.416]	[4.182]	[4.544]
Observations	284	284	284	284	284	284	284	284
R-squared	0.016	0.035	0.029	0.031	0.016	0.037	0.030	0.032

Table 7: Who Owns and Manages Family Business Groups? Gender Effects in Succession

Each column reports the coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The sample consists of 90 firms that are directly owned by family members based on KFTC reports. Fraction of family ownership (board positions) in Panels A, B, and C considers the current chair+1 generation. The proportion of family ownership (board positions) held by sons [daughters and sons-in-law] refers to the ratio of ownership (the number of board positions) held by sons [daughters and sons-in-law] of the current chair and his/her siblings divided by the entire ownership (number of board positions) held by family members in a particular firm in the business group. The number of sons [daughters and sons-in-law] in c+1 generation refers to the total number of sons [daughters and sons-in-law] of the current chair and his/her siblings. The number of generation refers to the family's current generation, with the founder's generation being counted as the first generation. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Ownership	Number of family members with ownership	Fraction of family ownership (× 100) held by		
		Sons	Daugters	Sons-in-law
Variables	(1)	(2)	(3)	(4)
Family size	-0.02297	-0.16069	-0.02462**	0.00029
	[0.019]	[0.126]	[0.010]	[0.000]
Number of sons (c+1 generation)		2.49003*		
		[1.227]		
Number of daughters (c+1 generation)			0.24642***	
			[0.066]	
Number of sons-in-law (c+1 generation)				0.00020
				[0.002]
Number of generation	-0.40829	15.51496	0.98058*	-0.00470
	[1.005]	[9.451]	[0.474]	[0.013]
Constant	6.43141**	-41.26421	-2.30238	0.00600
	[2.363]	[24.041]	[1.404]	[0.027]
Observations	90	90	90	90
R-squared	0.059	0.161	0.047	0.020

Panel B: Board positions	Number of family members with board position	Fraction of family board positions (× 100) held by		
		Sons	Daughter	Sons-in-law
Variables	(1)	(2)	(3)	(4)
Family size	0.00125	-0.03503	-0.01655	0.02802**
	[0.002]	[0.055]	[0.026]	[0.012]
Number of sons (c+1 generation)		2.32067**		
		[0.959]		
Number of daughters (c+1 generation)			0.37121	
			[0.343]	
Number of sons-in-law (c+1 generation)				0.0674
				[0.063]
Number of generation	-0.31839*	-2.26205	-0.78058	-1.00995**
	[0.162]	[3.892]	[1.161]	[0.457]
Constant	1.59187***	-2.26637	1.55083	1.62722
	[0.518]	[13.211]	[2.856]	[1.189]
Observations	90	90	90	90
R-squared	0.045	0.098	0.114	0.035

Panel C: Connections between ownership and board positions	Number of family members with board position	Fraction of family board positions (× 100) held by		
		Sons	Daugters	Sons-in-law
Variables	(1)	(2)	(3)	(4)
Number of family owners	0.07510***	0.90154**	0.05571	-0.26150**
	[0.023]	[0.354]	[0.071]	[0.120]
Fraction of family ownership (× 100) held by sons (c+1 gen.)		0.21752**		
		[0.100]		
Fraction of family ownership (× 100) held by daughters (c+1 gen			0.02576	
			[0.042]	
Fraction of family ownership (× 100) held by sons-in-law (c+1 ge				63.61077***
				[18.944]
Number of generation	-0.23913*	-4.43438	-0.42078	-0.61462
	[0.131]	[4.097]	[0.566]	[0.352]
Constant	1.15946**	14.47288	1.81194	2.73351*
	[0.431]	[13.505]	[2.276]	[1.530]
Observations	90	90	90	90
R-squared	0.126	0.106	0.008	0.619

Table 8: Tournaments among Sons and Managerial Myopia

Each column reports the coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1)-(4), the dependent variable is payout ratio, which refers to the ratio of a firm's net dividends paid divided by its net income. For Columns (5)-(8), the dependent variable is the log of R&D expenses, which refers to the logarithm of a firm's long-term research and development (R&D) expenses in millions of KRW. Columns (1), (2), (5), and (6) consider sons in the current chair+1 (c+1) generation, the generation that immediately follows the current chair's generation. Columns (3), (4), (7), and (8) consider sons in the current chair's (c) generation. The number of sons in c+1 generation refers to the total number of sons of the current chair and his/her siblings, while the number of sons in c generation refers to the total number of the current chair's brothers, plus the current chair (if male). Firms with sons' ownership (dummy) indicates a firm in the business group directly owned by sons in the c (or c+1) generations. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable							
	Payout ratio (x100)				Log(R&D Expenses)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	c+1 generation		c generation		c+1 generation		c generation	
Number of sons	-1.28470***	-1.45847***	-0.09478	-0.08650	-5.21293	-3.34206	-1.14717	-1.02872
	[0.316]	[0.345]	[0.170]	[0.188]	[6.147]	[6.595]	[2.175]	[2.137]
Number of sons × Firms with sons ownership (dummy)		3.75937**		0.44685		-52.17473***		-16.15351
		[1.717]		[1.710]		[13.841]		[30.440]
Firms with sons ownership (dummy)		-36.33279*		9.51947		623.97395***		246.98155
		[17.348]		[14.334]		[129.550]		[312.517]
Log total assets	0.07478	0.19336	0.07182	-0.55383	68.64532***	66.79249***	69.18044***	63.78309***
	[1.154]	[1.099]	[1.218]	[1.111]	[10.498]	[11.049]	[10.834]	[9.898]
Group age	0.40956***	0.45111***	0.35105***	0.36978**	1.52229	0.39705	1.21614	1.50741
	[0.072]	[0.107]	[0.117]	[0.131]	[1.221]	[1.244]	[1.074]	[1.102]
Constant	0.11805	-2.27254	-5.85821	-0.33013	-789.03065***	-725.38317***	-808.82475***	-769.07691***
	[15.257]	[13.765]	[14.835]	[14.057]	[150.869]	[158.619]	[127.770]	[125.353]
Observations	236	236	236	236	284	284	284	284
R-squared	0.058	0.069	0.029	0.053	0.227	0.248	0.225	0.238

Table 9: Tournaments and Risks – Conditional Evidence

Each column reports the coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1)-(4), the full sample of 287 firms is broken down into two groups and compared as pairs. Private firms are firms in a business group that are not listed on the KOSPI or KOSDAQ exchange, while public firms are those that are listed. Founder chair includes business groups that have the founder as the current chair, while non-founder chairs are identified as otherwise. For Columns (5)-(8), different types of daughter marriages are compared. Chaebol marriage refers to an indicator variable that equals one if a particular business group has at least one son-in-law from a chaebol family in the current chair+1 generation, and zero otherwise. Non-chaebol marriage refers to an indicator variable that equals one if a particular business group's chair+1 generation has at least one son-in-law but does not have one from a chaebol family, and zero otherwise. Marriage within recent five years is an indicator variable that equals one if a particular business group has at least one son-in-law in the current chair+1 generation who married into the family between 1998 and 2003, and zero otherwise. Marriage of more than five years is an indicator variable that equals one if a particular business group's chair+1 generation has at least one son-in-law but does not have any who married into the family between 1998 and 2003, and zero otherwise. The dependent variable is operating income volatility, which is computed as the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. The number of sons in c+1 generation refers to the total number of sons of the current chair and his/her siblings. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Income (t-3~t+3) Volatility (× 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Private	Public	Founder chair	Non-founder chair	Chaebol marriage	Non-chaebol marriage	Marriage within last 5 years	Marriage more than 5 years ago
Number of sons (c+1 generation)	1.93631**	-0.21532	0.94107***	1.74803	2.77021***	1.33121**	1.71886**	1.32833
	[0.687]	[1.061]	[0.198]	[1.132]	[0.689]	[0.562]	[0.616]	[0.956]
Number of Sons × Daughters' marriage					-1.84809*	0.98692	-1.46603**	-0.34683
					[0.960]	[1.153]	[0.659]	[1.010]
Daughters' marriage (c+1 generation)					8.12385	0.81928	4.24721	10.17807
					[8.581]	[8.167]	[5.838]	[8.675]
Log total assets	-2.56866	1.17468	-0.55677	-2.55670	-2.19726	-2.16629	-2.37514	-2.19634
	[2.148]	[3.185]	[0.934]	[1.526]	[1.326]	[1.314]	[1.354]	[1.327]
Group age	0.19959	0.01837	-0.00425	0.12753	0.12991	0.05728	0.17860	0.11092
	[0.329]	[0.154]	[0.112]	[0.229]	[0.139]	[0.141]	[0.129]	[0.124]
Constant	73.78035**	43.31424	68.36150***	76.95341**	69.49151***	79.46944***	76.43298***	76.06026***
	[33.182]	[46.820]	[11.674]	[30.821]	[21.403]	[21.741]	[20.096]	[22.942]
Observations	176	99	57	218	275	275	275	275
R-squared	0.023	0.002	0.013	0.020	0.024	0.020	0.025	0.020

Table 10: Natural Experiment: The Sudden Death of a Group Chairman – Corporate Risks

Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The dependent variable of our regression is the change in a firm's riskiness, for which we use the change in income volatility, measured by the difference of the five-year income volatility before and after the Hyundai chairman's death on Aug 4th, 2003. We exclude the year 2004, as well as the firms that were controlled by the chairman who died suddenly, to avoid any confounding effect, namely the increasing business uncertainty around the CEO's death. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable; this is the total number of sons in the current chair's generation for Hyundai Group and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair's generation and the current chair+1 generation for Hyundai Group, and zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and is zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Δ Income Volatility (× 100)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	0.78378***	0.71248***							
	[0.124]	[0.149]							
Number of New Sons in Tournament (add c) × Strong Contender			0.89004***						
			[0.134]						
Number of New Sons in Tournament (add c) × Weak Contender			0.24085						
			[0.200]						
Number of New Sons In Tournament (swap c+1 with c generation)				1.32639***	1.20574***				
				[0.210]	[0.252]				
Number of New Sons in Tournament (swap c) × Strong Contender						1.50622***			
						[0.227]			
Number of New Sons in Tournament (swap c) × Weak Contender						0.40759			
						[0.338]			
Hyundai (indicator)							17.24306***	15.67456***	
							[2.731]	[3.272]	
Hyundai Event × Strong Contender									19.58089***
									[2.956]
Hyundai Event × Weak Contender									5.29870
									[4.396]
Δ Log total assets		6.64469	6.78696		6.64469	6.78696		6.64469	6.78696
		[13.284]	[13.342]		[13.284]	[13.342]		[13.284]	[13.342]
Constant	-6.51342**	-10.82419	-10.91649	-6.51342**	-10.82419	-10.91649	-6.51342**	-10.82419	-10.91649
	[2.731]	[10.035]	[10.074]	[2.731]	[10.035]	[10.074]	[2.731]	[10.035]	[10.074]
Observations	240	240	240	240	240	240	240	240	240
R-squared	0.006	0.009	0.010	0.006	0.009	0.010	0.006	0.009	0.010

Table 11: Natural Experiment: The Sudden Death of a Group Chairman – Mergers and Acquisitions

Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The dependent variable of Panel A is the change in the total amount of M&A transactions, which refers to the difference of the five-year total M&A transaction amounts before and after the Hyundai chairman's death on Aug 4th, 2003. In Panel B, the change in the number of M&As refers to the change in the five-year average number of M&A transactions before and after the event. We exclude the year 2004, as well as the firms that were controlled by the chairman who died suddenly, to avoid any confounding effect, namely the increasing business uncertainty around the CEO's sudden death. We also do not consider any intra-group M&As that involve Hyundai entities that were formerly controlled by the dead chairman to avoid group restructuring effects, if any. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable; this is the total number of sons in the current chair's generation for Hyundai Group, and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair's generation and the current chair+1 generation for Hyundai Group, and is zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Total transaction	Dependent Variable: Δ Total transaction of M&A (million USD)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	7.25246***	6.86680***							
	[1.219]	[1.236]							
Number of New Sons in Tournament (add c) × Strong Contender			11.69940***						
			[1.245]						
Number of New Sons in Tournament (add c) × Weak Contender			-4.30721***						
			[1.288]						
Number of New Sons In Tournament (swap c+1 with c generation)				12.27339***	11.62073***				
				[2.063]	[2.093]				
Number of New Sons in Tournament (swap c) × Strong Contender						19.79899***			
						[2.107]			
Number of New Sons in Tournament (swap c) × Weak Contender						-7.28912***			
						[2.179]			
Hyundai (indicator)							159.55413***	151.06954***	
							[26.822]	[27.203]	
Hyundai Event × Strong Contender									257.38688***
									[27.396]
Hyundai Event × Weak Contender									-94.75856***
									[28.329]
Δ Log total assets		40.08843**	46.14880**		40.08843**	46.14880**		40.08843**	46.14880**
		[16.171]	[20.563]		[16.171]	[20.563]		[16.171]	[20.563]
Constant	64.46536**	41.04546	37.50496	64.46536**	41.04546	37.50496	64.46536**	41.04546	37.50496
	[26.822]	[29.492]	[30.223]	[26.822]	[29.492]	[30.223]	[26.822]	[29.492]	[30.223]
Observations	279	279	279	279	279	279	279	279	279
R-squared	0.010	0.013	0.025	0.010	0.013	0.025	0.010	0.013	0.025

Panel B: Number of M&A	Dependent Variable: Δ Number of M&A								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	0.01073***	0.00995**							
	[0.003]	[0.004]							
Number of New Sons in Tournament (add c) × Strong Contender			0.01918***						
			[0.003]						
Number of New Sons in Tournament (add c) × Weak Contender			-0.01141***						
			[0.004]						
Number of New Sons In Tournament (swap c+1 with c generation)				0.01815***	0.01683**				
				[0.006]	[0.006]				
Number of New Sons in Tournament (swap c) × Strong Contender						0.03246***			
						[0.006]			
Number of New Sons in Tournament (swap c) × Weak Contender						-0.01931***			
						[0.006]			
Hyundai (indicator)							0.23600***	0.21883**	
							[0.076]	[0.077]	
Hyundai Event × Strong Contender									0.42203***
									[0.077]
Hyundai Event × Weak Contender									-0.25103***
									[0.078]
Δ Log total assets		0.08113***	0.09272***		0.08113***	0.09272***		0.08113***	0.09272***
		[0.019]	[0.023]		[0.019]	[0.023]		[0.019]	[0.023]
Constant	0.03182	-0.01557	-0.02234	0.03182	-0.01557	-0.02234	0.03182	-0.01557	-0.02234
	[0.076]	[0.072]	[0.074]	[0.076]	[0.072]	[0.074]	[0.076]	[0.072]	[0.074]
Observations	279	279	279	279	279	279	279	279	279
R-squared	0.004	0.006	0.014	0.004	0.006	0.014	0.004	0.006	0.014

Table 12: Robustness Test

Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1)-(3), the dependent variable is operating income volatility, which refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. In Column (1), the number of sons (c+1 generation) variable is divided into two groups. Number of sons (c+1 generation) LT50 refers to the total number of sons of the current chair and his/her siblings if the total number of sons is lower than its sample median. Number of sons (c+1 generation) GT50 refers to the total number of sons of the current chair and his/her siblings if the total number of sons is greater than the sample median. In Column (2), number of sons (c+1 generation) is interacted with first son chair and no first son chair. First son chair is a dummy variable that equals one if the current chairman is the first male child. No first son chair is a dummy that equals one if the current chairman is not the first male child. In Columns (3)-(6), we exclude cross-listing firms to avoid globalization effects on corporate-risk taking. In those columns, we re-run our earlier analyses from Column (1) of Table 4 and Columns (1) to (3) of Table 10, respectively. For the definitions of the variables used in these columns, refer to Tables 4 and 10. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable					
	Income (t-3~t+3) Volatility (× 100)			Δ Income Volatility (× 100)		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Number of sons (c+1 generation) LT50	3.61997*					
	[1.792]					
Number of sons (c+1 generation) GT50	2.75375***					
	[0.884]					
Number of sons x First son chair		0.52848				
		[0.575]				
Number of sons x No first son chair		1.57578**				
		[0.535]				
Number of sons (c+1 generation)			1.52407***			
			[0.492]			
Number of New Sons in Tournament (add c-generation)				0.97519***	0.90000***	
				[0.111]	[0.159]	
Number of New Sons in Tournament (add c) × Strong Contender						1.08350***
						[0.146]
Number of New Sons in Tournament (add c) × Weak Contender						0.39792*
						[0.198]
Log total assets	-2.39267*	-2.34051	-1.39564			
	[1.293]	[1.339]	[1.391]			
Group age	0.11322	0.22164	0.01415			
	[0.201]	[0.147]	[0.176]			
Δ Log total assets					6.64759	6.74323
					[13.372]	[13.414]
Intercept LT50	97.08577***					
	[24.832]					
Intercept GT50	82.89977***					
	[23.482]					
Constant		75.32042***	72.29476***	-6.85692**	-11.20603	-11.26859
		[20.294]	[24.046]	[2.446]	[9.803]	[9.832]
Observations	275	275	266	231	231	231
R-squared	0.021	0.024	0.013	0.009	0.012	0.013

Appendix A

Variable Definitions

Family characteristics variables

Family size	The total number of direct and indirect descendants of the parents of the founder of each business group and the founder's parents themselves. Family size includes the founder's siblings, the descendants of the founder's siblings, and their spouses. Family members who are younger than 15 years as of 2004 are excluded.
Number of generation	The number of generations in the family. The founder's generation is the first, and then each successive generation is counted, up to the most recent generation that is included in family size. The generation of founder's parents (generation 0) is excluded.
Current chair generation	The generation that the current chairman of each business group belongs to.
Current chair tenure	The number of years that the current chairman of each business group has been officially appointed as the group's chairman, as of 2004.
Number of male family members	The total number of direct and indirect (married in) male family members who are included in family size.
Number of female family members	The total number of direct and indirect (married in) female family members who are included in family size.
Number of sons [daughters, sons-in-law, and daughters-in-law] (c+1 generation)	The total number of sons [daughters, sons-in-law, and daughters-in-law] of the current chair and the chair's siblings.
Founder dead	An indicator variable that equals one if the founder is dead as of 2004, and zero otherwise.
Age gap low	An indicator equal to one if the difference of the eldest son's age and youngest son's age in the current chair+1 generation is smaller than the median level of age difference, and zero otherwise.
Sons below age 15	Sons of the current chair and the chair's siblings whose age is below 15. Those sons are excluded from the sample since in Korea they are not legally eligible to work.

Family involvement variables

Number of family members with ownership	The total number of family members who directly own a particular firm of the business group. Family members who are younger than 15 as of 2004 are excluded.
(Current chair+1 generation)	
Number of sons [daughters, sons-in-law, and daughters-in-law] with ownership (board positions)	Total number of sons [daughters, sons-in-law, and daughters-in-law] of the current chair and the chair's siblings with ownership (board positions) in at least one of the group's firms.
Fraction of family ownership (board positions) held by sons [daughters, sons-in-law, and daughters-in-law]	The ratio of ownership (the number of board positions) held by sons [daughters, sons-in-law, and daughters-in-law] of the current chair and the chair's siblings divided by the entire ownership (number of board positions) held by family members in a particular firm in business group.
(Current chair's generation)	
Number of male [female, married male, married female] family members	Total number of the current chair and the chair's brothers [chair's sisters, chair's brothers-in-law, chair's sisters-in-law].
Number of male [female, married male, and married female] family members with ownership (board positions)	Total number of male [female, married male, and married female] family members with ownership (board positions) in at least one of the group firms.
Fraction of family ownership (board positions) held by male [female, married male, and married female] family members	The ratio of ownership (the number of board positions) held by male [female, married male, and married female] family members divided by the entire ownership (number of board positions) held by family members in a particular firm in the business group.
Marriage variables	
Daughter's Marriage	An indicator variable that equals one if a particular business group's controlling family has at least one son-in-law in the current chair +1 generation, and zero otherwise.
Chaebol Marriage	An indicator variable that equals one if a particular business group's controlling family has at least one son-in-law from a chaebol family in the current chair +1 generation, and zero otherwise.
Non-chaebol Marriage	An indicator variable that equals one if a particular business group's controlling family has at least one son-in-law but no sons-in-law from a chaebol family in the current chair +1 generation, and zero otherwise.
Marriage within last five years	An indicator variable that equals one if a particular business

	group's controlling family has at least one son-in-law in the current chair+1 generation who married in between 1998 and 2003, and zero otherwise.
Marriage more than five years	An indicator variable that equals one if a particular business group's controlling family has at least one son-in-law in the current chair +1 generation but does not have one who married into the family within five years, and zero otherwise.
Firm and group characteristics variables	
Log of total assets	The logarithm of total assets of each firm in millions of KRW.
Log of sales	The logarithm of total sales of each firm in millions of KRW.
Leverage	The debt ratio calculated by total debt divided by total equity.
ROA	The ratio of earnings before interest and tax (EBIT) divided by total assets
Residual ROA	The difference between ROA and the one-digit SIC average ROA for all firms in the full sample.
Payout ratio	The ratio of net dividends paid divided by net income.
Log of R&D investment	The logarithm of long-term research and development (R&D) expenses in millions of KRW. R&D expenses only include long-term R&D investments, which are regarded as assets, but exclude short-term R&D expenses, which are regarded as costs in the balance sheet.
Income volatility	The standard deviation of the logarithm of annual operating income from t-3 to t+3 periods.
Sales volatility	The standard deviation of the logarithm of annual sales from t-3 to t+3 periods.
Cash-flow volatility	The standard deviation of the logarithm of annual net operating cash flow from t-3 to t+3 periods.
Group age	Age of a business group as of 2004.
Firm age	Age of each firm in the business group as of 2004.
Public Firms	An indicator variable that equals one if firms are listed on the KOSPI or KOSDAQ exchange, and zero otherwise.
Reputable Group	An indicator variable that equals one if the total asset size of the group is greater than that of the top one third of groups, and zero otherwise.

Ownership Structure variables

Group chair ownership	The average percentage of direct ownership held by the group chairperson in a particular business group.
Family ownership	The average percentage of direct ownership held by founding families in a business group. The group chair's ownership is excluded.
Subsidiary ownership	The average percentage of direct ownership held by subsidiaries in a business group.
Position	The distance between the family and a firm in a group. A value of 1 indicates that the firm is directly controlled by the founding family.
Pyramidal depth	The difference between the maximum value of position and minimum value of position.
Cash-flow right	The sum of direct equity ownership held by the founding family after excluding treasury stocks and cross shareholdings.
Voting right	The ratio of maximum number of stocks that the founding family can possibly exercise for voting divided by the total number of stocks outstanding This includes direct and indirect voting shares held by the founding family, subsidiaries, senior managers in special relationships, and non-profit organizations.
Discrepancy	The difference between cash-flow rights and voting rights.

Appendix B

Evidence on High Quality Sons-in-law

In our sample, we find that on average, sons-in-law have higher educational records than sons. When we compare their bachelor degrees, 64.3% of sons-in-law in our sample graduate from top six universities in Korea, whereas 45.3% of sons are from those top domestic institutions. We also find that sons in chaebol (39.1%) tend to study abroad for their college educations, whereas only 21.4% of sons-in-law received bachelor degrees from overseas institutions. Sons-in-law tend to have more advanced and professional degrees such as masters degree (14.3%), MBA (50.0%), Ph.D. (21.4%), JD (7.1%), and MD (21.4%) than sons [masters degree (7.8%), MBA (40.6%), Ph.D. (1.6%), JD (1.6%), and MD (0%)]. Based on the Financial Times Global MBA Rankings, 35.7% of sons-in-law received their MBA degrees from the top 10 MBA programs, whereas 21.9% of sons did so.

Below we provide the anecdotal evidence of high quality sons-in-law who successfully manage the affiliates of several chaebols. Anecdotal evidence of highly competent sons-in-law is easily found in various chaebol families. To provide the widely-existing evidence on such figures, in this appendix we provide two cases for chaebols in our sample (SK and Hyundai) as well as two other cases for chaebols that are not included in our testing sample (Aekyung and Crown-Haitai Confectionary).

1. *SK Group – Jang-suk Park*

Jang-suk Park, SK Group founder Chey, Jong-gun's second son-in-law, is currently participating in the group's management. Park joined SK Group in 1979 and was appointed as the CEO of the SKC in 2004 – the SK group affiliate that drives chemicals and film specialist business. Once he became the CEO, he pushed forward the company's restructuring by liquidating outdated VCR tape business and re-anchoring the group's core business to new and growing sectors such as industrial optical films. Park's innovative drive and forward-looking approach led to tangible outcomes; the SKC came to occupy 27% of the global solar cell polyester film market and developed solar cell EVA and Fluoride film. In 2009, the SKC finally became the only company that is capable of producing all three types of solar cell films. In 2011, with Park's initiative for technical innovation, the SKC had its highest sales record ever, breaking the KRW1 trillion mark.

2. Hyundai Group – Ted Chung

In May 2015, Tae-young Chung (or Ted Chung), the second son-in-law of the Hyundai Motors Group was promoted to the vice chairman who manages the group's financial units. With his promotion, the industry's eyes are on the probable change in his status and roles in the group's future succession scheme. The utmost interest, in particular, is focused on the group's succession scheme for its financial affiliates including the Hyundai Capital, the Hyundai Card, the Hyundai Commercial, the HMC Investment Securities and the Hyundai Life. The newly appointed vice chairman has been known as an "icon of innovation" in the financial world, garnering a high reputation as a celebrity CEO. While his success was proved in terms of numbers as shown in the market share growth of Hyundai Card to 12% from a mere 2 %, the true reason for his rise as the next generation business leader lies in his exceptional culture-based marketing and corporate culture innovation that enabled such success stories. Ted Chung graduated from Seoul National University with a bachelor's degree in French, and he also received a master of business administration from Massachusetts Institute of Technology.

3. *Aekyung Group – Yong-chan Ahn*

Yong-chan Ahn is the vice chairman of Aekyung Group's consumer products and airline division. Ahn is virtually recognized as a professional CEO of Aekyung rather than simply a son-in-law of the Aekyung Group. Yong-chan joined Aekyung's marketing department in 1987 after finishing his master of business administration degree from the Wharton School of the University of Pennsylvania, where he served as chairman of the alumni association until 2010. Since he was appointed as CEO of Aekyung, Yong-chan has gained a reputation for his aggressive management by promoting restructuring of businesses. While he got rid of some consumer brands that had not been reaching their full sales potential, he steadily managed to increase sales by 10% on average for the following 10 years, and the company's debt ratio of 870% in 1995 dropped to 190% in the same period. Yong-chan, after promoted to the group's vice chairman in 2006, pulled off a feat of putting one of group affiliates, Cheju Airline, in the black with 3.4 million operating profit for the first time in the company's history.

4. Crown-Haitai Confectionary – Jung-hoon Shin

Jung-hoon Shin, Crown-Haitai Confectionary Chairman Young dal Yun's son-in-law, was selected as the CEO of the Haitai Confectionery and Foods Co. Ltd after he played a leading role in Crown's (industry's ranking No.4) acquisition of Haitai Confectionery and Food (ranking No. 2) in 2005.

He gained a serious recognition for his managerial talent when he successfully helped the company overcome the 2008 Chinese milk scandal from the firm' OEM factories in China. Following the episode, Jung-hoon turned his eye to overseas markets to look for new business opportunities. As part of the efforts, in 2014, he took over Palazzo del Freddo, the world's oldest gelato company based in Rome founded in 1880 which became world famous after Audrey Hepburn took a bite of its gelato in the movie "Roman Holiday." With this merger deal, he is now planning to open 200 overseas stores in the Europe and Asia. Before joining Crown-Haitai Confectionery and Foods, Jung-hoon served as a Director of Bain & Company, one of the most well-known global management consulting firms. He graduated from Seoul National University with a bachelor's degree in business administration, and earned his master's degree of business administration from University of Michigan.

Appendix C

Background of the Hyundai Group Succession Tournaments

In 1998 when the founder and honorary chairman of Hyundai Group, Chung, Ju-young, retired from day-to-day management, his 5th son, Mong-hun, along with Mong-koo (his 2nd son) took over the Hyundai Group as co-chairmen. At that time, Mong-hun was gaining in-group influence as he led major affiliates of Hyundai and people in the know were saying he secured his heir apparent position. When Ju-young Chung ultimately decided to appoint Mong-hun as a sole "President of Hyundai Manager's Consulting Committee" (i.e. as Hyundai Group's head) in 2000, Mong-koo dissented his father's decision by replacing executives who are sympathetic to Mong-hun with his own allies in the firms under his control. For example, several key senior executives from the Hyundai Securities – a core financial affiliate of the Hyundai Group – were replaced with Mong-koo's allies. Mong-koo also talked another brother, Mong-jun (6th son), into suing Mong-hun's two firms for incurring financial losses to the Hyundai Heavy Industry, the key firm to Mong-jun. Despite Mong-koo's disobedient actions, the founder Chung, Ju-young, who firmly sided with Mong-hun, stepped in and quelled the revolt. This aborted rebel attempt – which is termed the "War of Princes" – eventually led Mong-koo to step down from his co-chairmanship and made Mong-hun a sole chair of the Hyundai Group. The brotherly dispute over managerial rights ended following this event, and as a compromise to bring peace within Hyundai, Mong-koo was granted in charge of for Hyundai Motor Group whereas Mong-jun became mainly responsible for the Hyundai Heavy Industries. All these firms kept Hyundai brand and remained as a close union under the big Hyundai Group umbrella, keeping practices of concerted business plans that are central to compete against other chaebol rivalries ("MK's Coup D'état: It was Doomed to be a Failure," The Donga Weekly Volume 228, April 6, 2000).

The family feud subsided after the "War of Princes" outbroke when Mong-hun, the founder favored new chairman of Hyundai, suddenly died in August 2003. Prior to Mong-hun's suicide, the Hyundai Group became under investigation of illegal fund transfer to North Korea made during the previous administration. It is commonly understood that Hyundai was supporting previous administration's Sunshine Policy towards North Korea and made direct business transactions with North Korea under the informal support from President Dae-jung Kim's administration for helping their policy toward unification. However, under new administration, these informal fund transfers were investigated as a political showdown to tame Hyundai Group, which eventually led the group chairman to commit suicide (James Brooke, "Indicted Hyundai Executive Plunges to Death in Seoul," The New York Times, August 4, 2003).

After Mong-hun's sudden death, infighting within the Hyundai's controlling family broke out. Notably Mong-hun's brothers Mong-koo and Mong-jun as well as Mong-hun's widow, Jung-eun Hyun, competed for the official title of the Hyundai chairman. Older generation of the Hyundai family (i.e., Mong-hun's uncles themselves) lacked the mandate within the family to become the next group chairman. Instead, they were indirectly involved in this succession tournament by siding and sponsoring one of the potential candidates. The support came mostly through public endorsement and/or the promise of proxy votes in favor of their favorite candidate ("The Scrupulous Regent of the Hyundai Family," The Hankyung, September 4, 2006). For example, KCC Corp. led by Chung, Sang-young (Mong-hun's uncle) acquired stake in the Hyundai Elevator Co. Ltd, a company formerly run by Mong-hun, in order to block the firm's succession to Hyun, Jung-eun, following Mong-hun's death. Sang-young is known to indirectly support Mong-hun's brothers as a formal successor of the Hyundai Group rather than Mong-hun's wife (Deuk-jin Cho, "Hyundai Must Be Inherited by the Chung Family," Kyunghyang Weekly, April 8, 2008). Eventually, the struggle to find the new official chairman of the Hyundai Group ended in 2011 when Mong-koo acquired the control over the group's symbolic company under the family's approval – the Hyundai Engineering & Construction, the company with which the founder of Hyundai Group, Ju-young Chung, started his corporate empire since January 1950 (Won-suk Choi and Noo-ri Ha, "Chung Family in Bid to Buy Hyundai Engineering," The Chosun Ilbo, July 1, 2010; Joong-sik Cho and Kyoung-yup Ho, "The Prince Returns to the Palace As a King After 11 Years," The Chosun Ilbo, April 2, 2011).

Using differences in firm-level volatility before and after the sudden death of Hyundai Group's chairman on August 4th, 2003, we identify a causal link between increased competition among succession contestants and corporate risk-taking. With the background described above, we support the notion that upon the chairman's sudden death, succession tournaments exogenously reopened primarily to the c-generation male relatives (i.e., Mon-hun's brothers) rather than Mong-hun's uncles in his father's generation.

Appendix Tables

Appendix Table A1.1 Tournaments among Sons and Corporate Risk-taking, Controlling for Outlier Effects

In this table, we exclude Hyundai and Samsung group to avoid outlier effects on corporate risks. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1) and (4)-(8), the dependent variable is operating income volatility, which refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. For Column (2), sales volatility refers to the standard deviation of the logarithm of a firm's annual sales from t-3 to t+3 periods. For Column (3), cash-flow volatility refers to the standard deviation of the logarithm of a firm's annual net operating cash flow from t-3 to t+3 periods. Columns (1)-(3) and (6)-(8) use the number of sons in the current chair+1 generation as an explanatory variable; this refers to the total number of sons of the current chair and the chair's siblings. Column (4) uses the number of sons in the current chair+1 generation whose ages are below 15 as an explanatory variable. Column (5) uses the number of males in the current chair's generation as an explanatory variable; this refers to the number of brothers of the current chair, plus the chair if male. In Column (6), age gap low (dummy) is an indicator that equals one if the difference of the eldest and youngest son's age in the current chair+1 generation is smaller than the median of age difference, and zero otherwise. In Column (7), pyramidal depth is the difference between the maximum value of position and the minimum value of position. In Column (8), reputable group (dummy) is an indicator that equals one if the total asset size of a group is in the top tercile of groups and zero otherwise. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of year 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Income (t-3~t+3) Volatility (× 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables		Sales Volatility	CF Volatility	Sons below age 15	Sons in c-generation	Son's age gap	Pyramidal depth	Reputable group
Number of sons (c+1 generation)	1.73432**	1.04244	2.37200**	-5.15573**	0.02922	0.40459	-0.56014	0.55778
	[0.757]	[0.743]	[1.020]	[1.954]	[0.167]	[1.001]	[1.238]	[0.946]
Number of sons (c+1 gen.) x Age gap low						2.67678*		
						[1.219]		
Age gap low (dummy)						-17.32586		
						[10.088]		
Number of sons (c+1 gen.) x Pyramidal depth							0.67939**	
							[0.247]	
Pyramidal depth							-8.53413***	
							[1.938]	
Number of Sons (c+1 gen.) x Reputable group								2.07789
								[1.395]
Reputable group (dummy)								-16.76818
								[9.546]
Log total assets	-2.17975	-2.99716**	-2.81553**	-2.06109	-2.28462	-2.19727	-2.10190	-2.15322
	[1.419]	[1.315]	[1.200]	[1.486]	[1.408]	[1.461]	[1.456]	[1.453]
Group age	-0.24235	-0.51272*	-0.66718***	0.08347	-0.08096	-0.09983	-0.12062	-0.13593
	[0.165]	[0.236]	[0.124]	[0.138]	[0.177]	[0.235]	[0.122]	[0.223]
Constant	93.16545***	96.68567***	111.95904***	94.18169***	98.82838***	96.01519***	116.14218***	96.90471***
	[23.497]	[25.647]	[21.005]	[22.433]	[26.069]	[22.005]	[22.760]	[21.830]
Observations	239	247	244	239	239	239	237	239
R-squared	0.019	0.060	0.065	0.020	0.010	0.024	0.025	0.022

Appendix Table A1.2 Natural Experiment: The Sudden Death of a Group Chairman, Controlling for Outlier Effects

In this table, we exclude Samsung group to avoid outlier effects on corporate risks. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The dependent variable of our regression is the change in a firm's riskiness, for which we use the change in income volatility, measured by the difference of the five-year income volatility before and after the Hyundai chairman's death on Aug 4th, 2003. We exclude the year 2004, as well as the firms that were controlled by the chairman who died suddenly, to avoid any confounding effect, namely the increasing business uncertainty around the CEO's death. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable, which is the total number of sons in the current chair's generation for Hyundai Group and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair generation and the current chair+1 generation for Hyundai Group, and zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and is zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Δ Income Volatility (× 100)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	0.83008***	0.62215***							
	[0.163]	[0.184]							
Number of New Sons in Tournament (add c) × Strong Contender			0.82427***						
			[0.177]						
Number of New Sons in Tournament (add c) × Weak Contender			0.08265						
			[0.213]						
Number of New Sons In Tournament (swap c+1 with c generation)				1.40475***	1.05287***				
				[0.275]	[0.311]				
Number of New Sons in Tournament (swap c) × Strong Contender						1.39491***			
						[0.300]			
Number of New Sons in Tournament (swap c) × Weak Contender						0.13986			
						[0.360]			
Hyundai (indicator)							18.26180***	13.68736***	
							[3.580]	[4.049]	
Hyundai Event × Strong Contender									18.13388***
									[3.898]
Hyundai Event × Weak Contender									1.81821
									[4.676]
Δ Log total assets		19.52075*	19.75270*		19.52075*	19.75270*		19.52075*	19.75270*
		[10.569]	[10.554]		[10.569]	[10.554]		[10.569]	[10.554]
Constant	-7.53216*	-20.22983**	-20.38071**	-7.53216*	-20.22983**	-20.38071**	-7.53216*	-20.22983**	-20.38071**
	[3.580]	[8.544]	[8.542]	[3.580]	[8.544]	[8.542]	[3.580]	[8.544]	[8.542]
Observations	181	181	181	181	181	181	181	181	181
R-squared	0.009	0.037	0.039	0.009	0.037	0.039	0.009	0.037	0.039

Appendix Table A1.3 Natural Experiment: The Sudden Death of a Group Chairman – M&As, Controlling for Outlier Effects

In this table, we exclude Samsung group to avoid outlier effects on corporate risks. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The dependent variable of Panel A is the change in the total amount of M&A transactions, which refers to the difference of the five-year total M&A transaction amounts before and after the Hyundai chairman's death on Aug 4th, 2003. In Panel B, the change in the number of M&As refers to the change in the five-year average number of M&A transactions before and after the event. We exclude the year 2004, as well as the firms that were controlled by the chairman who died suddenly, to avoid any confounding effect, namely the increasing business uncertainty around the CEO's sudden death. We also do not consider any intra-group M&As that involve Hyundai entities that were formerly controlled by the dead chairman to avoid group restructuring effects, if any. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable; this is the total number of sons in the current chair's generation for Hyundai Group, and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair's generation and the current chair+1 generation for Hyundai Group, and is zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Total transaction	Dependent Variable: Δ Total transaction of M&A (million USD)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	6.42131***	6.01852***							
	[1.378]	[1.414]							
Number of New Sons in Tournament (add c) × Strong Contender			10.85134***						
			[1.427]						
Number of New Sons in Tournament (add c) × Weak Contender			-5.22560***						
			[1.477]						
Number of New Sons In Tournament (swap c+1 with c generation)				10.86683***	10.18518***				
				[2.332]	[2.393]				
Number of New Sons in Tournament (swap c) × Strong Contender						18.36381***			
						[2.415]			
Number of New Sons in Tournament (swap c) × Weak Contender						-8.84333***			
						[2.499]			
Hyundai (indicator)							141.26885***	132.40737***	
							[30.310]	[31.105]	
Hyundai Event × Strong Contender									238.72952***
									[31.390]
Hyundai Event × Weak Contender									-114.96323***
									[32.491]
Δ Log total assets		43.21964*	51.75792*		43.21964*	51.75792*		43.21964*	51.75792*
		[23.286]	[29.138]		[23.286]	[29.138]		[23.286]	[29.138]
Constant	82.75065**	57.21565	52.17107	82.75065**	57.21565	52.17107	82.75065**	57.21565	52.17107
	[30.310]	[35.573]	[37.423]	[30.310]	[35.573]	[37.423]	[30.310]	[35.573]	[37.423]
Observations	211	211	211	211	211	211	211	211	211
R-squared	0.008	0.010	0.022	0.008	0.010	0.022	0.008	0.010	0.022

Panel B: Number of M&A	Dependent Variable: Δ Number of M&A								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	0.01200**	0.01125**							
	[0.005]	[0.005]							
Number of New Sons in Tournament (add c) × Strong Contender			0.02046***						
			[0.005]						
Number of New Sons in Tournament (add c) × Weak Contender			-0.01018*						
			[0.005]						
Number of New Sons In Tournament (swap c+1 with c generation)				0.02031**	0.01904**				
				[0.008]	[0.008]				
Number of New Sons in Tournament (swap c) × Strong Contender						0.03463***			
						[0.008]			
Number of New Sons in Tournament (swap c) × Weak Contender						-0.01723*			
						[0.008]			
Hyundai (indicator)							0.26401**	0.24752**	
							[0.104]	[0.106]	
Hyundai Event × Strong Contender									0.45018***
									[0.105]
Hyundai Event × Weak Contender									-0.22398*
									[0.107]
Δ Log total assets		0.08043***	0.09670***		0.08043***	0.09670***		0.08043***	0.09670***
		[0.026]	[0.031]		[0.026]	[0.031]		[0.026]	[0.031]
Constant	0.00381	-0.04371	-0.05332	0.00381	-0.04371	-0.05332	0.00381	-0.04371	-0.05332
	[0.104]	[0.099]	[0.101]	[0.104]	[0.099]	[0.101]	[0.104]	[0.099]	[0.101]
Observations	211	211	211	211	211	211	211	211	211
R-squared	0.005	0.006	0.015	0.005	0.006	0.015	0.005	0.006	0.015

Appendix Table A2.1 Natural Experiment: The Sudden Death of a Group Chairman – Placebo Test (2000)

In this table, we conduct a placebo test to confirm that increased risk is due to re-opened succession tournament. The dependent variable of our regression is the change in a firm's riskiness, for which we use the change in income volatility, measured by the difference of the five-year income volatility before and after the "War of Princes" in 2000. We exclude the event year 2000 to avoid any confounding effect. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable, which is the total number of sons in the current chair's generation for Hyundai Group and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair generation and the current chair+1 generation for Hyundai Group, and zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and is zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Δ Income Volatility (× 100)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	-1.10204***	-1.10060***							
	[0.268]	[0.268]							
Number of New Sons in Tournament (add c) × Strong Contender			-1.42364***						
			[0.269]						
Number of New Sons in Tournament (add c) × Weak Contender			-0.29300						
			[0.268]						
Number of New Sons In Tournament (swap c+1 with c generation)				-1.86498***	-1.86255***				
				[0.454]	[0.453]				
Number of New Sons in Tournament (swap c) × Strong Contender						-2.40923***			
						[0.455]			
Number of New Sons in Tournament (swap c) × Weak Contender						-0.49585			
						[0.454]			
Hyundai (indicator)							-24.24479***	-24.21318***	
							[5.903]	[5.890]	
Hyundai Event × Strong Contender									-31.32001***
									[5.919]
Hyundai Event × Weak Contender									-6.44605
									[5.899]
Δ Log total assets		-38.92216***	-38.93883***		-38.92216***	-38.93883***		-38.92216***	-38.93883***
		[8.092]	[8.122]		[8.092]	[8.122]		[8.092]	[8.122]
Constant	0.53226	19.12287**	19.13083**	0.53226	19.12287**	19.13083**	0.53226	19.12287**	19.13083**
	[5.903]	[7.792]	[7.822]	[5.903]	[7.792]	[7.822]	[5.903]	[7.792]	[7.822]
Observations	134	134	134	134	134	134	134	134	134
R-squared	0.013	0.125	0.128	0.013	0.125	0.128	0.013	0.125	0.128

Appendix Table A2.2 Natural Experiment: The Sudden Death of a Group Chairman – M&As, Placebo Test (2000)

In this table, we conduct a placebo test to confirm that increased risk is due to re-opened succession tournament. The dependent variable of Panel A is the change in the total amount of M&A transactions, which refers to the difference of the five-year total M&A transaction amounts before and after the "War of Princes" in 2000. In Panel B, the change in the number of M&As refers to the change in the five-year average number of M&A transactions before and after the event. We exclude the event year 2000 to avoid any confounding effect. We also do not consider any intra-group M&As that involve Hyundai entities that were controlled by the new chairman to avoid group restructuring effects, if any. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable, which is the total number of sons in the current chair's generation for Hyundai Group and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair generation and the current chair+1 generation for Hyundai Group, and zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and is zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Total transaction	Dependent Variable: Δ Total transaction of M&A (million USD)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	-2.70446**	-2.80508**							
	[1.138]	[1.142]							
Number of New Sons in Tournament (add c) × Strong Contender			-3.58020***						
			[1.142]						
Number of New Sons in Tournament (add c) × Weak Contender			-1.02655						
			[1.151]						
Number of New Sons In Tournament (swap c+1 with c generation)				-4.57678**	-4.74707**				
				[1.926]	[1.932]				
Number of New Sons in Tournament (swap c) × Strong Contender						-6.05880***			
						[1.932]			
Number of New Sons in Tournament (swap c) × Weak Contender						-1.73724			
						[1.948]			
Hyundai (indicator)							-59.49813**	-61.71186**	
							[25.043]	[25.116]	
Hyundai Event × Strong Contender									-78.76438***
									[25.116]
Hyundai Event × Weak Contender									-22.58406
									[25.330]
Δ Log total assets		12.57795	11.93198		12.57795	11.93198		12.57795	11.93198
		[15.408]	[15.351]		[15.408]	[15.351]		[15.408]	[15.351]
Constant	30.70493	22.25349	22.68753	30.70493	22.25349	22.68753	30.70493	22.25349	22.68753
	[25.043]	[27.579]	[27.640]	[25.043]	[27.579]	[27.640]	[25.043]	[27.579]	[27.640]
Observations	278	278	278	278	278	278	278	278	278
R-squared	0.006	0.007	0.008	0.006	0.007	0.008	0.006	0.007	0.008

Appendix Table A3.1 Tournaments among Sons and Corporate Risk-taking, Controlling for Globalization Effects

In this table, we exclude cross-listing firms to avoid globalization effects on corporate risks. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. For Columns (1) and (4)-(8), the dependent variable is operating income volatility, which refers to the standard deviation of the logarithm of a firm's annual operating income from t-3 to t+3 periods. For Column (2), sales volatility refers to the standard deviation of the logarithm of a firm's annual sales from t-3 to t+3 periods. For Column (3), cash-flow volatility refers to the standard deviation of the logarithm of a firm's annual net operating cash flow from t-3 to t+3 periods. Columns (1)-(3) and (6)-(8) use the number of sons in the current chair+1 generation as an explanatory variable; this refers to the total number of sons of the current chair and the chair's siblings. Column (4) uses the number of sons in the current chair+1 generation whose ages are below 15 as an explanatory variable. Column (5) uses the number of males in the current chair's generation as an explanatory variable; this refers to the number of brothers of the current chair, plus the chair if male. In Column (6), age gap low (dummy) is an indicator that equals one if the difference of the eldest and youngest son's age in the current chair+1 generation is smaller than the median of age difference, and zero otherwise. In Column (7), pyramidal depth is the difference between the maximum value of position and the minimum value of position. In Column (8), reputable group (dummy) is an indicator that equals one if the total asset size of a group is in the top tercile of groups and zero otherwise. Log of total assets refers to the logarithm of a firm's total assets in millions of KRW at the end of year 2004. Group age refers to the number of years since the year of incorporation of each business group as of 2004. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Income (t-3~t+3) Volatility (× 100)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables		Sales Volatility	CF Volatility	Sons below age 15	Sons in c-generation	Son's age gap	Pyramidal depth	Reputable group
Number of sons (c+1 generation)	1.52407***	2.10120**	2.31274**	-5.76703***	-0.08531	1.03139*	-0.07169	0.99895*
	[0.492]	[0.823]	[0.823]	[1.571]	[0.193]	[0.516]	[1.033]	[0.480]
Number of sons (c+1 gen.) x Age gap low						2.51208***		
						[0.816]		
Age gap low (dummy)						-11.53359		
						[8.375]		
Number of sons (c+1 gen.) x Pyramidal depth							0.48505	
							[0.277]	
Pyramidal depth							-7.85261***	
							[2.520]	
Number of Sons (c+1 gen.) x Reputable group								1.99908**
								[0.872]
Reputable group (dummy)								-11.72373
								[7.180]
Log total assets	-1.39564	-1.65153	-2.38371*	-1.30945	-1.36751	-1.41210	-1.42317	-1.35445
	[1.391]	[1.382]	[1.142]	[1.499]	[1.444]	[1.443]	[1.481]	[1.440]
Group age	0.01415	-0.32607	-0.30571	0.20258*	0.07293	0.02006	0.15850	0.04476
	[0.176]	[0.255]	[0.256]	[0.100]	[0.147]	[0.143]	[0.136]	[0.157]
Constant	72.29476***	62.60638**	88.88900***	80.30420***	82.43051***	75.31995***	93.05268***	74.06229***
	[24.046]	[27.071]	[26.096]	[22.154]	[24.616]	[21.773]	[25.067]	[22.528]
Observations	266	276	273	266	266	266	264	266
R-squared	0.013	0.041	0.056	0.016	0.004	0.021	0.020	0.017

Appendix Table A3.2 Natural Experiment: The Sudden Death of a Group Chairman, Controlling for Globalization Effects

In this table, we exclude cross-listing firms to avoid globalization effects on corporate risks. Each column reports coefficients from an OLS regression with heteroscedasticity-robust standard errors. Standard errors are clustered at the business group level and reported in parentheses under the coefficient estimates. The dependent variable of our regression is the change in a firm's riskiness, for which we use the change in income volatility, measured by the difference of the five-year income volatility before and after the Hyundai chairman's death on Aug 4th, 2003. We exclude the year 2004, as well as the firms that were controlled by the chairman who died suddenly, to avoid any confounding effect, namely the increasing business uncertainty around the CEO's death. Columns (1) and (2) use Number of New Sons in Tournament (add c-generation) as an explanatory variable, which is the total number of sons in the current chair's generation for Hyundai Group and is zero for all other groups. In Column (3), Number of New Sons in Tournament (add c-generation) is interacted with Strong Contender and Weak Contender dummies. Strong Contender is a dummy for firms controlled by sons in the current chair's generation in Hyundai Group. Weak Contender is a dummy for firms controlled by male relatives in the current chair-1 generation. Columns (4) and (5) use Number of New Sons in Tournament (swap c+1 with c generation) as an explanatory variable, which is the difference of the total number of sons in the current chair generation and the current chair+1 generation for Hyundai Group, and zero for all other groups. In Column (6), we interact Number of New Sons in Tournament (swap c+1 with c generation) with the Strong Contender and Weak Contender dummies. In Columns (7) and (8), Hyundai Event (indicator) is a dummy that is one for Hyundai Group firms and is zero otherwise. In Column (9), Hyundai Event (indicator) is interacted with the Strong Contender and Weak Contender dummies. We control for Δ Log total assets, which refers to the difference of the five-year average logarithm of a firm's total assets (in KRW millions) before and after (excluding 2004) the chairman's death in 2003. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent Variable: Δ Income Volatility (× 100)								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of New Sons in Tournament (add c-generation)	0.97519***	0.90000***							
	[0.111]	[0.159]							
Number of New Sons in Tournament (add c) × Strong Contender			1.08350***						
			[0.146]						
Number of New Sons in Tournament (add c) × Weak Contender			0.39792*						
			[0.198]						
Number of New Sons In Tournament (swap c+1 with c generation)				1.65033***	1.52309***				
				[0.188]	[0.268]				
Number of New Sons in Tournament (swap c) × Strong Contender						1.83362***			
						[0.248]			
Number of New Sons in Tournament (swap c) × Weak Contender						0.67340*			
						[0.335]			
Hyundai (indicator)							21.45426***	19.80011***	
							[2.446]	[3.490]	
Hyundai Event × Strong Contender									23.83708***
									[3.219]
Hyundai Event × Weak Contender									8.75422*
									[4.359]
Δ Log total assets		6.64759	6.74323		6.64759	6.74323		6.64759	6.74323
		[13.372]	[13.414]		[13.372]	[13.414]		[13.372]	[13.414]
Constant	-6.85692**	-11.20603	-11.26859	-6.85692**	-11.20603	-11.26859	-6.85692**	-11.20603	-11.26859
	[2.446]	[9.803]	[9.832]	[2.446]	[9.803]	[9.832]	[2.446]	[9.803]	[9.832]
Observations	231	231	231	231	231	231	231	231	231
R-squared	0.009	0.012	0.013	0.009	0.012	0.013	0.009	0.012	0.013