Power of tournament incentives: Evidence from Japanese corporate boards*

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Abstract

We find robust evidence that Japanese firms with many inside directors younger than the top manager (junior directors) frequently replace managers. The proportion of junior directors over non-top manager directors is positively associated with firm performance. Given that most Japanese top managers are promoted within the firm from employee/director positions, those results suggest that firms with many junior directors conduct frequent turnovers to provide tournament incentives to young directors and fierce competition among them create value. We do not find evidence that outside directors strengthen the sensitivity of forced turnovers to firm performance. Also, there is no robust evidence that junior directors weaken the sensitivity.

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1. Introduction

This paper explores functions of insider-dominated corporate boards. Since the Cadbury Committee Report was released in 1992, many countries have launched mandatory or quasi-mandatory guidelines on corporate governance structure (Dahya et al., 2007). Those governance standards commonly adopt one-size fits all approach, assuming that independent boards monitor management effectively. In line with this approach, the New York Stock Exchange (NYSE) and NASDAQ introduced listing requirements that mandated firms to have majority-independent boards in early 2000s. Besides, US institutional investors promote US good governance practices to non-US companies as they globally diversify their portfolios. For instance, Aggarwal et al. (2011) show evidence that foreign institutional shareholders from countries with strong shareholder protection improve the corporate governance index, which is created by 41 governance attributes (e.g., board independence, board size, separation of CEO and chairman, and so on), of non-US companies

However, previous studies show that the one-size fits all approach does not work well even within the US. Linck et al. (2008) and Lehn et al. (2009) show evidence that US firms optimally choose their board size and independence, and board structures do not affect firm performance after controlling for the endogeneity. Coles et al. (2008) argue that the proportion of insiders over the total board members is positively associated with performance of R&D-intensity firms. Previous studies also show evidence that some board attributes other than independence are associated with effectiveness of board monitoring. Coles et al. (2014) find that board co-option has a stronger explanation power of the sensitivities of CEO pay and forced turnover to firm performance than board independence. Sandvik (mimeo) also shows evidence that co-opted boards are associated with high debt spread and high bankruptcy probability. Those results suggest that corporate governance is not effectively improved simply by enhancing board independence.

Given that the one-size fits all approach does not work well even inside the US, a natural question is raised: does international convergence of corporate governance toward US good practices improve performance of local companies? To address the research question, we investigate a board attribute, which is not examined in previous studies, associated with board functions in Japan. Japanese boards are generally dominated by insiders who have served as an employee for many years under lifelong employment system (Basu et al., 2007). Top managers usually have taken a board seat for several years before being appointed as top manager. Appendix 1 depicts characteristics of Japanese

top managers by using data of 4342 (both routine and forced) management turnovers in our data. Managers have served as a director for 6.8 years on average (median is 5 years) before taking the top manager position. Given the recent trend toward US style of independent boards, it is important to examine costs and benefits of insider-dominated boards.

We introduce tournament incentives to investigate functions of Japanese corporate boards. Although corporate boards are conventionally viewed as a monitoring and advising institution, Appendix 1 suggests that Japanese boards serve as an internal labor market consisting of candidates for next top manager. It is also noteworthy that inside directors younger than the top manager (hereafter denoted by junior directors) occupy a significant portion of board members. In our sample companies, about 60 percent of non-manager directors are junior directors. Furthermore, Appendix 1 indicates the incoming manager is an insider younger than the predecessor in 75.3 percent of turnovers, and the average new manager has stayed in the firm for 19.6 years.[1] External labor markets are not well developed in Japan, and outside directorship opportunities had been extremely limited. Those facts imply that in Japanese corporate board rooms junior directors compete in tournament for next top manager. Given that many Japanese directors continue to serve for a specific company under the life-long employment system, promotion to top manager will serve as honorable prize to them. The fierce competition among junior directors is likely to motivate them to show their ability through good advising and devoted supports to the incumbent manager.

Meanwhile, firms should optimally design the probability of winning prize and its size to provide tournament incentives. Kale et al. (2009) show evidence that US firms with many non-CEO executives provide large tournament prize, which is represented by pay gap between CEO and those executives. Generally, Japanese managerial compensations are much smaller than US CEO pay probably because of inactive managerial labor market, and the pay gap is likely small. Kaplan (1994) reports that total cash compensations per director in Japan is 4.8 times of the average wage of employed male while the multiple is 13.5 in US. Nevertheless, promotion to top manager serves as an important status prize in the tournament. Since presence of many junior directors decreases the perceived probability of promotion for individual junior directors, Japanese firms need to determine the frequency of management turnover to induce junior directors to devote significant efforts. This view gives rise to the prediction that firms with many junior directors replace management frequently. Generally, effective board monitoring is expected to dismiss poorly-performing managers (Weisbach, 1988). However, our

[1] The incoming manager had worked as an employee of the firm in 61.6 percent of total turnovers.

hypothesis stands on the view that management turnovers of firms with many inside junior directors are determined in consideration of tournament incentive.

Our sample consists of 35,457 firm-years involving 3,185 Japanese listed companies over the period from 2003 to 2016. Toyokeizai Directors Data offers detailed information on individual directors (such as age, position, and so on). Consistent with our hypothesis, we find that the frequency of total management turnover significantly increases with the proportion of junior director. Our estimation suggests that Majority-junior firms (firms with the junior director ratio of 85 percent or more) replace management with 4 – 6 % higher probability than Minority-junior companies (firms with the junior director ratio of 50% or less) with similar manager age, tenure, predicted percentage of junior directors, and firm performance. Tournament incentives are an important determinant of Japanese management turnovers. In this boardroom, outside directors are less likely to discipline poorly-performing managers through forced turnovers. Indeed, we do not find evidence that independent boards strengthen the sensitivity of forced turnovers to firm performance. We also do not find robust evidence that junior directors weaken the forced turnover – performance sensitivities.

If frequent turnovers provide tournament incentives to junior directors, fierce competition in junior-dominated boards should create value. Consistent with this view, we find that the proportion of junior directors is positively associated with firm performance. Specifically, Majority-junior firms have 0.08 – 1.6 greater Tobin's Q than Minority-junior companies with similar manager age, tenure, and the predicted proportion of junior directors. Again, we do not find robust evidence that board independence increases firm performance.

Our research makes several important contributions to the literature. To the best of our knowledge, only few studies show evidence that age structure of corporate boards is associated with board functions and firm performance. Since Japanese boards serve as an internal labor market, we should pay attention to the age structure, which has been overlooked by previous studies. Masulis et al. (2017) find that firms with older independent directors show poor performance, higher CEO compensation, and a lower sensitivity of CEO turnover to firm performance. We differentiate this paper from Masulis et al. (2017) by focusing on inside junior directors and their tournament incentives. We also argue that it is inappropriate to evaluate corporate boards solely in their monitoring function. Japanese insider-dominated boards serve as a value-enhancing internal labor market of future managers. Consistent with Coles et al.'s (2014) argument, our finding implies that board attributes other than independence are important to examine effectiveness of corporate boards. Previous studies suggest that tournament incentives,

represented by pay gap between CEO and non-CEO executives, affect firm value and risk-taking (Kale et al., 2009; Kini and Williams, 2011). Our research provides additional evidence of the positive effect of tournament incentives, by highlighting the relation between board age structure and frequency of turnovers. Those findings also provide an important implication that cross-border promotion of US good practices do not necessarily create value. For instance, the proportion of outside directors is negatively associated with the ratio of junior directors. Increases of outside directors, who do not sufficiently know capability of individual inside directors, with a certain board size may harm the tournament function of Japanese corporate boards. Institutional investors, proxy advisors, and regulative authorities need to take unique characteristics of local firm governance into consideration when they engage with investee companies, make voting advices, and launch corporate governance standards.

The rest of the paper is organized as follows. Section 2 provides literature review and background information. Section 3 describes our sample selection and data. Section 4 presents our main empirical results. Section 5 offers additional analyses. Finally, this paper is concluded in Section 6.

2. Literature review, background information, and hypotheses

Corporate boards are generally expected to monitor and advise management in the interests of shareholders. A conventional idea is that independent directors monitor management more effectively than inside directors. Indeed, many previous studies find evidence of positive aspects of independent boards: create firm value (Rosenstein and Wyatt, 1990; Gupta and Fields, 2009; Nguyen and Nielsen, 2010); increase equity-based compensations as well as the sensitivity of management turnover/pay to firm performance (Weisbach, 1988; Ryan and Wiggins, 2004; Cornett et al., 2009); improve decisions of mergers and acquisitions (Byrd and Hickman, 1992; Cotter et al., 1997; Paul, 2007; Cai and Sevillir, 2012); decrease earnings management and fraud (Klein, 2002; Xie et al., 2003); and so on (e.g., Brickley et al., 1994 for introduction of poison pill). For Japanese companies, Kaplan and Minton (1994) show evidence that outside director appointments (from banks and non-financial companies) increase with poor stock performance, and those from banks also increase with earnings losses. Basu et al. (2007) find that the presence of outside director decreases top executive pay, which is negatively related to subsequent accounting performance. Meanwhile, Miwa and Ramseyer (2005) argue that Japanese firms optimally choose the number of outsiders in the board and it does not affect firm performance.

Since the Cadbury Committee Report suggested UK listed firms to have at least three non-executive outside directors (as well as to separate CEO and board chairperson) in 1992, many countries have launched regulations or guidelines on corporate governance (Dahya et al., 2007). For instance, NYSE and NASDAQ require listed companies to have majority-independent boards after the enactment of Sarbanes-Oxley (SOX) Act of 2002. In Asian countries, Korea mandated listed companies in 1998 to have at least 25 percent of all board members to be non-executive outside directors.[2] Previous studies show favorable evidence toward the introduction of those regulations and guidelines (Dahya and McConnell, 2005, 2007; Chhaochharia and Grinstein, 2007; Choi et al., 2007; Black and Kim, 2012). For instance, Jain and Rezaee (2006) find a positive (negative) abnormal return at the time of legislative events that increased (decreased) the likelihood of the passage of the SOX Act. The Japanese government also launched Corporate Governance Code in 2015, which includes a principle to have at least two independent outside directors.[3] Although the Japanese Corporate Governance Code is not mandatory requirements (adopt comply or explain approach), most companies have complied the principle and significantly increased board independence.[4] In addition to those government initiatives, institutional investors also promote US good governance practices (Aggarwal et al., 2011). There is a trend of international convergence of corporate governance toward US good practices.

However, Boone et al. (2007) suggest that firms change their board size and composition during the post-IPO period in response to the change in firm's competitive environment and nature of managerial team. Previous studies also suggest that board structures do not affect firm performance after controlling for the endogeneity (Linck et al., 2008; Lehn et al., 2009) and the relation between board independence and performance depends on firm characteristics (Coles et al., 2008). Furthermore, recent studies show evidence that board co-option is significantly associated with CEO pay, management turnovers, costs of debt, and so on (Coles et al., 2014; Sandvik, mimeo). Those findings shed a doubt on the view that promotion of US good practices improves corporate governance all around the world.

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[2] Since January 2001, Korean financial institutions and non-financial firms with assets greater than 2 trillion Won are required to have non-executive outside directors occupy at least 50 percent of total board members.

[3] China also mandated listed companies to have outside directors account at least for one-third of all board members by June 2003.

[4] According to the Nikkei Cges database, only 46% of listed companies had outside directors on the board as of year 2010. As of year 2015, however, 95.5% of listed companies have at least one outside director. The mean ratio of outside directors to all board members has increased from 11 percent in 2010 to 25 percent in 2015.

To address the issue, we examine the relation between board characteristics, management turnover, and firm performance in Japan. Although the Japanese government pushes the US style of corporate governance forward, Japanese companies have traditionally developed a different corporate governance system from the US one, represented by *keiretsu* group (industrial group), main bank system, cross-shareholdings, and sparing usage of stock options (Aoki and Patrick, 1995; Shinozaki et al., 2016).[5] A distinctive characteristic of Japanese corporate boards is that insiders, who have been employed by the firm for many years (since their university graduation in many cases), generally dominate the board, and top manager is usually selected from those inside directors. This situation suggests that Japanese boards serve as an internal labor market consisting of candidates for future top manager. Under the life-long employment system, it is not rate that Japanese business men complete their carriers in a single company which they joined right after university graduation. Promotion to the firm's top manager makes them reach the top in their whole life tournament, and therefore should serve as an extremely honorable prize. Since the top manager position is usually succeeded to a younger director under seniority system, boards dominated by junior directors will generate fierce competition for promotion. The competition will incentivize young directors to show their capability by providing good advising to incumbent managers and managing their division well, and in turn increase firm value.[6] On the contrary, junior directors in senior-dominated boards are subject to less fierce competition, and have only weak incentive to show their capability. Importantly, fierce competition can have negative effects on tournament incentives, since it decreases perceived probability of promotion for individual directors. To provide tournament incentives, Japanese companies with many junior directors need to award the prize (promotion) frequently. In sum, those firms will replace management frequently as a process of the tournament. We argue that it is important to take the tournament aspect into account to understand Japanese corporate boards and management turnovers.

Our prediction accords with the finding by Kale et al. (2009) that the pay gap between CEO and next-layer executives increases with the number of those executives, although we do not adopt pay gap as a proxy for prize.[7] Kale et al. (2009) also show

[5] Shinozaki et al. (2015) argue that Japanese firms owned by stable and controlling shareholders do not follow US good governance practices.

[6] For instance, Canon Inc. announced in 2016 that managing director Masaya Maeda (63 years old) will succeed to president Fujio Mitarai (80 years old). The Canon board had 14 junior directors at that time, and the president Mitarai explained in press conference that Mr. Maeda was "chosen because of his efforts to position Canon at the top of digital camera market" (The Japan Times. January 27, 2016).

[7] Kale et al. (2009) also find that the pay gap becomes large when the firm has just hired a new

evidence that the pay gap is positively associated with firm performance, suggesting that tournament incentives create value.[8] We predict that the proportion of junior directors has a positive impact on firm performance.

There is an alternative reason why age structure matters in Japanese board rooms. In Japanese organizations (including schools), junior people are generally supposed to respect and learn from senior people. Given that many Japanese directors have worked in a single company, this hierarchy should be still evident in boardrooms, preventing junior directors from disciplining the management. This view suggests that top managers are likely entrenched when he/she is surrounded by junior directors.

3. Sample selection and data

Information on individual directors (e.g., age) of Japanese listed companies is available from Toyokeizai Director database over the 14 year period from 2002 to 2015. Although the data also includes information on audit and supervisory board members and non-director executives, we remove their information to focus on board of directors. The board structure data is merged with the Nikkei NEEDS Cges database, which includes basic financial ratios (e.g., Tobin's Q, ROA, leverage, annual stock return, and so on) as well as governance variables such as ownership structure (see Appendix 2 for definition and data source of variable). We require our sample companies to have non-missing values for necessary variables. Financial institutions are removed from our analysis because they are under strict supervision by regulative authorities. Throughout the following analyses, one-year lagged data are used for corporate governance variables such as board, ownership structure, and managerial attribute variables. As a result, our entire sample consists of 35,457 firm-years involving 3185 companies during 2003 to 2016.

The calculation of percentage of junior directors needs to identify top manager of the firm. Differently from US companies, the top manager in Japan is not commonly titled by CEO. The Toyokeizai Director database includes position ranking for every single director. However, identifying the highest rank director as top manager may not be appropriate in this research, since it is relatively common in Japanese companies that the ex-top manager serves as a chairman and ranked No.1 in the database. Our top manager

CEO. The pay gap further becomes large when the new CEO is appointed from outside the firm. Those results suggest that executives' perceived probability of promotion is an important determinant of the size of tournament prize.

[8] Kini and Williams (2011) show evidence that the tournament incentive is positively associated with corporate risk-taking.

definition needs to identify the position that provides the holder with honorable prize. In the following analysis, we identify the president, which is the most common title for Japanese top managers, as the top manager if he/she is ranked No.3 or higher. When there is no president among top three directors, we define the chairman (ranked No.3 or higher) as the top manager. If the database finds neither president nor chairman among top three directors, we identify the top management by manually looking at top three directors' ranks and titles.[9] Panel A of Table 1 indicates that the mean top manager under this identification is 59 years old (median is 61), and the mean tenure is 7.4 year (median is 4). This top manager identification is also advantageous in identifying forced turnovers as we will discuss below. Our main results are qualitatively same when we define the highest rank director as the top manager. In this alternative identification, the mean top manager age is 62.9 years old.

We compute the percentage of junior directors (% Junior) as the number of inside directors younger than the top manager scaled by the number of directors for whom the birthdate is available (top manager is excluded both from the numerator and denominator). Younger or not is identified based on school age, because it is highly related to senior-junior hierarchy within the firm (recall many Japanese directors are insiders who have worked for the company as an employee since university graduation). Specifically, directors who were born in the period between January 1st to April 1st of year *t* are treated as same age with the top manager who was born in the period from April 2nd to December 31th at year $t-1$ (in Japan people who were born between April 2nd of year $t-1$ to April 1st of year *t* belong to a same grade). We treat same age as senior, given that same age directors are less likely nominated for the next top manager. Outside directors are removed from the numerator since outside directors are also less likely to be the next top manager. Panel A of Table 1 shows that about 55 percent of non-manager directors are insiders younger than the top manager. It is not rare that all of non- manager directors are junior directors. Indeed, % Junior takes a value of one for 5339 firm-years (approximately 15 percent of the entire sample).[10] Panel A of Appendix 3 shows such an example. Yokohama Reito Co., Ltd., a wholesale trade company listed on the 1st section of Tokyo Stock Exchange, has nine board members as of June 2015, all of which are insiders younger than the President Toshio Yoshikawa (% Junior is one). Those junior directors (marked by J in the right column) are likely to compete in tournament for next top manager position.

[9] We basically rank directors in the order of vice president, vice chairman, representative director, senior managing director (*semmu*), managing director (*joumu*), and director. The ranking in the Toyokeizai database is used to identify top manager from directors with same title.

[10] The % Junior director sharply declined in recent years due to increases in outside directors.

Meanwhile, Panel B of Appendix 3 indicates that Nippon Flour Mills Co., Ltd., a foods company listed on the TSE 1st section, has two outside directors as of June 2015, who have long relations with the firm and are older than the current top manager. The current chairman, Mr. Hiroshi Sawada, is ranked No.1 in the Toyokeizai database, who served as the president of the company from June 1993 to June 2012 (president and chairman from June 2009 to June 2012). He gave the president title to Mr. Haruki Kodera (ranked No.2) on June 2012, and remains on the board as a chairman. Given that Mr. Sawada is 84 years old as of June 2015, he was likely to give decision rights to Mr. Kodera to a certain degree (and Mr. Kodera will received status prize) when he resigned from the president position. We identify it as management succession, and defines Mr. Kodera as the top manager. Mr. Kodera is 20 years younger than his predecessor, and served as a director from June 2006. He was likely to make significant efforts to show his management ability (e.g., make good advice) for the six year period of director duty under the leadership of President Sawada.

For the case of Nippon Flour Mills, six directors are identified as junior directors. The president was born in February 1953, and in the Japanese school system educated at the same grade with people who were born from April 2nd, 1952 to April 1st, 1953. Mr. Tesuo Amano and Mr. Hirokazu Shimizu are same school age with the top manager, and so classified as non-junior directors in this research. Accordingly, % Junior of the firm is 0.5 (there are 12 non-top manager directors).

To examine the relation between % Junior, board independence, and manager attributes, we divide the entire sample equally into three groups upon % Junior. The mean % Junior is about 90 percent for the highest (High % Junior) group while it is only 14 percent for the lowest (Low % Junior) group. Panel B of Table 1 indicates that manager tenure increases with % Junior. Although the result appears to be inconsistent with our hypothesis, it is not surprising that young directors increase as management tenure increases. Similarly, Panel B suggests that % Junior increases with manager's age. It is well-documented that outsiders have not been common in Japanese boards until the Japanese government and TSE recently introduced several measures to enhance board independence. We compute the proportion of outside directors (% Outsider) by the number of outside directors divided by the number of all board members. Panel A of Table 1 indicates that more than half (about 53.5 percent) of sample firm-years have no outside directors. Panel B of Table 1 indicates that % Junior decreases with % Outsider, probably because we do not include outside directors in junior directors.

Junior-dominated boards need to replace management frequently to provide tournament incentives to junior directors, irrespective of the type of turnover (routine or

forced). Accordingly, we mainly investigate total (routine and forced) turnovers, while forced turnovers are also examined to test the monitoring role of Japanese corporate boards. We identify total management turnovers when the top manager is changed. Panel A of Table 1 indicates that about 12 percent of firm-years conduct management turnovers. The unconditional frequency of management turnovers is very close to the equivalent figure in Kang and Shivdasani (1995), which reports that 12.88 percent of 1350 Japanese firm-years during 1885 to 1990 changed the president. Consistent with our hypothesis, Panel C of Table 1 clearly suggests that the frequency of management turnover increases with % Junior. Firms with high % Junior replaces management almost every 5 year (19 percent of firm-years conduct management turnovers), while those with low % Junior change the top manager only once for 18 years (5.5 percent of firm-years conduct turnovers). However, the univariate analysis cannot rule out the possibility that firms with many junior directors frequently replace management simply because the managers are old and have long tenure.

Board monitoring function is associated with forced management turnovers. We identify forced turnover for firm-years that satisfy the following conditions: (i) the top manager is changed; (ii) the outgoing top manager disappears from the board. As mentioned, it is relatively common in Japanese companies that ex-top manager remains in the board as the chairman or other titles. Ex-manager's dismissal from the board should suggest disciplinary replacement of top manager. Our definition of top manager, which relies on job title rather than the rank, enables this identification, since it is least punitive that highest ranked old directors leave the board when they resign from the position. Kang and Shivdasani (1995) also identify forced turnovers as management turnovers, following which the president is no longer on the board of directors. Out of 35,457 sample firm-years, only 1724 firm-years (4.9 percent) implement forced management turnovers (Panel A of Table 1). This is slightly greater than the corresponding figure in Kang and Shivdasani (1995) (3.1 percent). Panel C of Table 1 suggests that forced turnovers also increase with % Junior.

4. Empirical results

4.1 Board age structure and total management turnover

We hypothesize that firms with many junior directors replace management frequently to provide tournament incentives. To test this hypothesis, we investigate the relation between total turnovers and % Junior after controlling for manager age, tenure, and various firm characteristics. We adopt industry-adjusted return on equity (net income

over net assets, denoted by ROE) as our main measure of performance. Recent Japanese managers recognize ROE as an important performance measure, while shareholder unfriendly nature of Japanese traditional corporate governance may make stock market performance less important in management turnovers. Kato and Kubo (2006) find that accounting performance has more significant explanation power of Japanese CEO compensations than stock market performance. The industry-adjusted ROE is computed by subtracting the industry average ROE (computed by deleting the firm under consideration) from the firm's ROE.

Manager's age and tenure are included in independent variable, since older and longer tenure managers are more likely replaced while those variables are positively associated with % Junior (Panel B of Table 1). Board size is also adopted since large boards may not effectively monitor management due to free riding and coordination problems (Yermack, 1996). Given that managers are less likely replaced as their ownership increases, we include percentage ownership of directors (DirecOwn). In Japan, foreign shareholders may monitor management more effectively than domestic shareholders who have business relations to the firm. To control for their impacts on the frequency of management turnovers, the percentage ownership by foreigners (ForeignOwn) is also adopted. Since Kaplan (1994) and Kang and Shivdasani (1995) find that Japanese management turnovers increase after reporting negative accounting income, a binary variable for reporting negative income for two consecutive years is included. Natural logarithm of assets (Ln(Assets)) is adopted to control for firm size. Finally, we include R&D expenditures scaled by assets (R&D) to control for growth opportunities. Zero is assigned to R&D when R&D expenditures are missing. A binary variable indicating non-missing R&D expenditures is also added to control for the difference in turnover frequency between firm-years with and without non-missing R&D expenditures. All models with industry-fixed effects use firm-clustering standard errors to conduct statistical tests for coefficients.

Results of logit regressions are presented in Table 2. Model (1) conducts an estimation with industry- and year-fixed effects for the entire sample. The model provides a positive and significant coefficient on % Junior, suggesting that firms with many junior directors replace management frequently. The bottom of the table reports the marginal effect of % Junior (change in the probability of turnover associated with one unite change of % Junior from the mean value with holding all other variables at their mean values). The presented figure suggests that a one standard deviation increase in % Junior (0.33) increases the probability of management turnover by approximately 3.8 percent. The marginal effect is economically significant given that the unconditional

probability of total turnover is 12.2 percent. Those models also generate a negative and significant coefficient on the industry-adjusted ROE. One percent decline in the industry-adjusted ROE (from the mean value) increases the probability of management turnovers by 0.083 percent. Consistent with Kaplan and Minton (2012), the result indicates that both routine and forced management turnovers have an aspect of disciplinary event.

[Insert Table 2 about here]

Corporate governance research is commonly subject to endogeneity problems (Coles et al., 2011). There might be unobserved firm characteristics that affect both board characteristics and frequency of management turnovers. A common approach to addressing the concern is to implement firm-fixed effects model estimations that are advantageous to control for time-invarying firm characteristics. Results of logit regressions with firm- and year-fixed effects are presented in Model (2). The sample size declines to 27,098 since 905 firms (8359 firm-years) did not replace the top manager during the whole sample period. Model (2) suggests that % Junior has a positive and significant coefficient that provides a support for our hypothesis.

Firms may optimally adjust their proportion of junior directors and the frequency of turnovers over time in response to changes in their business environments. Although Model (2) controls for firm-specific time-unvarying factors by using firm-fixed effects model, time-varying omitted variables might cause a seeming relation between the variables under consideration. To address the concern, we create a matched sample that has similar characteristics but still has a wide variation in % junior. Specifically, we label firm-years of which % Junior is equal to or greater than the 85% as Majority-junior firms. This procedure leaves us 8070 Majority-junior companies (about 23 percent of the entire sample). For every Majority-junior firm, we select the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in a specific matching variable (15,822 firm-years are classified as Minority-junior firms). We firstly use manager age and tenure as a matching criteria because % Junior is highly correlated with those variables (Panel B of Table 1). To minimize the difference in Age (Tenure) between Majority-junior firms and their matched companies, we require matched companies to have Age (Tenure) that is equal to or higher than the Majority-junior firm's Age (Tenure) minus one. When multiple firms are selected as a matched firm of a single Majority-junior firm due to same Age and Tenure, we choose one of them so that we can assign a matched firm to as many Majority-junior firms as possible. After those procedures, we delete Majority-junior firms that have no matched companies from the analysis. As a result, no significant difference exists in Age and Tenure between the

two subsamples, although sample size declines to 5500 for Age matching and to 9858 for Tenure matching. Results are qualitatively unchanged when we allow a single Majority-junior firm to have multiple matched companies and when we keep Majority-junior firms that have no matched companies (in those cases, there remains a significant difference in Age and Tenure between Majority-junior and their matched companies). We adopt an indicator variable (Majority-junior) that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms to highlight the difference in the probability of turnovers between treated and control groups.

Model (3) of Table 2 presents results when we select matched Minority-junior firms by Age. The mean and median age is 61.3 and 62 both for Majority-junior firms and their matched companies. Meanwhile, the average Majority-junior firm has mean (median) % Junior of 0.96 (1) while the mean (median) % Junior for the matched companies is 0.35 (0.4). Those figures suggest that a significant difference exists in % Junior between the two groups. Those models carry a positive and significant coefficient on Majority-junior. The marginal effect indicates that Majority-junior firms conduct total turnovers with 4.5 percent higher probability than Minority-junior firms (for Majority-junior, the marginal effect indicates the change in probability of turnovers when Majority-junior changes from zero to one with holding other variables at their mean values). Consistent with our hypothesis, the result suggests that firms with many junior directors replace managers more frequently than do those with less junior directors run by similar age managers.

Model (4) selects matched Minority-junior firms by Tenure. The mean Tenure is 6.9 for Majority-junior firms and 7.0 for their matched companies (median is 4.3 for both groups). Meanwhile, the mean and median of % Junior for Majority-junior firms are 0.96 and 1, much higher than those for matched companies (0.24 and 0.25). Again, Majority-junior has a positive and significant coefficient, suggesting that firms with majority-junior boards tend to replace management with 4.9 percent higher probability than those with minority-junior boards run by similar tenure managers. The economically significant differences in the turnover probability indicate that management turnovers of Majority-junior firms are mainly determined by the tournament process.

To control for as many firm characteristics as possible, we also find matched companies based on the predicted value of % Junior, which is estimated by OLS regression of % Junior. In addition to control variables in Table 2, the following variables are included to estimate the predicted value: leverage computed by total liabilities over assets (LEVERAGE); the length of years since the firm's IPO (FirmAge); ROA (current income over assets); and the dummy variable that takes on a value of one for firms listed

on the 1st section of TSE and zero for others (TSE 1st dummy). In this matching process, we require matched companies to have predicted % Junior which is greater than the Majority-junior firm's predicted value – 0.05. As a result, we find a matched firm for 1588 Majority-junior firms. The mean expected value of % Junior is 0.63 both for Majority-junior and matched firms. But, still there is a significant difference in % Junior between the two groups (0.95 versus 0.37). Model (5) engenders a positive and significant coefficient on Majority-junior. Again, the result suggests that firms with many junior directors replace management more frequently (5.6 percent higher probability), compared to similar characteristics firms with less junior directors.

It is also important to compare the frequency of management turnovers of Majority-junior firms to those of Minority-junior companies with similar performance. To address the issue, we select matched companies by using ROE. The mean ROE is 5.3 percent both for Majority-junior and matched companies, while there is a significant difference in % Junior between the two groups (0.96 versus 0.23). Again, Model (6) carries a positive and significant coefficient on Majority-junior, suggesting that firms with many junior directors replace management more frequently (5.7 percent higher probability) than similar performance companies with less junior directors. Overall, results show robust evidence consistent with our hypothesis that firms with many junior directors frequently replace management.

With respect to control variables, Table 2 presents a positive and significant coefficient on Age. The result is consistent with the conventional wisdom that older managers are more likely replaced. All models with industry-fixed effects carry a negative and significant coefficient on Tenure, while the fixed effects model engenders a positive and significant one (Model (2)). We interpret that omitted firm characteristic variables affect both management turnovers and tenure. A similar problem exists for Board size. It has a positive and significant coefficient in the fixed-effects model (Model (2)), while industry-fixed effects estimations generate insignificant coefficients. A possible interpretation is that large boards generate fierce competition among non-top manager directors, and thus firms replace management after an increase of directors (or board size increases when the successor joins the board). Consistent with our prediction, most estimations carry a negative and significant coefficient on DirecOwn, suggesting that managers with strong voting power can decrease frequency of their turnovers. Although ForeignOwn has a positive and significant coefficient in some estimations, the fixed-effects model (Model (2)) provides an insignificant coefficient. We cannot rule out the possibility that unobserved firm-specific characteristics are associated with the frequency of turnovers and ForeignOwn. All estimations provide a positive and significant

coefficient on Loss Dummy. Again, the result suggests that total management turnovers are conducted after poor performance. We do not find robust evidence that firm size and growth opportunities (proxied by R&D) affect frequency of management turnovers.

Table 2 systematically provides a negative and significant coefficient on industry-adjusted ROE, suggesting that total turnovers are more likely conducted after poor performance (Kaplan and Minton, 2012). Junior-dominated boards might destroy value if they frequently replace management irrespective of performance. It is likely difficult for junior directors in Japanese corporate culture to discipline incumbent management. Junior directors might entrench managers and weaken the sensitivity of management turnovers to firm performance.

To examine potential deficits of junior-dominated boards, Models (1) and (2) of Table 3 implement logit regressions of total turnovers that add the interaction term of industry-adjusted ROE and % Junior (Model (1) adds industry- and year-fixed effects whereas Model (2) includes firm- and year-fixed effects). As with the previous result, the estimations carry a positive and significant coefficient on % Junior, and a negative and significant coefficient on industry-adjusted ROE. Importantly, the interaction terms have a positive and significant coefficient. However, the positive coefficient of the interaction term may not necessarily indicate that junior directors weaken the turnover – performance sensitivity, since coefficients of logit regressions do not represent marginal effects on the probability of management turnovers.

[Insert Table 3 about here]

To further examine the effect of junior directors on management turnovers, we separately estimate logit regressions without the interaction term for Low- and High- % Junior firms, which consist of bottom and top one-third companies in % Junior, respectively. The estimation for Low % junior firms (Models (3) of Table 3) carry a greater coefficient in absolute value on the industry-adjusted ROE than the regression for High % junior firms (Model (4)). The result is consistent with the sign of interaction terms in Models (1) and (2). However, the bottom of the table indicates that the marginal effect of firm performance on the probability of management turnovers does not significantly differ between the two groups: one percent decline of industry-adjusted ROE increases the turnover probability by 0.064 percent for High % Junior companies, while the same performance decline increases the probability by 0.066 percent for Low % Junior companies. Recall that Low % Junior companies replace management only once for 18 years (Panel C of Table 1). A plausible interpretation is that performance declines do not significantly increase the probability of turnovers for Low % Junior firms since those companies rarely replace management. In contrast, High % Junior companies replace

management every five years (Panel C of Table 1), and therefore, the performance decline has a certain impact on the probability of management turnovers despite the small coefficient. Overall, we do not find strong evidence that junior directors weaken turnover – performance sensitivities.

4.2 Board age structure and forced management turnover

Although corporate boards are expected to dismiss poorly-performing managers, the tournament-based management turnovers may distort the disciplinary aspect of forced turnovers. To address the issue, Table 4 conducts logit regressions for forced turnovers. The industry- and year-fixed effects model for the entire sample (Model (1)) engenders a positive and significant coefficient on % Junior. The marginal effect suggests that one-standard deviation increase in % Junior increases the probability of forced turnovers approximately by 1 percent. This effect is economically significant, given that the unconditional probability of forced turnover is 4.9 percent. The significant effect of junior directors is observed after controlling for time-invarying firm characteristics (Model (2)). We also estimate logit regressions with industry- and year-fixed effects for matched samples (Models (3) – (6)). All those models provide a positive and significant coefficient on Majority-junior. The marginal effects indicate that the companies with 85% or greater % Juniordismiss managers with 1 – 2 percent higher probabilities than companies with 50% or less % Junior that are similar in manager age, tenure, predicted value of % Junior, and performance.

[Insert Table 4 about here]

The industry-adjusted ROE has a negative and significant coefficient in all estimations. Model (1) suggests that one-percent decline of industry-adjusted ROE increases the probability of forced turnovers by approximately 0.05 percent. As for control variables, Table 4 presents qualitatively same results with regressions for total turnovers (Table 2). Manager age is positively associated with the likelihood of forced turnovers. Although industry-fixed effects models generate a negative and significant coefficient on Tenure, the firm-fixed effects model (Model (2)) suggests that manager with longer tenure are more likely dismissed. The firm-fixed effects model indicates that forced turnovers are more likely conducted after an increase of directors. Most estimations carry a positive and significant coefficient on Loss dummy, suggesting that reporting negative income for two running years causes forced management turnovers. Differently from the previous regression, the firm fixed-effects model estimation for forced turnovers carries an insignificant coefficient on DirecOwn.

To examine whether junior-dominated boards inhibit the disciplinary role of

management turnovers, Table 5 investigates whether the sensitivity of forced turnovers to firm performance declines with % Junior. Models (1) and (2) run logit estimations with the interaction term of industry-adjusted ROE and % Junior, and provide a positive and significant coefficient on the interaction term. Accordingly, Models (3) and (4) suggest that Low % Junior firms have a greater coefficient of firm performance in absolute value than do High % junior companies. However, the estimated marginal effects indicate that High % Junior firms increase the likelihood of forced turnovers more than do Low % Junior firms when their industry-adjusted ROE declines by one percent (4.2 versus 3.5 percent). There is no robust evidence that tournament-based turnovers in junior-dominated boards make forced turnovers less sensitive to firm performance. Put differently, firms with junior-dominated boards provide tournament incentives through frequent turnovers without inhibiting disciplinary aspects of turnovers.

[Insert Table 5 about here]

4.3 Board independence and forced management turnover

Although international movements toward independent boards presumes that such boards effectively monitor management, our findings suggest that the presence of inside directors younger than the top manager is an important determinant of Japanese management turnovers. It is skeptical whether outside directors can effectively dismiss poorly-performing managers in such boardrooms. To address the issue, we implement logit regressions of forced turnovers by replacing % Junior with % Outsider. Model (1) of Table 6 engenders a positive and significant coefficient on % Outsider. However, the estimated marginal effect suggests that a one-standard deviation increase in % Outsider (0.138) results in a smaller increase in the frequency of forced turnovers than the equivalent increase of % Junior does (0.5 percent versus 1 percent). Furthermore, the firm-fixed effect model (Model (2)) does not provide a significant coefficient on % Outsider. We cannot rule out the possibility that there are unobserved firm characteristics that affect both management turnovers and board independence.

[Insert Table 6 about here]

Importantly, both models (1) and (2) generate an insignificant coefficient on the interaction term of industry-adjusted ROE and % Outsider, while the performance variable has a negative and significant coefficient. We also conduct logit regressions separately for firms with and without outside directors (Models (3) and (4)). The estimated marginal effects show no evidence that firms with outside directors have greater marginal effects of firm performance on the probability of forced turnovers than firms without do (0.046 percent versus 0.049 percent). We also replicate the analysis for total

turnovers, and untabulated results find no significant differences in the marginal effect of firm performance between firms with and without outside directors. Overall, we find no strong evidence to justify the view that independent boards effectively discipline poorly-performing managers through turnovers.

We have so far separately examine effects of % Junior and % Outsider on the frequency of management turnovers. As a further analyses, we replicate the analyses by simultaneously including those two variables. Consistent with our hypothesis, all estimations engender a positive and significant coefficient on % Junior (untabulated). Those estimations also provide a positive and significant coefficients on % Outsider, including the firm-fixed effects model.

4.4 Board structure and firm performance

We have shown evidence consistent with the view that firms with many junior directors frequently replace management to provide them with tournament incentives. The fierce competition among junior directors is likely to motivate them to provide good advice and improve their division performance, and in turn improve capability of future managers. If the proportion of junior directors over non-manager directors captures the degree of competition, the variable should be positively associated with firm value. Since the value of tournament will be represented in future earnings (through training of future manager) as well as in current performance (through good advice and supports), we adopt Tobin's Q (total capitalization and liabilities divided by assets) as a proxy for firm value.

Table 7 presents regression results of Tobin's Q. In addition to control variables used in the turnover regression, this analysis adds LEVERAGE, FirmAge, ROA, and TSE 1st dummy. Model (1) of Table 7 presents results of an estimation with industry- and year-fixed effects for the entire sample. Consistent with our hypothesis, the result generates a positive and significant coefficient on % Junior. To address endogeneity concerns, Model (2) implements an estimation with firm- and year-fixed effects. The model still carries a positive and significant coefficient on % Junior.

[Insert Table 7 about here]

Models (3) through (5) conduct regressions with industry- and year-fixed effects for matched samples. All models engender a positive and significant coefficient on Majority-junior. The estimated coefficients suggest that firms with 85% or higher % Junior have Tobin's Q about 0.08 – 0.17 higher than companies with 50% or lower % Junior that are similar in manager age, tenure, and the predicted value of % Junior. Given that the mean Tobin's Q is 1.13, those differences suggest that fierce tournament in junior-dominated boards create economically significant value.

The coefficient of % Outsider is positive and significant in models with industry-fixed effects. However, % Outsider does not have a significant coefficient in the firm-fixed effects model (Model (2)). We cannot rule out the possibility that unobserved firm-characteristics (e.g., reputation and social scrutiny) affect both board independence and Tobin's Q. The former analysis does not show evidence that outside directors make forced turnovers sensitive to firm performance. We do not find robust evidence that board independence matters in Japanese boardrooms where inside and young directors compete in tournament for next top manager.

With respect to control variables, the firm-fixed effects model carries an insignificant (at the five percent level) coefficient on managerial attribute variables (age and tenure). Consistent with the view that foreign shareholders monitor management to pursue shareholder value, foreigners' ownership is positively associated with Tobin's Q. Large companies tend to have low market valuation. LEVERAGE has a positive and significant coefficient, consistent with Jensen's (1986) free cash flow theory. Listing on the first section of TSE tends to increase market valuation (Tobin's Q). Not surprisingly, accounting performance (ROA) is positively associated with Tobin's Q. We do not find robust evidence on the effect of board size, director ownership, R&D expenditures, and firm age on Tobin's Q.

5. Further analyses

5.1 Instrumental variable regression

We have addressed endogeneity concerns by using estimations with firm-fixed effects and creating matched samples. An alternative solution would be to find a valid instrument for the endogenous variable (% Junior). Although it is extremely difficult to find an instrument that is related to board structure but is not related to management turnovers and firm value (Coles et al., 2014), we attempt to implement instrumental variable (IV) regressions. For regression of total management turnovers, we adopt a subset of control variables in Tobin's Q regression as IVs: (i) FirmAge; (ii) TSE 1st dummy. Since firms with long history may have outstanding former managers on the board as honorable members, we predict FirmAge is negatively associated with % Junior. Listing on the 1st section of TSE is likely to have reputation effects, which will attract young capable workers. Accordingly, we predict TSE 1st dummy has a positive relation to % Junior.

Results of IV probit regression is presented in Model (1) of Table 8. Consistent with our prediction, the 1st stage result provides a negative and significant coefficient on

FirmAge and a positive and significant coefficient on TSE 1st dummy. The F-statistic for those IVs is also reliably significant, suggesting that the estimation is not subject to weak IV problems. We also run a standard probit regression of total turnovers that adds those IVs in the independent variable. Untabulated results carry an insignificant coefficient on those IVs. Consistent with our previous findings, the 2nd stage result of Model (1) provides a positive and significant coefficient on % Junior. Meanwhile, the Wald test does not reject the null hypothesis that % Junior is exogenous, suggesting that our previous estimations are consistent. We also replicate the analysis by including % Outsider as a control variable, and the untabulated result finds a positive and significant coefficient on % Junior. We argue that the positive relation between % Junior and total turnovers is not driven by endogeneity problems.

[Insert Table 8 about here]

We introduce new variables as IVs for regression of Tobin's Q: (i) indicator variable that takes on a value of one for firm-years adopting officer system and zero otherwise (Officer system); (ii) The ratio of 60 – 64 years old men's population to 50 – 59 years old men's population in the prefecture of the firm's headquarter (Population ratio). In the traditional Japanese corporate governance, top managers (representative directors) were selected from among directors, and differently from US system, top management and directors were not separated organizationally (both of them belonged to board of directors). However, Sony Corporation introduced offer system in the 1997 general meeting that separates executive officers from directors and decreased board size from 38 to 10 (Uchida, 2011). Sony's behavior spurred many other Japanese firms, and about 59 percent of Japanese listed companies adopt the officer system as of 2015. The introduction of officer system should significantly change board age structure as well as downsize boards. Given that young executives are less likely to take board seats, Officer system is predicted to be negatively associated with % Junior. Meanwhile, Uchida (2011) does not find evidence that board downsizing associated with introduction of officer system affects firm value.

Seniority system in Japanese companies generates typical patterns in top manager and directors' demographic characteristics. Appendix A indicates that the median age of new manager is 59, and about 31 percent of our sample firms have a top manager of 60 – 64 years old.[11] The average age of non-manager director is 57. In addition, Japanese boards are generally occupied by male directors (only 9 percent of our sample firms have a female director). A supply-side story raises a prediction that the men's population ratio of 60 – 64 over 50 – 59 in the prefecture of firm's headquarter is negatively associated

[11] About 19 (17) percent of sample firms have a top manager of 65 – 69 (55 – 59) years old.

with % Junior. We also adopt various IVs such as top manager death, industry-average of % Junior (computed by excluding the firm under consideration), and so on. Those estimations do not clear the validity test of IVs.

Model (2) of Table 8 presents results of GMM IV regression of Tobin's Q. We adopt GMM estimations since Pagan-Hall test statistic is significant. Consistent with our prediction, the 1st stage regression engenders a negative and significant coefficient on Officer system and Population ratio. F-value for IVs is greater than 10, suggesting that weak IV problems are not evident in this estimation. Hansen-J statistic does not reject the null hypothesis that IVs are not related to the error term of 2nd stage regression. Those statistics suggest validity of the IVs. In addition, the Hausman test rejects the null hypothesis that % Junior is exogenous in the estimation.

As for control variables, the 1st stage regression provides a negative and significant coefficient to % Outsider. Introduction of outside directors may weaken competition among junior directors. Not surprisingly, old managers tend to have many junior directors. Most importantly, the 2nd stage regression engenders a positive and significant coefficient on % Junior. We also replicate the analysis by treating FirmAge, which does not have a significant coefficient in the 2nd stage, as IV. Untablutaed result suggests that the IVs are valid and % Junior has a positive and significant coefficient in the 2nd stage. Those results suggest that the proportion of junior directors is positively associated with firm value after controlling for endogeneity problems.

We also replicate the Model (1) estimation by adding Officer System and Population ratio to the set of IV. Untabulated results engender a positive and significant coefficient on % Junior, although the F-test cannot reject the null hypothesis that the new set of IVs are not related to the error term of the 2nd stage regression. We conduct alternative IV probit estimation, in which Officer System and Population ratio are adopted as control variables (Firm age and TSE 1st dummy are used as IV). This estimation also engenders a positive and significant coefficient on % Junior, suggesting that firms with many junior directors frequently conduct management turnovers.

5.2 Alternative measures

We have so far adopted industry-adjusted ROE to examine management turnovers. As a robustness check, Panel A of Table 9 replicates the logit regressions by using industry-adjusted ROA (return on assets computed by current income scaled by assets) as a performance measure. Models (1) and (2) implement regressions for the entire sample, and provide a negative and significant coefficient on the industry-adjusted ROA. Those models carry a positive and significant coefficient on % Junior. Models (3) through (6)

implement logit regressions for matched samples. Model (6) of Panel A selects matched firms by ROA, since this model adopts ROA as a performance measure. All the models carry a positive and significant coefficient on Majority-junior, suggesting that Majority-junior firms replace management with 4.5 – 5.5 percent higher probabilities than do Minority-junior firms with similar manager age, tenure, the predicted % Junior, and performance. Consistent with previous findings, the results indicate that presence of junior directors has an economically significant impact on the probability of total turnovers and promotion.

[Insert Table 9 about here]

Kaplan (1994) and Kang and Shivdasani (1995) show that non-routine management turnovers in Japan are associated with stock price performance as well as with accounting performance. Panel B of Table 9 replicates the logit regressions by using excess stock returns. Nikkei Cges database provides the average of firms' daily stock return during accounting year. We compute our excess stock return measure (ExSR) as the average return minus the average daily return of TOPIX for corresponding year. Consistent with previous studies, Models (1) and (2) of Panel B provide a positive and significant coefficient on ExSR. Importantly, all the models carry a positive and significant coefficient on % Junior. Overall, our results show robust evidence that junior-dominated boards frequently replace management.

Our hypotheses stand on the view that promotion to the top manager serves as a significant status prize especially for junior directors who worked for the firm long time. To provide tournament incentives, junior-dominated boards should increase management successions that appoint such junior directors as a new top manager. However, a new top manager is appointed from outside the firm in 683 management turnovers (about 13 percent of total turnovers).[12] To address the issue, we create alternative turnover dummies that take on a value of one for management turnovers that (i) appoint a junior director who had worked for the firm for five years or longer (5yr Junior); (ii) appoint a junior director who had worked for the firm for ten years or longer (10yr Junior); (iii) appoint a junior director who had worked for the firm as an employee (EMP Junior).[13]

Table 10 presents logit regression results of the alternative turnover variables. All models carry a positive and significant coefficient on the % Junior and Majority-Junior, suggesting that in-house management successions are more frequently conducted as the proportion of junior director increases. We also implement logit regression of turnovers

[12] Outsider appointments are identified when the time of top manager appointment is identical to the time when the manager join the firm.

[13] Employee experience is identified when the time of their director appointment is later than the time when they join the firm.

that appoints a non-junior director as a top manager. Untabulated results are mixed; % Junior and Majority-Junior do not have a significant coefficient in firm-fixed effects model estimations and matched sample analyses using Age and Tenure as a matching variable.

[Insert Table 10 about here]

Table 11 separately estimates the marginal effect of performance on the frequency of alternative turnovers (5yr Junior, 10yr Junior, and EMP Junior) for Low and High % Junior companies. The results indicate that the turnover-performance sensitivity is greater for High % Junior companies, except for 5yr Junior. There is no robust evidence that junior directors weaken the turnover-performance sensitivity.

[Insert Table 11 about here]

We have adopted Tobin's Q to examine effects of board age structure on firm performance, since competition among junior directors will improve future firm performance as well as current performance. Nevertheless, we also replicate the regression of firm performance by using ROA (Panel A of Table 12) and sales growth ratio (SGR) (Panel B of Table 12) as a performance measure (percentage values of those performance measures are adopted for estimation). Both industry- and firm-fixed effects models for the entire sample (Models (1) and (2)) generate a positive and significant coefficient on % Junior, suggesting that ROA and SGR increase with the proportion of junior directors. Also, industry-fixed effects models for the matched sample (Models (3) through (6)) carry a positive and significant coefficient on Majority-junior. The estimated coefficients in Panel A indicate that Majority-junior firms have ROA about one percent higher than Minority-junior companies with similar manager age, tenure, and the predicted % Junior. The difference is economically significant given that the mean ROA in the entire sample is 5.4 percent. Similarly, results in Panel B suggests that Majority-junior firms have SGR higher by 1 – 2 percent than Minority-junior companies with similar manager age, tenure, and characteristics associated with the board age structure (the mean SGR in the entire sample is 3.8 percent). In contrast, many estimations provide an insignificant coefficient (at the five percent level) to % Outsider.

[Insert Table 12 about here]

We have defined junior directors as inside directors younger than the top manager, given the presumption that directors at the same age are less likely to be next top manager. As a robustness check, we replicate the analyses by adding same age inside directors to the numerator of % Junior director. Untabulated results are qualitatively the same. We manually identify top manager by position and rank, when neither president nor chairman is listed among top three directors. We replicate the analyses by deleting firms with those

observations. Again, untabulated results are qualitatively same.

5.3 Additional analyses

Only 12 percent of our sample observations conduct management turnovers. The unbalanced sample structure may bias logit regression results. To address the concern, this section adopts alternative matching procedure. For every firm-year that conducts management turnover, we find a matched firm-year from same year and industry that is closest in firm performance (adjusted ROE) or the probability of conducting management turnovers. The probability of management turnover is estimated by Model (1) of Table 2 dropping % Junior from the independent variable. Matched firms are required not to replace manager during five years surrounding the matching year. Models (1) and (5) of Table 13 present logit regression results for all turnovers and their matching observations. Other models indicate results for a specific type of turnovers (5yr Junior, 10yr Junior, and EMP Junior) and their matched companies. All estimations provide a positive and significant coefficient to % Juinor, supporting our hypotheses.

[Insert Table 13 about here]

Our sample is extracted from all listed companies in Japan, some of which belong to a business group (e.g., vertical corporate group and family business group). Parent companies may exert control over management turnovers of subsidiaries. To address the issue, we separately implement logit regressions of management turnovers for firms with and without controlling shareholders. Controlling shareholders are defined as a shareholder that owns 20 percent or more of the firm's outstanding shares. Table 14 presents results of logit regressions of total turnovers; Panel A (Panel B) is for firms with (without) controlling shareholders. Models (3) through (6) examine Majority-Junior firms and their matched Minority-Junior companies, which are selected from same year, industry, and the category (with or without controlling shareholder). All estimations carry a positive and significant coefficient on % Junior and Majority-Junior. Junior-dominated boards increase the frequency of management turnovers, irrespective of presence of controlling shareholders

[Insert Table 14 about here]

Table 15 shows results of Tobin's Q regression. All estimations for firms without controlling shareholders (Panel A) engender a positive and significant coefficient on % Junior and Majority-Junior. Meanwhile, Models (2) and (3) of Pane B (firms with controlling shareholders) provide an insignificant coefficient to those variables. Matched sample analyses (Models (3) to (6)) offer a smaller coefficient on Majority-Junior for companies with controlling shareholders. The results potentially indicate that controlling

shareholders impede value creation effects of tournament among junior directors.

[Insert Table 15 about here]

Competition among junior directors may become fierce with the number of junior directors, rather than % Junior. To address the issue, we conduct logit regressions of total turnovers by using the number of junior directors, and find a positive and significant coefficient on the number of junior directors. Meanwhile, results on the relation between the number of junior directors and Tobin's Q is mixed. A potential reason is high correlation between the number of junior directors and board size (correlation coefficient is 0.70). We also conduct variety of estimations by adding control variables. Given that % Junior is positively associated with the probability of management turnovers, the value effect of junior directors might come from turnover effects. We implement performance regressions by adding turnover dummy that takes on a value of one for firm-years conducting management turnovers and zero otherwise. Those estimations still carry a positive and significant coefficient on % Junior, while the turnover dummy has an insignificant coefficient. We also create more detailed listing exchange dummies (four dummy variables). Adding those dummies does not materially change the results.

The positive relation between firm performance and the proportion of junior directors does not support the view that junior directors entrench management. As a further test, we examine the relation between capital expenditures (scaled by assets) and % Junior. Coles et al. (2014) show evidence that the proportion of co-opted directors, who likely entrench management, is positively associated with capital expenditures. Untabulated analyses do not find robust evidence that % Junior is related to capital expenditures. Our analyses do not support the idea that junior directors allow overinvestments by empire-building managers.

Coles et al. (2014) show evidence that co-opted directors, who is appointed to the board after the incumbent manager takes the position, weaken sensitivities of CEO pay and forced turnovers to firm performance. They argue that board co-option is an important attribute associated with effectiveness of board monitoring. The same mechanism is likely evident in Japan, since top managers are likely involved with the selection of those directors. In addition, top managers generally have longer carrier as a director of the firm, which likely provides them with strong power over co-opted directors. Meanwhile, Panel B of Table 1 indicates that co-opted boards have more junior directors. In Japan, co-opted boards might have favorable effects due to fierce tournament among junior directors.

We define co-opted directors as directors who join the board simultaneously or after the incumbent manager took the position. Although Coles et al. (2014) define all inside directors as co-opted regardless of their appointment dates, we treat inside directors

who joined the board before the current top manager appointment as non-co-opted since the majority of Japanese board members are insiders. The proportion of co-opted director (% Co-opted) is calculated as the number of co-opted directors over the number of directors for whom his/her director appointment date is available (exclude the top manager both from numerator and denominator). Panel A of Table 1 shows that about 60 percent of directors (except the top manager) are appointed to the board simultaneously or after the incumbent manager takes the position. All non-top manager directors are co-opted (% Co-opted is one) for approximately 15 percent of the entire sample (5338 firm-years). Panel A of Appendix 3 shows that Yokohama Reito has seven of eight non-top manager directors being co-opted (marked by C in the right column). Panel B indicates that there are five co-opted directors in Nippon Flour Mills. Those directors are all junior directors who started their director carrier under the incumbent manager, who already have long experience as a director.

Table 16 presents results of logit regression of forced management turnovers. All models provide a positive and significant coefficient on % Co-opted, suggesting that co-opted boards tend to replace management frequently. The estimated marginal effect suggests that one-standard deviation increase of % Co-opted (0.332) increases the probability of forced turnovers approximately by 1 percent. The positive relation between % Co-opted and the likelihood of management turnovers may be partly driven by the correlation between % Co-opted and % Junior.

[Insert Table 16 about here]

Models (1) and (2) do not generate a significant coefficient on the interaction term of % Co-opted and industry-adjusted ROE. We also implement logit regressions without the interaction term for Low (High) % Co-opted firms that consist of bottom (top) one-third firms in % Co-opted. Models (3) and (4) indicate that Low % Co-opted firms have greater coefficient of industry-adjusted ROE in absolute value than do High % Co-opted firms. Importantly, the estimated marginal effects in those models suggest that Low % Co-opted firms increase the probability of forced turnovers greater than do High % Co-opted firms when the industry adjusted ROE declines by one percent (0.052 percent versus 0.022 percent). Consistent with Coles et al. (2014), Japanese co-opted directors entrench management. In conjunction with our arguments on inside junior directors, the result suggests that some board attributes other than independence are significantly associated with board functions.

Previous studies also examine whether board characteristics affect the sensitivity of CEO pay to performance (e.g., Coles et al., 2014). Kale et al. (2009) show evidence that pay gap between CEO and the next layer of executives decreases with the perceived

probability of promotion, providing a support for the tournament theory. Those analyses are not feasible in our research since individual directors' pay is not disclosed in Japan. Instead, we conduct regressions of average cash compensations per director, which is available from Nikkei Cges database. Firm-fixed effects model estimations indicate that the proportion of junior directors is negatively associated with the level of average cash compensation (untabulated). The result suggests that a certain level of pay gap exists between top managers (or senior directors) and junior directors. In Japan, junior directors win prize as a form of cash compensation by promotion or staying in the board for a long period. We also find that % Junior is negatively associated with the compensation-performance sensitivity, although the significance level is marginal. The result is attributable to the fact that junior directors' pay is less sensitive to firm performance than top manager and senior directors' pay.

Kini and Williams (2011) show evidence that tournament incentives induce risk-taking behaviors. To examine whether tournament incentives result in risk-taking in Japan, we implement regressions of three-year stock return volatility (standard deviation of daily stock return) and leverage. Although untabulated results (industry-fixed effects, firm-fixed effects, and GMM IV estimations) suggest that % Junior is positively associated with the stock return volatility, we do not find a significant relation between % Junior and leverage. The mixed result may be attributable to the fact that most Japanese directors compete in within-firm tournament. Risk-taking behaviors increase the probability of financial distress, which significantly decreases the probability of insiders' promotion to top manager. Risk-taking may incur both costs and benefits to non-manager directors.

6. Conclusion

We investigate the relationship between the proportion of inside directors younger than top manager, management turnover, and firm performance of Japanese companies. Although corporate boards are generally expected to monitor management, Japanese boards, which are dominated by insiders, serve as an internal labor market where junior directors compete in tournament for next top manager. Firms with many junior directors enhance the competition, which will create value. We raise a prediction that firms with many junior directors replace management frequently (increase probability of wining the prize) to provide tournament incentives. Consistent with this view, we find robust evidence that the frequency of management turnovers increases as the proportion of junior directors among non-manager directors increases. Meanwhile, we do not find strong evidence that firms with junior dominated boards have weak sensitivities of management

turnovers to firm performance. We also show evidence that the proportion of junior directors is positively associated with firm performance. Those results suggest that board age structure should be considered to examine Japanese corporate boards. In contrast, we find no robust evidence that the proportion of outside directors affects the forced turnover-performance sensitivity and firm performance.

To the best of our knowledge, this is one of a few studies to show evidence that age structure of corporate boards is associated with board functions. This result is attributable to the fact that Japanese insider-dominated boards serve as an internal labor market that provide tournament incentives to junior directors. The result provides additional evidence that tournament incentives are an important determinant of corporate governance structure, by highlighting characteristics of Japanese corporate boards. Our results are in spirit consistent with Coles et al.'s (2014) argument that board independence does not necessarily represent effectiveness of the board. Increases of independent directors under a certain board size may damage the tournament function in Japanese board rooms. Cross-border promotion of US good practices does not necessarily create value for local companies.

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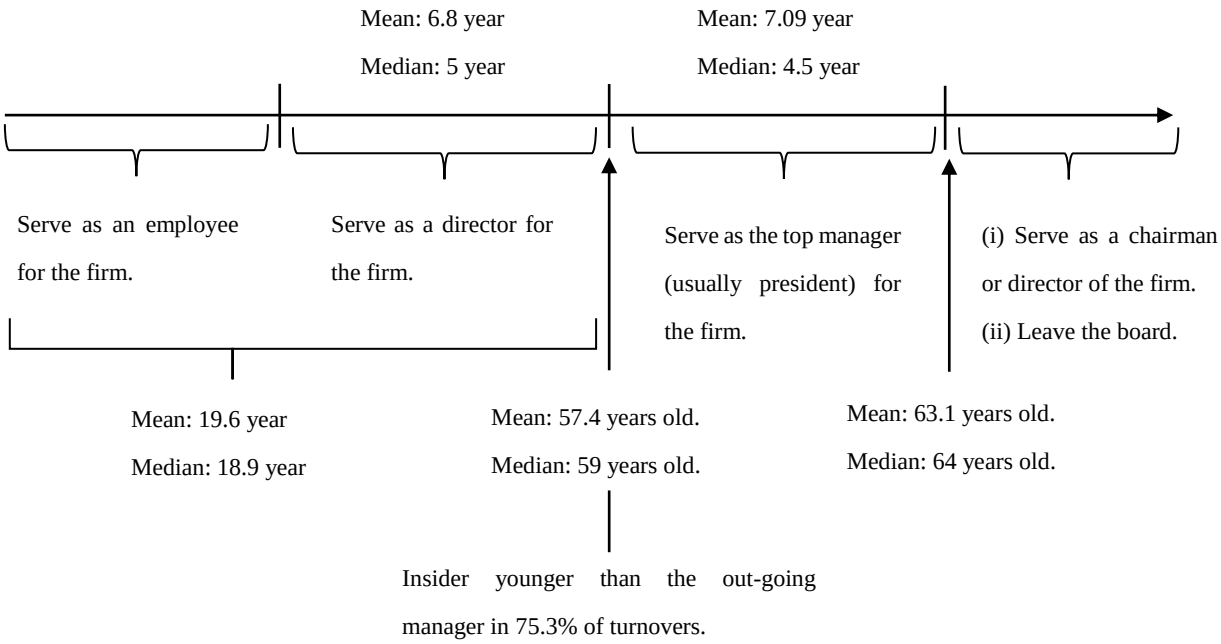
Appendix 1
Life of Japanese top managers

This appendix summarizes the life of top managers by using data of 4342 firm-years, in which (routine and forced) management turnovers occurred.



Appendix 2
Definition of variable and data source

This appendix presents definition of variables used in this research and data source. Top manager is defined as: (i) president if the firm's president is ranked No.3 or higher in the Toyokeizai Director database; (ii) chairman if the firm's president is ranked No.4 or lower and the chairman is ranked No.3 or higher. If there are no president and chairman among top 3 directors, we manually identify the top manager by taking director rank and position name into consideration. For data sources, TK is Toyokeizai Director data, Cges is Nikkei NEEDS Cges database, FQ is Nikkei NEEDS FinancialQuest database, PM is Nikkei Portfolio Master.

Variable	Definition and data source
Total turnover	Dummy variable that takes on a value of one for firm-years in which the top management is changed. Identified by using TK.
Forced turnover	Dummy variable that takes on a value of one for firm-years in which the top management is changed and the out-going manager does not remain in the board. Identified by using TK.
% Junior director	The number of inside directors younger than the top manager scaled by the number of directors for whom the date of birth is available (top manager is excluded both from the numerator and denominator). Younger or not is identified based on school age. Directors' birthdates are obtained from TK.
Majority-junior	Dummy variable that takes on a value of one for Majority-junior firms (firm-years of which the % Junior is equal to or higher than 85%) and zero for their matched Minority-junior firms (firm-years of which the % Junior is equal to or lower than 50%).
% Outsider	The percentage of outside directors over all directors. Obtained from Cges.
% Co-opted	The number of co-opted directors over the number of directors for whom his/her director appointment date is available (exclude the top manager both from numerator and denominator). Co-opted directors are defined as directors who are appointed to the board simultaneously or after the current top manager takes the position. Directors' appointment dates are obtained from TK.
Tenure	The lengths of years for which the incumbent top manager takes the position. The top manager's appointment date is available from TK.
Age	The top manager's age. The top manager's birthdate is available from TK.
Board size	The number of directors. Obtained from Cges.
DirecOwn	Percentage ownership by all directors. Obtained from Cges.
ForeignOwn	Percentage ownership by foreigners. Obtained from Cges.
ROE	Return on equity available from Cges, which is computed by net income divided by net assets.
ROA	Return on assets available from Cges, which is computed by current income divided by assets.
ExSR	The average of daily stock return of the firm for accounting year minus the average of daily index (TOPIX) return. The firm's average return is obtained from Cges and TOPIX is obtained from PM.
Tobin's Q	Total capitalization and book value of liabilities scaled by book value of assets. Obtained from Cges.
SGR	Sales growth ratio. Sales is available from Cges.
Loss dummy	Dummy variable that takes on a value of one for firm-years that report negative income for two consecutive years. Net income is available from Cges.
Ln(Assets)	Natural logarithm of assets. Assets is obtained from Cges.
R&D	R&D expenditures divided by assets. Zero is assigned when R&D expenditures is missing. The variables are obtained from FQ.
R&D dummy	Dummy variable that takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures.
LEVERAGE	Leverage available from Cges, which is computed by total liabilities divided by assets.
FirmAge	Length of years since the firm's IPO. The IPO date is available from Cges.
TSE 1st dummy	Dummy variable that takes on a value of one for firm-years listed on the 1st section of Tokyo Stock Exchange. Firms' listing information is available from Cges.

Appendix 3

Examples of Japanese Corporate Board

This appendix depicts board of directors of Yokohama Reito Co. Ltd. (Panel A) and Nippon Flour Mills Co., Ltd. (Panel B), as of June 2015. Rank is the position ranking in Toyokeizai Director data. Junior directors (marked by J in the right column) are directors younger than the top manager in school age. Co-opted directors (marked by C in the right column) are directors who took the board seat simultaneously or after the incumbent top manager was appointed.

Panel A: Yokohama Reito Co., Ltd.

Rank	Name	Position	Top manager = T	Top manager appointment (yyyymm)	Birthday (yyyymmdd)	Director appointment (yyyymm)	Junior = J	Co-opt = C
1	Toshio Yoshikawa	President	T	200312	19441102	199212		
2	Fumio Iwabuchi	Managing director			19541210	200712	J	C
3	Takaaki Mizuno	Managing director			19480622	200112	J	
4	Yuji Inoue	Director			19540408	200912	J	C
5	Sigekata Senda	Director			19630916	201112	J	C
6	Toshimasa Iijima	Director			19520401	200312	J	C
7	Toshihiko Nishiyama	Director			19530301	200312	J	C
8	Koji Ochi	Director			19610806	201112	J	C
9	Hiroyuki Matsubara	Director			19551004	201312	J	C

% Junior director = 1 (8/8).

% Co-opted director = 0.875 (7/8).

Appendix 3
(Continued)

Panel B: Nippon Flour Mills Co., Ltd.

Rank	Name	Position	Top manager = T	Top manager appointment (yyyymm)	Birthday (yyyymmdd)	Director appointment (yyyymm)	Junior = J	Co-opt = C
1	Hiroshi Sawada	Chairman			19310101	198306		
2	Haruki Kodera	President	T	201206	19530212	200606		
3	Masayuki Kondo	Director			19540210	200706	J	
4	Tatsuo Amano	Director			19520716	200706		
5	Mitsuo Somezawa	Director			19500808	200806		
6	Hirokazu Shimizu	Director			19530327	201006		
7	Hiroyuki Matsui	Director			19550918	201306	J	C
8	Yoshiaki Murakami	Director			19560503	201406	J	C
9	Noboru Sekine	Director			19570319	201506	J	C
10	Toshifumi Horiuchi	Director			19590525	201506	J	C
11	Toshiya Maezuru	Director			19610107	201506	J	C
12	Morimasa Akashi	Outside Director			19330221	199406		
13	Sadao Kumakura	Outside Director			19400119	200406		

% Junior director = 0.5 (6/12).
% Co-opted director = 0.417 (5/12).

Table 1

Descriptive statistics and correlations between board variables

Panel A presents descriptive statistics. Total turnover takes on a value of one for firm-yeas that conduct management turnovers and zero otherwise. Forced turnover takes on a value of one for firm-years in which top manager is dismissed and zero otherwise. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. % Outsider is the proportion of outside directors over all board members. % Co-opted is the proportion of co-opted directors over non-manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. DirectorOwn is percentage ownership by directors. ForeigOwn is percentage ownership by foreigners. ROE is return on equity computed by net income over book value of net assets. ROA is return on assets computed by current income over assets. ExSR is the average of daily stock return of the firm during accounting year minus the average of daily index (TOPIX) return. Tobin's Q is computed by total capitalization and book value of liabilities over assets. SGR is sales growth ratio. Loss dummy takes on a value of one for firm-years that report negative income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures. LEVERAGE is computed by total liabilities over assets. FirmAge is the length of years since the firm's IPO. TSE 1st dummy takes on a value of one for firm-years listed on the 1st Section of Tokyo Stock Exchange. Please see detailed definition of variables for Appendix 2. Panel B presents board and manager characteristics (% Junior, Tenure, Age, % Outsider, and % Co-opted) separately for subsamples created by % Junior (the entire sample is equally divided into three groups). Panel C presents frequency of total and forced turnovers separately for the subsamples.

Panel A: Summary statistics

	N	Mean	S.D.	Minimum	Median	Maximum
Total turnover	35457	0.122	0.328	0	0	1
Forced turnover	35457	0.049	0.215	0	0	1
% Junior	35457	0.551	0.333	0	0.600	1
% Outsider	35457	0.102	0.138	0	0.000	0.6
% Co-opted	35457	0.580	0.332	0	0.308	1
Tenure	35457	7.386	8.315	0.167	4.167	38
Age	35457	59.324	8.331	37	61	78
Board size	35457	8.067	3.339	3	7.000	20
DirectorOwn	35457	0.085	0.127	0.000	0.022	0.566
ForeignOwn	35457	0.085	0.108	0.000	0.037	0.498
ROE	35457	5.106	14.377	-77.0125	5.494	50
ROA	35457	5.437	6.405	-16.616	4.482	29.601
ExSR	35457	-0.001	0.140	-0.671	-0.003	0.730
Tobin's Q	35457	1.131	0.609	0.466	0.975	4.658
SGR	35457	0.038	0.167	-0.443	0.026	0.898
Loss dummy	35457	0.075	0.263	0	0.000	1
Ln(Assets)	35457	10.516	1.650	7.061334	10.360	15.14542
R&D	35457	0.013	0.021	0.000	0.003	0.110
R&D Dummy	35457	0.634	0.482	0.000	1.000	1.000
LEVERAGE	35457	0.005	0.002	0.008	0.005	0.009
FirmAge	35457	26.526	19.866	1.167	19.167	64.833
TSE 1st dummy	35457	0.499	0.500	0	0	1

Table 1
(Continued)

Panel B: Board and manager attributes						
	N	Mean	S.D.	Minimum	Median	Maximum
% Junior						
Low % Junior	11482	0.139	0.135	0	0.143	0.391
Middle % Junior	10914	0.571	0.099	0.4	0.571	0.737
High % Junior	13061	0.895	0.097	0.75	0.889	1
Difference test		510.00***			136.70***	
Tenure						
Low % Junior	11482	5.648	5.780	0.167	3.417	38
Middle % Junior	10914	6.360	7.294	0.167	3.333	38
High % Junior	13061	9.772	10.231	0.167	5.250	38
Difference test		38.17***			31.44***	
Age						
Low % Junior	11482	52.245	7.384	37	53	78
Middle % Junior	10914	60.317	6.227	37	61	78
High % Junior	13061	64.717	5.844	37	65	78
Difference test		150.00***			114.30***	
% Outsiders						
Low % Junior	11482	0.145	0.171	0	0.100	0.6
Middle % Junior	10914	0.133	0.136	0	0.125	0.6
High % Junior	13061	0.040	0.067	0	0.000	0.333333
Difference test		64.84***			52.55***	
% Co-opted						
Low % Junior	11482	0.506	0.338	0	0.500	1
Middle % Junior	10914	0.559	0.325	0	0.571	1
High % Junior	13061	0.662	0.315	0	0.714	1
Difference test		37.50***			36.12***	

Panel C: Turnovers			
	Number of observations	Number of turnovers	Percentage
Total turnovers			
Low % Junior	11482	629	5.5%
Middle % Junior	10914	1233	11.3%
High % Junior	13061	2480	19.0%
Proportion difference test (High versus Low % Junior)			
Forced turnovers			
Low % Junior	11482	335	2.9%
Middle % Junior	10914	534	4.9%
High % Junior	13061	855	6.5%
Proportion difference test (High versus Low % Junior)			

Table 2

Logit regression of total management turnover

This table presents results of logit regressions of total management turnover (both routine and forced turnovers). Total turnovers are identified when the top manager is replaced. The dependent variable takes on a value of one for firm-years of total turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) through (6) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), the predicted value of % Junior estimated by an OLS regression (Model (5)), or ROE (Model (6)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript $t - 1$ means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 2

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5	(6) model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	1.284***	0.850***				
	(0.0791)	(0.123)				
Majority-junior $_{t-1}$			0.589***	0.712***	0.949***	0.945***
			(0.0888)	(0.0888)	(0.123)	(0.0871)
Performance $_{t-1}$	-0.924***	-0.831***	-1.230***	-0.769***	-1.161***	-0.510*
	(0.144)	(0.155)	(0.317)	(0.252)	(0.434)	(0.273)
Tenure $_{t-1}$	-0.0171***	0.146***	-0.0144**	-0.0150***	-0.0171*	-0.0190***
	(0.00247)	(0.00601)	(0.00591)	(0.00533)	(0.00887)	(0.00412)
Age $_{t-1}$	0.0509***	0.131***	0.0855***	0.0624***	0.0756***	0.0588***
	(0.00410)	(0.00702)	(0.0115)	(0.00693)	(0.0157)	(0.00646)
Board size $_{t-1}$	0.000114	0.0277**	-0.0213	0.00405	-0.0179	-0.00166
	(0.00568)	(0.0112)	(0.0164)	(0.0107)	(0.0226)	(0.0106)
DirecOwn $_{t-1}$	-1.295***	-1.924***	-1.558***	-1.857***	-0.411	-1.941***
	(0.238)	(0.439)	(0.480)	(0.465)	(0.586)	(0.437)
ForeignOwn $_{t-1}$	0.637***	0.282	1.257**	0.315	1.328*	0.335
	(0.214)	(0.438)	(0.505)	(0.439)	(0.791)	(0.444)
Loss $_{t-1}$	0.335***	0.295***	0.318*	0.500***	0.437*	0.453***
	(0.0684)	(0.0821)	(0.176)	(0.124)	(0.243)	(0.125)
Ln(Assets)	-0.0143	-0.0172	0.0105	0.0306	0.0104	0.0247
	(0.0179)	(0.0863)	(0.0433)	(0.0353)	(0.0656)	(0.0343)
R&D	0.108	3.028	-1.494	-2.157	-2.054	-3.014
	(1.107)	(3.185)	(2.762)	(2.345)	(4.111)	(2.164)
R&D dummy	-0.0487	0.250*	0.0137	0.0805	0.109	-0.0404
	(0.0534)	(0.137)	(0.132)	(0.105)	(0.191)	(0.100)
Constant	-6.140***		-8.666***	-8.236***	-7.255***	-7.467***
	(0.382)		(1.448)	(0.846)	(1.730)	(0.732)
Observations	35,457	27,098	5,500	9,858	3,176	10,868
ME % Junior	0.116					
ME Majority-junior			0.045	0.049	0.056	0.057
ME Performance	-0.083		-0.120	-0.071	-0.102	-0.045
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 3

Total turnover – performance sensitivity

This table presents results of logit regressions of total management turnover (both routine and forced turnovers). Total turnovers are identified when the top manager is replaced. The dependent variable takes on a value of one for firm-years of total turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) and (4) run estimations for subsamples created by % Junior (high (low) % Junior consists of firm-years for which the % Junior falls in the top (bottom) one-third in the entire sample) while Models (1) and (2) are for the entire sample. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript $t-1$ means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 3

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Sample	Entire	Entire	Low % Junior	High % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior $_{t-1}$	1.325***	0.916***	1.915***	0.893***
	(0.0802)	(0.124)	(0.346)	(0.263)
Performance $_{t-1}$	-2.081***	-2.308***	-1.547***	-0.444**
	(0.270)	(0.296)	(0.287)	(0.195)
Performance $_{t-1}$*% Junior $_{t-1}$	1.881***	2.407***		
	(0.355)	(0.416)		
Tenure $_{t-1}$	-0.0176***	0.145***	-0.0372***	-0.0139***
	(0.00247)	(0.00600)	(0.00921)	(0.00309)
Age $_{t-1}$	0.0518***	0.132***	0.0238***	0.0617***
	(0.00410)	(0.00703)	(0.00831)	(0.00553)
Board size $_{t-1}$	-0.000762	0.0275**	-0.0577***	0.0161**
	(0.00567)	(0.0112)	(0.0188)	(0.00786)
DirecOwn $_{t-1}$	-1.279***	-1.914***	-1.204**	-1.808***
	(0.237)	(0.439)	(0.495)	(0.322)
ForeignOwn $_{t-1}$	0.606***	0.258	1.405***	0.0534
	(0.213)	(0.438)	(0.435)	(0.307)
Loss dummy $_{t-1}$	0.324***	0.288***	0.162	0.239**
	(0.0679)	(0.0818)	(0.163)	(0.0969)
Ln(Assets)	-0.0108	-0.00728	-0.0707*	0.00397
	(0.0177)	(0.0863)	(0.0416)	(0.0246)
R&D	0.00925	2.941	-1.234	0.0646
	(1.101)	(3.177)	(2.665)	(1.642)
R&D dummy	-0.0460	0.266*	-0.273**	0.0668
	(0.0534)	(0.137)	(0.130)	(0.0744)
Constant	-6.274***		-3.348***	-6.975***
	(0.380)		(0.798)	(0.575)
Observations	35,457	27,098	11,373	13,061
ME % Junior	0.118		0.082	0.130
ME Performance	-0.186		-0.066	-0.064
Year FE	Yes	Yes	Yes	Yes

Table 4

Logit regression of forced turnover

This table presents results of logit regressions of forced management turnovers. Forced turnovers are identified when the top manager is replaced and the out-going top manager disappears from the board. The dependent variable takes on a value of one for firm-years of forced turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no forced turnovers during the sample period. Models (3) through (6) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), the predicted value of % Junior estimated by an OLS regression (Model (5)), or ROE (Model (6)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of forced turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 4

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5	(6) model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	0.885***	0.572***				
	(0.123)	(0.159)				
Majority-junior $_{t-1}$			0.319**	0.444***	0.781***	0.598***
			(0.130)	(0.140)	(0.175)	(0.140)
Performance $_{t-1}$	-1.334***	-0.998***	-1.587***	-1.371***	-1.860***	-0.897**
	(0.186)	(0.190)	(0.438)	(0.378)	(0.583)	(0.399)
Tenure $_{t-1}$	-0.0560***	0.0623***	-0.0589***	-0.0609***	-0.0478***	-0.0532***
	(0.00463)	(0.00720)	(0.0113)	(0.0107)	(0.0139)	(0.00820)
Age $_{t-1}$	0.0386***	0.0659***	0.0626***	0.0447***	0.0527***	0.0426***
	(0.00591)	(0.00818)	(0.0156)	(0.00971)	(0.0199)	(0.00974)
Board size $_{t-1}$	-0.0349***	0.0493***	-0.0538*	-0.0190	0.00947	-0.0393**
	(0.0112)	(0.0169)	(0.0280)	(0.0188)	(0.0375)	(0.0195)
DirecOwn $_{t-1}$	-2.330***	-0.925	-1.744**	-2.898***	-1.656**	-3.200***
	(0.376)	(0.563)	(0.751)	(0.839)	(0.810)	(0.763)
ForeignOwn $_{t-1}$	0.389	0.313	0.997	-0.463	2.227**	-0.304
	(0.318)	(0.603)	(0.634)	(0.685)	(0.961)	(0.668)
Loss $_{t-1}$	0.339***	0.272**	0.264	0.449**	0.160	0.411**
	(0.0959)	(0.106)	(0.243)	(0.175)	(0.311)	(0.187)
Ln(Assets)	-0.0991***	-0.0718	-0.0366	-0.0920	-0.288***	-0.106*
	(0.0304)	(0.111)	(0.0643)	(0.0560)	(0.0912)	(0.0540)
R&D	1.210	6.702	5.013	1.044	3.155	-2.724
	(1.793)	(4.398)	(4.166)	(3.667)	(6.531)	(3.758)
R&D dummy	-0.0586	0.422**	-0.0717	0.00184	-0.206	-0.0828
	(0.0889)	(0.191)	(0.208)	(0.158)	(0.276)	(0.151)
Constant	-4.464***		-5.974***	-4.923***	-2.546	-4.051***
	(0.487)		(1.686)	(0.757)	(1.949)	(0.786)
Observations	35,457	13,000	5,428	9,822	3,064	10,784
ME % Junior	0.032					
ME Majority-junior			0.011	0.013	0.021	0.015
ME Performance	-0.048		-0.065	-0.049	-0.072	-0.031
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 5

Forced turnover – performance sensitivity

This table presents results of logit regressions of forced management turnovers. Forced turnovers are identified when the top manager is replaced and the out-going top manager disappears from the board. The dependent variable takes on a value of one for firm-years of forced turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) and (4) run estimations for subsamples created by % Junior (high (low) % Junior consists of firm-years for which the % Junior falls in the top (bottom) one-third in the entire sample) while Models (1) and (2) are for the entire sample. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript $t - 1$ means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of forced turnovers associated with one unit change of the designated variable. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 5

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Sample	Entire	Entire	Low % Junior	High % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior $_{t-1}$	0.927***	0.625***	2.083***	0.403
	(0.126)	(0.162)	(0.468)	(0.420)
Performance $_{t-1}$	-1.897***	-1.580***	-1.858***	-0.834***
	(0.318)	(0.338)	(0.376)	(0.301)
Performance $_{t-1}$*% Junior $_{t-1}$	0.980**	1.006**		
	(0.449)	(0.489)		
Tenure $_{t-1}$	-0.0565***	0.0617***	-0.0845***	-0.0470***
	(0.00464)	(0.00720)	(0.0165)	(0.00603)
Age $_{t-1}$	0.0393***	0.0666***	0.0226**	0.0360***
	(0.00591)	(0.00819)	(0.0108)	(0.00827)
Board size $_{t-1}$	-0.0356***	0.0492***	-0.0816***	-0.0204
	(0.0112)	(0.0169)	(0.0269)	(0.0145)
DirecOwn $_{t-1}$	-2.310***	-0.935*	-2.649***	-2.897***
	(0.373)	(0.564)	(0.736)	(0.604)
ForeignOwn $_{t-1}$	0.370	0.288	1.553***	-0.695
	(0.317)	(0.602)	(0.504)	(0.597)
Loss dummy $_{t-1}$	0.338***	0.268**	0.0606	0.353**
	(0.0958)	(0.106)	(0.213)	(0.146)
Ln(Assets)	-0.0968***	-0.0643	-0.158***	-0.126***
	(0.0303)	(0.111)	(0.0556)	(0.0447)
R&D	1.141	6.721	-0.241	0.428
	(1.789)	(4.396)	(3.506)	(2.860)
R&D dummy	-0.0571	0.434**	-0.164	-0.0197
	(0.0889)	(0.191)	(0.183)	(0.130)
Constant	-4.560***		-2.526**	-3.990***
	(0.488)		(1.111)	(0.844)
Observations	35,457	13,000	11,340	13,052
ME % Junior	0.033		0.039	0.020
ME Performance	-0.068		-0.035	-0.042
Year FE	Yes	Yes	Yes	Yes

Table 6
Board independence and forced turnover – performance sensitivity

This table presents results of logit regressions of forced management turnovers. Forced turnovers are identified when the top manager is replaced and the out-going top manager disappears from the board. The dependent variable takes on a value of one for firm-years of forced turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) and (4) run estimations for subsamples created by % Outsider (% Outsider > 0 (% Outsider = 0) consists of firm-years that have (do not have) outside directors on the board) while Models (1) and (2) are for the entire sample. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Outsider is the proportion of outside directors over all board members. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript $t - 1$ means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of forced turnovers associated with one unit change of the designated variable. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 6
(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Sample	Entire	Entire	% Outsider = 0	% Outsider > 0
Estimation	Industry FE	Firm FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Outsider $_{t-1}$	0.966***	0.169		1.428***
	(0.219)	(0.336)		(0.335)
Performance $_{t-1}$	-1.493***	-0.971***	-1.511***	-1.146***
	(0.236)	(0.241)	(0.270)	(0.259)
Performance $_{t-1}$*% Outsider $_{t-1}$	1.172	-0.145		
	(0.885)	(0.985)		
Tenure $_{t-1}$	-0.0523***	0.0643***	-0.0537***	-0.0495***
	(0.00449)	(0.00722)	(0.00584)	(0.00714)
Age $_{t-1}$	0.0626***	0.0846***	0.0631***	0.0633***
	(0.00442)	(0.00641)	(0.00600)	(0.00617)
Board size $_{t-1}$	-0.0313***	0.0516***	-0.0238	-0.0255*
	(0.0110)	(0.0168)	(0.0154)	(0.0150)
DirecOwn $_{t-1}$	-2.125***	-0.912	-1.742***	-2.945***
	(0.380)	(0.567)	(0.493)	(0.586)
ForeignOwn $_{t-1}$	0.160	0.352	-0.544	0.408
	(0.320)	(0.603)	(0.578)	(0.370)
Loss dummy $_{t-1}$	0.316***	0.268**	0.356***	0.279*
	(0.0958)	(0.106)	(0.132)	(0.143)
Ln(Assets)	-0.119***	-0.0860	-0.128***	-0.120***
	(0.0294)	(0.111)	(0.0449)	(0.0362)
R&D	0.645	6.682	1.200	0.894
	(1.780)	(4.407)	(2.743)	(2.182)
R&D dummy	-0.0325	0.425**	-0.104	0.0386
	(0.0893)	(0.191)	(0.122)	(0.121)
Constant	-5.159***		-5.027***	-5.640***
	(0.459)		(0.688)	(0.846)
Observations	35,457	13,000	18,972	16,485
ME % Outsider	0.035			0.057
ME Performance	-0.055		-0.049	-0.046
Year FE	Yes	Yes	Yes	Yes

Table 7
Regression of Tobin's Q

This table presents results of regressions of Tobin's Q (Total capitalization and book value of liabilities divided by book value of assets). All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no forced turnovers during the sample period. Models (3) through (5) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), or the predicted value of % Junior estimated by an OLS regression using all control variables in Table 4 as independent variables (Model (5)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Therefore, sample size varies across those models. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. % Outsider is the proportion of outside directors over all board members. Tenure and Age are top manager's tenure and age. Board size is the number of directors. DirecOwn is percentage ownership by directors. ForeignOwn is percentage ownership by foreigners. Ln(Assets) is natural logarithm of assets. SGR is sales growth ratio. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. LEVERAGE is computed by total liabilities over assets. FirmAge is the length of years since the firm's IPO. ROA is return on assets computed by current income over assets. TSE 1st dummy takes on a value of one for firm-years listed on the 1st section of Tokyo Stock Exchange. Please see detailed definition of variables for Appendix 2. Subscript $t-1$ indicates that one-year lagged data are used for the variable. Standard errors are presented in parentheses. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 7

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5
Sample	Entire	Entire	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE
% Junior$_{t-1}$	0.254***	0.0416**			
	(0.0261)	(0.0208)			
Majority-junior $_{t-1}$			0.0783***	0.167***	0.130***
			(0.0231)	(0.0230)	(0.0251)
% Outsider $_{t-1}$	0.568***	-0.0219	0.473***	0.437***	0.576***
	(0.0603)	(0.0441)	(0.0971)	(0.0922)	(0.153)
Tenure $_{t-1}$	0.000393	0.00104	-0.00256	0.000430	-0.00404**
	(0.000804)	(0.000714)	(0.00169)	(0.00133)	(0.00198)
Age $_{t-1}$	-0.0155***	-0.00230*	-0.0172***	-0.0135***	-0.0163***
	(0.00137)	(0.00127)	(0.00300)	(0.00162)	(0.00495)
Board size $_{t-1}$	0.00132	-0.00242*	-0.00738*	-0.00231	-0.00613
	(0.00204)	(0.00147)	(0.00410)	(0.00263)	(0.00484)
DirecOwn $_{t-1}$	0.0766	-0.107	0.242*	0.218**	0.106
	(0.0722)	(0.0929)	(0.126)	(0.105)	(0.164)
ForeignOwn $_{t-1}$	1.344***	0.567***	1.336***	1.138***	1.601***
	(0.108)	(0.105)	(0.183)	(0.136)	(0.235)
Ln(Assets)	-0.106***	-0.265***	-0.102***	-0.0859***	-0.133***
	(0.00883)	(0.0278)	(0.0155)	(0.0115)	(0.0211)
R&D	4.069***	-0.00242	3.558***	3.913***	2.965***
	(0.543)	(0.866)	(0.873)	(0.695)	(1.045)
R&D dummy	-0.0190	0.0115	-0.00405	0.00523	-0.0269
	(0.0193)	(0.0253)	(0.0336)	(0.0262)	(0.0464)
LEVERAGE	48.71***	66.07***	51.56***	50.82***	50.85***
	(3.814)	(6.877)	(6.786)	(5.556)	(8.817)
FirmAge $_{t-1}$	-0.000390	0.0509**	-5.00e-05	0.000406	0.000435
	(0.000428)	(0.0225)	(0.000764)	(0.000665)	(0.000836)
ROA $_{t-1}$	2.535***	2.069***	3.414***	3.090***	3.088***
	(0.204)	(0.123)	(0.345)	(0.254)	(0.433)
TSE 1st dummy $_{t-1}$	0.165***	0.0707**	0.151***	0.136***	0.169***
	(0.0162)	(0.0288)	(0.0284)	(0.0211)	(0.0361)
Constant	2.819***	1.987***	2.827***	2.099***	3.136***
	(0.140)	(0.741)	(0.233)	(0.166)	(0.349)
Observations	35,457	35,457	5,500	9,858	3,178
R-squared	0.339	0.220	0.369	0.368	0.380
Year FE	Yes	Yes	Yes	Yes	Yes

Table 8
GMM IV regression

This table presents results of GMM IV regression of Tobin's Q (Total capitalization and book value of liabilities divided by book value of assets). Two instrumental variables are adopted: Officer system (dummy variable that takes on a value of one for firm-years adopting officer system and zero otherwise) and Proportion ratio (the ratio of 60 – 64 years old men's population to 50 – 59 years old men's population in the prefecture of the firm's headquarter). % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. % Outsider is the proportion of outside directors over all board members. Tenure and Age are top manager's tenure and age. Board size is the number of directors. DirecOwn is percentage ownership by directors. ForeignOwn is percentage ownership by foreigners. Ln(Assets) is natural logarithm of assets. SGR is sales growth ratio. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. LEVERAGE is computed by total liabilities over assets. FirmAge is the length of years since the firm's IPO. ROA is return on assets computed by current income over assets. TSE 1st dummy takes on a value of one for firm-years listed on the 1st section of Tokyo Stock Exchange. Please see detailed definition of variables for Appendix 2. Subscript $t-1$ indicates that one-year lagged data are used for the variable. Standard errors are presented in parentheses. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 8
(Continued)

VARIABLES	(1) model 1		(2) model 2	
Estimation	IV Probit		GMM IV	
	1st	2nd	1st	2nd
Sample	Entire		Entire	
Dependent variable	% Junior	Total turnover	% Junior	Tobin's Q
% Junior $_{t-1}$		1.945***		1.114***
		(0.621)		(0.399)
% Outsider $_{t-1}$			-0.691***	1.164***
			(0.020)	(0.278)
Performance $_{t-1}$	0.0569***	-0.547***		
	(0.014)	(0.0770)		
Tenure $_{t-1}$	0.00122***	-0.0109***	0.0004	5.85e-05
	(0.00039)	(0.00140)	(1.09)	(0.000895)
Age $_{t-1}$	0.0295***	-0.0141	0.0296***	-0.0409***
	(0.0004)	(0.0206)	(0.0004)	(0.0118)
Board size $_{t-1}$	0.00325***	-0.00443	0.0014	-0.000998
	(0.0011)	(0.00391)	(0.0009)	(0.00239)
DirecOwn $_{t-1}$	0.1963***	-0.858***	0.1176***	-0.0267
	(0.03377)	(0.164)	(0.0317)	(0.0936)
ForeignOwn $_{t-1}$	0.0079	0.315**	0.1669***	1.193***
	(0.0354)	(0.126)	(0.0304)	(0.126)
Loss dummy $_{t-1}$	0.00516	0.174***		
	(0.00769)	(0.0387)		
Ln(Assets)	-0.0277***	0.0245	-0.0283***	-0.0784***
	(0.00329)	(0.0202)	(0.00298)	(0.0147)
R&D	-0.0862	0.0799	0.4981***	3.663***
	(0.2099)	(0.616)	(0.1740)	(0.582)
R&D dummy	-0.00722	-0.0248	-0.0148*	-0.00559
	(0.00927)	(0.0304)	(0.0083)	(0.0209)
LEVERAGE			7.200***	42.70***
			(1.581)	(4.867)
FirmAge $_{t-1}$	-0.0007***		-0.0006***	9.40e-05
	(0.0002)		(0.00019)	(0.000520)
ROA $_{t-1}$			0.1878***	2.378***
			(0.0433)	(0.212)
TSE 1st dummy $_{t-1}$	0.02809***		0.02156***	0.147***
	(0.0081)		(0.0073)	(0.0192)
Officer system $_{t-1}$			-0.0246***	
			(0.00570)	
Population ratio $_{t-1}$			-0.2234***	
			(0.0591)	
Constant	-0.9078***	-1.849**	-0.7963***	3.060***
	(0.0707)	(0.796)	(0.0725)	(0.384)

Table 8
(Continued)

Observations		35457		35457
R-squared				
Partial R-squared			0.0042	
F-value for IVs	9.84***		16.23***	
Hansen J-statistics				0.145
Pagan-Hall test				4562.77***
Wald test of exogeneity		3.48		
Hausman test				5.004**
Industry FE	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No
Year FE	Yes	Yes	Yes	Yes

Table 9

Logit regression of total management turnover: Use ROA and excess stock return

This table presents results of logit regressions of total management turnover (both routine and forced turnovers) for matched samples. Panel A uses industry-adjusted ROA, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), as a performance variable while Panel B adopts excess stock return (ExSR), which subtracts average daily index (TOPIX) return during the accounting year from the average firm's daily stock return. Total turnovers are identified when the top manager is replaced. The dependent variable takes on a value of one for firm-years of total turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) through (6) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), the predicted value of % Junior estimated by an OLS regression (Model (5)), ROE (Model (6) of Panel A), or ExSR (Model (6) of Panel B). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript $t - 1$ means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 9

(Continued)

Panel A: Use ROA as performance variable						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROA
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Industry adjusted ROA	Industry adjusted ROA	Industry adjusted ROA	Industry adjusted ROA	Industry adjusted ROA	Industry adjusted ROA
% Junior $_{t-1}$	1.286***	0.858***				
	(0.0792)	(0.123)				
Majority-junior $_{t-1}$			0.592***	0.719***	0.956***	0.894***
			(0.0886)	(0.0891)	(0.123)	(0.0846)
Performance $_{t-1}$	-1.388***	-1.990***	-1.948**	-1.806***	-2.248**	-0.973
	(0.377)	(0.491)	(0.839)	(0.676)	(1.118)	(0.651)
Tenure $_{t-1}$	-0.0171***	0.146***	-0.0141**	-0.0147***	-0.0175**	-0.0210***
	(0.00248)	(0.00601)	(0.00593)	(0.00536)	(0.00890)	(0.00411)
Age $_{t-1}$	0.0504***	0.130***	0.0847***	0.0616***	0.0746***	0.0537***
	(0.00413)	(0.00701)	(0.0115)	(0.00696)	(0.0159)	(0.00625)
Board size $_{t-1}$	0.000483	0.0271**	-0.0218	0.00383	-0.0167	0.0162
	(0.00568)	(0.0112)	(0.0164)	(0.0107)	(0.0226)	(0.0103)
DirecOwn $_{t-1}$	-1.277***	-1.894***	-1.551***	-1.789***	-0.353	-2.238***
	(0.238)	(0.438)	(0.481)	(0.465)	(0.589)	(0.417)
ForeignOwn $_{t-1}$	0.757***	0.356	1.388***	0.454	1.505*	0.888**
	(0.220)	(0.439)	(0.514)	(0.448)	(0.804)	(0.425)
Loss dummy $_{t-1}$	0.445***	0.371***	0.476***	0.549***	0.520**	0.547***
	(0.0678)	(0.0790)	(0.159)	(0.118)	(0.235)	(0.121)
Ln(Assets)	-0.0224	-0.00320	0.00208	0.0268	-0.000917	-0.0368
	(0.0180)	(0.0864)	(0.0431)	(0.0351)	(0.0651)	(0.0331)
R&D	0.138	3.073	-1.412	-2.132	-2.325	-1.920
	(1.112)	(3.189)	(2.778)	(2.340)	(4.132)	(2.175)
R&D dummy	-0.0512	0.245*	0.0114	0.0851	0.108	-0.0652
	(0.0532)	(0.137)	(0.131)	(0.104)	(0.190)	(0.0989)
Constant	-6.058***		-8.524***	-8.180***	-7.056***	-5.594***
	(0.383)		(1.396)	(0.841)	(1.616)	(0.634)
Observations	35,457	27,098	5,500	9,858	3,176	10,898
ME % Junior	0.116					
ME Majority-junior			0.046	0.050	0.056	0.056
ME Performance	-0.125		-0.191	-0.167	-0.197	-0.088
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9

(Continued)

Panel B: Use ExSR as a performance variable						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ExSR
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	ExSR	ExSR	ExSR	ExSR	ExSR	ExSR
% Junior $_{t-1}$	1.271***	0.852***				
	(0.0790)	(0.123)				
Majority-junior $_{t-1}$			0.579***	0.704***	0.938***	0.997***
			(0.0886)	(0.0886)	(0.124)	(0.0864)
Performance $_{t-1}$	-0.639***	-0.425***	-0.114	-0.522**	-0.613	-0.292
	(0.136)	(0.142)	(0.346)	(0.265)	(0.472)	(0.263)
Tenure $_{t-1}$	-0.0174***	0.145***	-0.0146**	-0.0154***	-0.0179**	-0.0167***
	(0.00247)	(0.00600)	(0.00595)	(0.00535)	(0.00896)	(0.00400)
Age $_{t-1}$	0.0515***	0.131***	0.0847***	0.0629***	0.0749***	0.0538***
	(0.00410)	(0.00701)	(0.0115)	(0.00694)	(0.0157)	(0.00636)
Board size $_{t-1}$	0.000659	0.0266**	-0.0208	0.00394	-0.0172	0.0180*
	(0.00567)	(0.0112)	(0.0163)	(0.0107)	(0.0226)	(0.0106)
DirecOwn $_{t-1}$	-1.374***	-1.983***	-1.682***	-1.905***	-0.534	-1.949***
	(0.239)	(0.438)	(0.481)	(0.467)	(0.587)	(0.434)
ForeignOwn $_{t-1}$	0.594***	0.305	1.130**	0.267	1.202	1.255***
	(0.213)	(0.439)	(0.508)	(0.442)	(0.794)	(0.454)
Loss dummy $_{t-1}$	0.517***	0.440***	0.636***	0.643***	0.675***	0.583***
	(0.0630)	(0.0761)	(0.148)	(0.111)	(0.212)	(0.114)
Ln(Assets)	-0.0211	-0.0443	0.00330	0.0280	-0.00177	-0.0476
	(0.0180)	(0.0859)	(0.0431)	(0.0355)	(0.0659)	(0.0368)
R&D	0.191	3.138	-1.251	-2.181	-2.256	-1.678
	(1.108)	(3.188)	(2.769)	(2.357)	(4.136)	(2.115)
R&D dummy	-0.0514	0.248*	0.00984	0.0806	0.129	0.0207
	(0.0533)	(0.137)	(0.131)	(0.105)	(0.192)	(0.0988)
Constant	-6.084***		-8.533***	-8.254***	-6.970***	-5.990***
	(0.377)		(1.426)	(0.838)	(1.685)	(0.682)
Observations	35,457	27,098	5,500	9,858	3,176	10,914
ME % Junior	0.115					
ME Majority-junior			0.045	0.049	0.056	0.059
ME Performance	-0.058		-0.011	-0.048	-0.054	-0.026
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 10

Logit regression of alternative management turnovers

This table presents results of logit regressions of alternative management turnovers. Panel A (Pabel B) identifies management turnovers when the top manager is replaced by a junior director who had worked for the firm for five (ten) years or longer. Panel C defines management turnovers when the new top manager is a junior director who had worked for the firm as an employee (the time appointed as a director is later than the time they joined the firm). The dependent variable takes on a value of one for firm-years of the specific type of turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) through (6) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), the predicted value of % Junior estimated by an OLS regression (Model (5)), or ROE (Model (6)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 10
(Continued)

Panel A: Turnovers that appoint an junior director who had worked for five years or longer as the new top manager						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	2.178***	1.910***				
	(0.108)	(0.212)				
Majority-junior $_{t-1}$			1.013***	1.315***	1.266***	1.532***
			(0.122)	(0.136)	(0.167)	(0.128)
Performance $_{t-1}$	-0.166	-0.0976	-0.532	-0.343	-0.293	0.109
	(0.200)	(0.244)	(0.417)	(0.319)	(0.610)	(0.340)
Tenure $_{t-1}$	-0.00610**	0.144***	0.00112	0.00654	0.00120	-0.00634
	(0.00292)	(0.00829)	(0.00688)	(0.00642)	(0.0105)	(0.00460)
Age $_{t-1}$	0.0762***	0.349***	0.0903***	0.0889***	0.0898***	0.0765***
	(0.00508)	(0.0134)	(0.0145)	(0.00903)	(0.0219)	(0.00791)
Board size $_{t-1}$	-0.00428	0.0107	-0.0265	0.000318	-0.0136	-0.0141
	(0.00742)	(0.0157)	(0.0211)	(0.0130)	(0.0280)	(0.0129)
DirecOwn $_{t-1}$	-0.401	-1.716**	-0.906	-1.357**	0.538	-0.990**
	(0.273)	(0.745)	(0.586)	(0.537)	(0.699)	(0.477)
ForeignOwn $_{t-1}$	0.697***	0.179	0.853	0.464	0.379	0.372
	(0.264)	(0.638)	(0.670)	(0.511)	(0.976)	(0.501)
Loss $_{t-1}$	0.208**	0.311***	0.00122	0.355**	0.329	0.368**
	(0.0976)	(0.119)	(0.259)	(0.168)	(0.330)	(0.164)
Ln(Assets)	0.108***	0.139	0.155***	0.123***	0.151*	0.159***
	(0.0218)	(0.146)	(0.0555)	(0.0438)	(0.0822)	(0.0384)
R&D	2.002	6.009	-1.609	-4.090	-3.107	-3.516
	(1.455)	(5.160)	(3.097)	(2.980)	(5.221)	(2.770)
R&D dummy	0.0416	0.106	0.194	0.282**	0.580**	0.179
	(0.0731)	(0.221)	(0.167)	(0.137)	(0.261)	(0.126)
Constant	-9.859***		-10.50***	-11.65***	-10.82***	-10.69***
	(0.480)		(1.045)	(0.882)	(1.546)	(0.774)
Observations	35,457	21,388	5,460	9,852	3,172	10,868
ME % Junior	0.088					
ME Majority-junior			0.033	0.029	0.030	0.032
ME Performance	-0.007		-0.028	-0.014	-0.013	0.005
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 10
(Continued)

Panel B: Turnovers that appoint an junior director who had worked for ten years or longer as the new top manager

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	2.288***	1.948***				
	(0.116)	(0.233)				
Majority-junior $_{t-1}$			1.115***	1.309***	1.318***	1.577***
			(0.135)	(0.140)	(0.189)	(0.134)
Performance $_{t-1}$	-0.442**	-0.266	-0.991**	-0.623*	-0.905	-0.278
	(0.202)	(0.268)	(0.431)	(0.326)	(0.649)	(0.358)
Tenure $_{t-1}$	-0.00435	0.141***	0.00496	0.00688	0.00873	-0.00538
	(0.00312)	(0.00881)	(0.00746)	(0.00669)	(0.0106)	(0.00490)
Age $_{t-1}$	0.0788***	0.362***	0.105***	0.0912***	0.102***	0.0816***
	(0.00536)	(0.0146)	(0.0154)	(0.00914)	(0.0244)	(0.00838)
Board size $_{t-1}$	-0.00202	0.00637	-0.0204	0.00392	-0.00700	-0.0133
	(0.00777)	(0.0166)	(0.0226)	(0.0136)	(0.0298)	(0.0136)
DirecOwn $_{t-1}$	-0.619**	-2.208***	-1.044	-1.444**	0.209	-1.149**
	(0.302)	(0.843)	(0.664)	(0.587)	(0.822)	(0.509)
ForeignOwn $_{t-1}$	0.671**	0.574	0.809	0.691	0.635	0.394
	(0.281)	(0.708)	(0.720)	(0.527)	(1.060)	(0.523)
Loss $_{t-1}$	0.142	0.270**	-0.0548	0.241	0.219	0.244
	(0.106)	(0.128)	(0.287)	(0.180)	(0.382)	(0.178)
Ln(Assets)	0.133***	0.180	0.158***	0.134***	0.168*	0.176***
	(0.0233)	(0.163)	(0.0607)	(0.0452)	(0.0879)	(0.0398)
R&D	1.700	7.484	-3.124	-3.088	-7.297	-4.112
	(1.595)	(5.520)	(3.346)	(2.951)	(5.046)	(2.880)
R&D dummy	0.104	-0.00464	0.268	0.284*	0.634**	0.155
	(0.0795)	(0.248)	(0.186)	(0.146)	(0.301)	(0.136)
Constant	-10.51***		-11.71***	-11.95***	-11.99***	-11.29***
	(0.506)		(1.117)	(0.878)	(1.670)	(0.795)
Observations	35,457	19,074	5,460	9,852	3,162	10,868
ME % Junior	0.075					
ME Majority-junior			0.028	0.026	0.024	0.027
ME Performance	-0.015		-0.042	-0.023	-0.031	-0.010
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 10
(Continued)

Panel C: Turnovers that appoint an junior director who had worked as an employee became the new top manager

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5	(6) model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	2.187***	1.842***				
	(0.106)	(0.201)				
Majority-junior $_{t-1}$			0.992***	1.227***	1.244***	1.488***
			(0.117)	(0.133)	(0.163)	(0.127)
Performance $_{t-1}$	-0.537***	-0.325	-0.948**	-0.632*	-0.782	-0.265
	(0.194)	(0.229)	(0.398)	(0.331)	(0.577)	(0.350)
Tenure $_{t-1}$	-0.00683**	0.128***	0.00164	0.00385	-0.00648	-0.00728
	(0.00298)	(0.00781)	(0.00679)	(0.00636)	(0.0103)	(0.00464)
Age $_{t-1}$	0.0743***	0.356***	0.0915***	0.0898***	0.0908***	0.0785***
	(0.00505)	(0.0130)	(0.0148)	(0.00916)	(0.0217)	(0.00808)
Board size $_{t-1}$	-0.00719	0.00255	-0.0244	-0.000933	-0.0170	-0.0144
	(0.00719)	(0.0155)	(0.0199)	(0.0130)	(0.0267)	(0.0127)
DirecOwn $_{t-1}$	-0.986***	-2.500***	-0.990*	-1.838***	0.685	-1.507***
	(0.286)	(0.744)	(0.588)	(0.547)	(0.747)	(0.497)
ForeignOwn $_{t-1}$	1.006***	0.0193	1.133*	0.801	1.535	0.666
	(0.272)	(0.616)	(0.678)	(0.517)	(0.977)	(0.507)
Loss $_{t-1}$	0.215**	0.268**	0.0563	0.343**	0.252	0.345**
	(0.0932)	(0.114)	(0.245)	(0.166)	(0.328)	(0.162)
Ln(Assets)	0.0631***	0.115	0.105*	0.0708	0.0639	0.109***
	(0.0222)	(0.141)	(0.0546)	(0.0439)	(0.0820)	(0.0388)
R&D	-0.0729	2.779	-0.419	-4.591	-4.275	-4.380*
	(1.482)	(5.216)	(3.009)	(2.828)	(5.110)	(2.640)
R&D dummy	0.111	0.301	0.274	0.303**	0.572**	0.174
	(0.0710)	(0.212)	(0.170)	(0.135)	(0.253)	(0.126)
Constant	-9.304***		-9.996***	-11.12***	-10.05***	-10.25***
	(0.486)		(1.041)	(0.900)	(1.501)	(0.782)
Observations	35,457	21,837	5,460	9,852	3,162	10,868
ME % Junior	0.093					
ME Majority-junior			0.036	0.031	0.034	0.034
ME Performance	-0.023		-0.054	-0.029	-0.038	-0.012
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 11
Turnover – performance sensitivities: Alternative turnover measures

This table presents results of logit regressions of alternative management turnovers. Models (1) and (2) (Models (3) and (4)) identify management turnovers when the top manager is replaced by a junior director who had worked for the firm for five (ten) years or more; denoted by 5yr Junior (10yr Junior). Models (5) and (6) define management turnovers when the new top manager is a junior director who had worked for the firm as an employee (the time appointed as a director is later than the time they joined the firm); denoted by EMP Junior. All estimations include industry- and year-fixed effects. Odd (even) number models are for Low (High) % Junior companies that consist of firm-years for which the % Junior falls in the bottom (top) one-third in the entire sample. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 11
(Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	model 1	model 2	model 3	model 4	model 5	model 6
Turnover	5yr Junior	5yr Junior	10yr Junior	10yr Junior	EMP Junior	EMP Junior
Sample	Low % Junior	High % Junior	Low % Junior	High % Junior	Low % Junior	High % Junior
Estimation	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior $_{t-1}$	5.639***	0.957***	6.146***	1.334***	5.091***	1.295***
	(0.761)	(0.305)	(0.907)	(0.321)	(0.743)	(0.301)
Performance $_{t-1}$	-1.933***	-0.0159	-2.203***	-0.222	-1.487**	-0.389*
	(0.697)	(0.232)	(0.693)	(0.243)	(0.694)	(0.229)
Tenure $_{t-1}$	0.0178	-0.00493	0.0324**	-0.00455	0.0159	-0.00498
	(0.0129)	(0.00331)	(0.0137)	(0.00358)	(0.0129)	(0.00339)
Age $_{t-1}$	0.0742***	0.0721***	0.0779***	0.0766***	0.0925***	0.0650***
	(0.0156)	(0.00625)	(0.0170)	(0.00656)	(0.0164)	(0.00620)
Board size $_{t-1}$	-0.0525	0.00265	-0.0407	0.00107	-0.0505	0.000438
	(0.0340)	(0.00912)	(0.0381)	(0.00958)	(0.0337)	(0.00892)
DirecOwn $_{t-1}$	0.201	-0.683**	-0.366	-0.918**	0.178	-1.278***
	(0.877)	(0.329)	(0.990)	(0.367)	(0.942)	(0.343)
ForeignOwn $_{t-1}$	1.045	0.565*	1.295	0.511	1.997***	0.760**
	(0.801)	(0.337)	(0.865)	(0.358)	(0.737)	(0.337)
Loss dummy $_{t-1}$	-0.192	0.194*	-0.197	0.107	0.293	0.110
	(0.448)	(0.117)	(0.502)	(0.128)	(0.376)	(0.116)
Ln(Assets)	0.0982	0.0956***	0.0994	0.130***	0.0347	0.0656**
	(0.0656)	(0.0284)	(0.0741)	(0.0301)	(0.0669)	(0.0282)
R&D	-2.909	0.383	-1.926	1.107	0.915	-1.403
	(4.621)	(1.986)	(5.149)	(2.104)	(4.846)	(1.917)
R&D dummy	-0.654**	0.180*	-0.545*	0.207**	-0.498*	0.217**
	(0.279)	(0.0925)	(0.330)	(0.0986)	(0.272)	(0.0896)
Constant	-8.313***	-8.535***	-9.467***	-9.589***	-8.970***	-8.138***
	(1.241)	(0.651)	(1.314)	(0.687)	(1.248)	(0.673)
Observations	11,234	13,061	10,928	13,061	11,258	13,061
ME % Junior	0.034	0.101	0.026	0.124	0.033	0.142
ME Performance	-0.012	-0.002	-0.009	-0.021	-0.010	-0.043
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 12

Logit regression of management turnover: Alternative matching

This table presents results of logit regressions of management turnovers. For every firm-year that conducts management turnover, we select as a matched sample a non-turnover observation from same industry and year that is closest in adjusted ROE (Models (1) – (4)) or the probability of conducting management turnover (Models (5) – (8)). The probability of management turnover is estimated by Model (1) of Table 2 dropping % Junior from the independent variable. We require matched firms not to conduct management turnovers during five years surrounding the matching year. We do not allow a single firm to be matched with multiple turnover firms, and drop turnover firms that have no matched firms from the analysis. The dependent variable takes on a value of one for firm-years conducting turnovers, and zero for matched firms. Models (1) and (5) include all turnover observations and their matched firms, while other models limit the sample to a specific type of turnovers and their matched firms. Models (2) and (6) (Models (3) and (7)) adopt turnovers in which the top manager is replaced by a junior director who had worked for the firm for five (ten) years or more; denoted by 5yr Junior (10yr Junior). Models (4) and (8) use management turnovers in which the new top manager is a junior director who had worked for the firm as an employee (the time appointed as a director is later than the time they joined the firm); denoted by EMP Junior. All estimations include industry- and year-fixed effects. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5	(6) model 6	(7) model 6	(8) model 6
Matching variable	Adjusted ROE				Propensity score			
Turnover type	Total	5yr Junior	10yr Junior	EMP Junior	Total			
Estimation	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	1.461***	2.612***	2.639***	2.584***	1.126***	1.785***	1.976***	1.846***
	(0.134)	(0.190)	(0.208)	(0.188)	(0.140)	(0.188)	(0.204)	(0.185)
Performance $_{t-1}$	0.124	0.372	0.298	0.155	-0.0983	1.157***	0.983***	0.625*
	(0.219)	(0.329)	(0.356)	(0.315)	(0.214)	(0.340)	(0.367)	(0.325)
Tenure $_{t-1}$	-0.0579***	-0.0442***	-0.0422***	-0.0429***	-0.0298***	-0.00789	-0.00455	-0.0111**
	(0.00423)	(0.00530)	(0.00568)	(0.00530)	(0.00435)	(0.00514)	(0.00544)	(0.00498)
Age $_{t-1}$	0.0634***	0.0924***	0.0989***	0.0920***	-0.0412***	-0.0448***	-0.0520***	-0.0488***
	(0.00647)	(0.00925)	(0.0103)	(0.00925)	(0.00616)	(0.00831)	(0.00920)	(0.00830)

Table 12

(Continued)

Board size $_{t-1}$	0.00654	0.0112	0.00873	-0.00245	-0.00316	-0.00649	-0.00575	-0.00603
	(0.0113)	(0.0151)	(0.0161)	(0.0149)	(0.0113)	(0.0146)	(0.0153)	(0.0141)
DirecOwn $_{t-1}$	-1.297***	-0.792*	-1.151**	-1.314***	-0.294	1.002**	1.236**	0.606
	(0.339)	(0.432)	(0.502)	(0.452)	(0.331)	(0.445)	(0.511)	(0.446)
ForeignOwn $_{t-1}$	0.401	0.830	0.737	1.198**	-0.296	-0.922*	-1.020*	-0.524
	(0.370)	(0.508)	(0.550)	(0.502)	(0.372)	(0.493)	(0.534)	(0.465)
Loss $_{t-1}$	0.440***	0.424**	0.384**	0.546***	0.164	-0.0255	-0.0584	0.0185
	(0.121)	(0.173)	(0.191)	(0.171)	(0.116)	(0.157)	(0.173)	(0.153)
Ln(Assets)	0.0290	0.116***	0.159***	0.0958**	0.0790**	0.219***	0.254***	0.164***
	(0.0321)	(0.0411)	(0.0447)	(0.0411)	(0.0316)	(0.0427)	(0.0463)	(0.0403)
R&D	-1.671	-0.458	-2.100	-2.903	-2.511	-1.414	-1.909	-3.721
	(2.102)	(2.847)	(3.033)	(2.924)	(1.922)	(2.418)	(2.630)	(2.528)
R&D dummy	0.0878	0.140	0.193	0.187	0.0539	0.175	0.295**	0.231*
	(0.100)	(0.133)	(0.146)	(0.132)	(0.0995)	(0.129)	(0.138)	(0.127)
Constant	-4.901***	-9.116***	-10.02***	-8.701***	1.270**	-0.956	-1.203	-0.118
	(1.092)	(1.508)	(1.597)	(1.516)	(0.610)	(0.775)	(0.830)	(0.767)
Observations	6,941	4,247	3,751	4,387	6,006	3,566	3,114	3,678
ME % Junior	0.363	0.633	0.633	0.627	0.280	0.439	0.483	0.455
ME Performance	0.031	0.090	0.071	0.038	-0.024	0.285	0.240	0.154
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 13

Regression of alternative performance variables

This table presents results of regressions of alternative performance variables: ROA (current income over assets) in Panel A and SGR (sales growth ratio) in Panel B. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no forced turnovers during the sample period. Models (3) through (5) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year and industry that is closest in Age (Model (3)), Tenure (Model (4)), or the predicted value of % Junior estimated by an OLS regression (Model (5)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Therefore, sample size varies across those models. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. % Outsider is the proportion of outside directors over all board members. Tenure and Age are top manager's tenure and age. Board size is the number of directors. DirecOwn is percentage ownership by directors. ForeignOwn is percentage ownership by foreigners. Ln(Assets) is natural logarithm of assets. SGR is sales growth ratio. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. LEVERAGE is computed by total liabilities over assets. FirmAge is the length of years since the firm's IPO. TSE 1st dummy takes on a value of one for firm-years listed on the 1st section of Tokyo Stock Exchange. Please see detailed definition of variables for Appendix 2. Subscript $t-1$ indicates that one-year lagged data are used for the variable. Standard errors are presented in parentheses. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 13

(Continued)

Panel A: Regression of ROA

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5
Sample	Entire	Entire	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE
% Junior$_{t-1}$	1.254***	0.423*			
	(0.292)	(0.227)			
Majority-junior $_{t-1}$			1.000***	1.171***	1.205***
			(0.293)	(0.279)	(0.292)
% Outsider $_{t-1}$	-0.168	0.412	1.422	1.161	1.392
	(0.638)	(0.576)	(1.084)	(0.932)	(1.717)
Tenure $_{t-1}$	0.0248***	0.00440	0.0102	0.0435***	0.0217
	(0.00847)	(0.00883)	(0.0166)	(0.0153)	(0.0206)
Age $_{t-1}$	-0.0578***	-0.0118	-0.00476	-0.0508**	0.0226
	(0.0150)	(0.0137)	(0.0358)	(0.0197)	(0.0542)
Board size $_{t-1}$	-0.00540	-0.0598***	-0.0552	-0.0241	-0.0246
	(0.0208)	(0.0183)	(0.0421)	(0.0296)	(0.0517)
DirecOwn $_{t-1}$	4.482***	-0.275	5.617***	5.307***	5.555***
	(0.850)	(0.977)	(1.503)	(1.250)	(1.821)
ForeignOwn $_{t-1}$	8.520***	-0.992	8.737***	7.059***	12.15***
	(1.090)	(1.137)	(2.031)	(1.534)	(2.548)
Ln(Assets)	0.435***	1.383***	0.405**	0.549***	0.366*
	(0.0917)	(0.264)	(0.172)	(0.133)	(0.212)
R&D	-27.36***	-58.10***	-14.48	-6.158	1.820
	(6.384)	(10.52)	(10.94)	(8.999)	(15.07)
R&D dummy	-0.303	-0.374	-0.300	-0.0396	-1.115**
	(0.236)	(0.286)	(0.431)	(0.339)	(0.529)
LEVERAGE	-733.9***	-1,157***	-812.0***	-662.6***	-688.3***
	(39.96)	(86.52)	(80.21)	(60.24)	(96.64)
FirmAge $_{t-1}$	-0.0426***	-0.222	-0.0435***	-0.0408***	-0.0369***
	(0.00416)	(0.294)	(0.00775)	(0.00595)	(0.00910)
TSE 1st dummy $_{t-1}$	1.118***	-1.334***	0.911***	0.619**	0.349
	(0.187)	(0.264)	(0.342)	(0.251)	(0.417)
Constant	7.993***	6.166	4.611*	6.661**	4.794
	(1.385)	(9.819)	(2.713)	(2.792)	(3.749)
Observations	35,457	35,457	5,500	9,858	3,178
R-squared	0.197	0.098	0.217	0.191	0.209
Year FE	Yes	Yes	Yes	Yes	Yes

Table 13

(Continued)

Panel B: Regression of SGR

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4	(5) model 5
Sample	Entire	Entire	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE
% Junior$_{t-1}$	3.639***	2.396***			
	(0.472)	(0.654)			
Majority-junior $_{t-1}$			1.166**	2.156***	1.461**
			(0.581)	(0.548)	(0.629)
% Outsider $_{t-1}$	4.027***	2.912*	1.396	3.963**	6.380*
	(0.939)	(1.736)	(1.826)	(1.815)	(3.389)
Tenure $_{t-1}$	0.0414***	0.0165	0.00113	0.0308	-0.0172
	(0.0123)	(0.0226)	(0.0322)	(0.0272)	(0.0406)
Age $_{t-1}$	-0.221***	-0.150***	-0.170**	-0.187***	-0.257**
	(0.0225)	(0.0367)	(0.0678)	(0.0358)	(0.109)
Board size $_{t-1}$	-0.102***	-0.202***	-0.116	-0.173***	-0.164
	(0.0324)	(0.0499)	(0.0861)	(0.0590)	(0.124)
DirecOwn $_{t-1}$	7.166***	5.857**	6.376***	6.292***	9.574***
	(1.166)	(2.499)	(2.408)	(2.182)	(3.610)
ForeignOwn $_{t-1}$	5.355***	-10.37***	2.911	0.928	3.800
	(1.525)	(3.248)	(3.301)	(2.821)	(4.921)
Ln(Assets)	0.932***	7.841***	1.007***	1.357***	1.237***
	(0.140)	(0.747)	(0.310)	(0.262)	(0.464)
R&D	-28.75***	-108.5***	-25.18	3.913	-10.93
	(6.899)	(22.84)	(17.49)	(15.10)	(23.46)
R&D dummy	0.0603	-0.181	-0.0103	0.591	0.929
	(0.318)	(0.873)	(0.737)	(0.576)	(1.146)
LEVERAGE	149.6**	1,180***	125.3	120.3	106.1
	(60.12)	(247.9)	(144.2)	(110.6)	(205.5)
FirmAge $_{t-1}$	-0.0624***	0.686	-0.0708***	-0.0466***	-0.0614***
	(0.00638)	(1.022)	(0.0148)	(0.0116)	(0.0202)
TSE 1st dummy $_{t-1}$	-0.310	-4.481***	-0.410	-1.271***	-1.524*
	(0.248)	(0.663)	(0.614)	(0.441)	(0.836)
Constant	9.519***	-93.81***	12.27	9.425	33.82*
	(1.665)	(33.68)	(9.807)	(7.314)	(18.01)
Observations	35,457	35,457	5,500	9,858	3,178
R-squared	0.115	0.120	0.115	0.126	0.122
Year FE	Yes	Yes	Yes	Yes	Yes

Table 14

Logit regression of total management turnover: Firms with and without controlling shareholders

This table presents results of logit regressions of total management turnover (both routine and forced turnovers). Panel A presents results for firms without controlling shareholders (shareholders who own 20 percent or more of outstanding shares), while Panel B indicates results for firms without controlling shareholders. Total turnovers are identified when the top manager is replaced. The dependent variable takes on a value of one for firm-years of total turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) through (6) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year, industry, and the category (with or without controlling shareholder) that is closest in Age (Model (3)), Tenure (Model (4)), the predicted value of % Junior estimated by an OLS regression (Model (5)), or ROE (Model (6)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Therefore, sample size varies across those models. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable from its mean value (for Majority-junior, the change in the probability when Majority-junior changes from zero to one). Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 14

(Continued)

Panel A: Firms without controlling shareholders						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	2.373***	2.000***				
	(0.123)	(0.250)				
Majority-junior $_{t-1}$			0.593***	0.898***	0.772***	0.946***
			(0.118)	(0.113)	(0.147)	(0.108)
Performance $_{t-1}$	0.0929	0.211	-1.673***	-0.530	-1.275**	-0.637*
	(0.238)	(0.296)	(0.461)	(0.338)	(0.549)	(0.327)
Tenure $_{t-1}$	-0.00933***	0.144***	-0.0139*	-0.00646	-0.0206*	-0.0202***
	(0.00335)	(0.00989)	(0.00752)	(0.00652)	(0.0107)	(0.00481)
Age $_{t-1}$	0.0721***	0.345***	0.0961***	0.0568***	0.0736***	0.0602***
	(0.00570)	(0.0156)	(0.0150)	(0.00871)	(0.0190)	(0.00759)
Board size $_{t-1}$	-0.00805	0.0114	-0.0420**	0.00974	-0.0123	0.00810
	(0.00842)	(0.0182)	(0.0207)	(0.0128)	(0.0272)	(0.0125)
DirecOwn $_{t-1}$	-0.450	-2.432**	-0.762	-1.103**	0.172	-1.344***
	(0.299)	(0.948)	(0.558)	(0.540)	(0.656)	(0.479)
ForeignOwn $_{t-1}$	0.454	-0.198	1.069*	1.003*	0.717	0.427
	(0.304)	(0.749)	(0.644)	(0.547)	(1.047)	(0.514)
Loss $_{t-1}$	0.282**	0.443***	0.311	0.786***	0.442	0.485***
	(0.110)	(0.134)	(0.238)	(0.154)	(0.291)	(0.147)
Ln(Assets)	0.112***	0.0845	0.0738	0.0304	0.0868	0.00860
	(0.0248)	(0.180)	(0.0569)	(0.0479)	(0.0898)	(0.0419)
R&D	0.747	7.544	-5.725*	-8.211***	-0.379	-4.588
	(1.668)	(6.470)	(3.396)	(3.139)	(4.759)	(2.818)
R&D dummy	0.0624	0.178	0.151	0.209	0.0710	0.0157
	(0.0836)	(0.272)	(0.166)	(0.129)	(0.230)	(0.116)
Constant	-9.712***		-10.12***	-8.206***	-7.791***	-7.533***
	(0.523)		(1.681)	(0.954)	(1.985)	(0.799)
Observations	24,890	15,468	3,600	6,786	2,182	7,828
ME % Junior	0.102					
ME Majority-junior			0.040	0.050	0.045	0.054
ME Performance	0.004		-0.143	-0.043	-0.104	-0.054
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 14

(Continued)

Panel B: Firms with controlling shareholders						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	model 1	model 2	model 3	model 4	model 5	model 6
Sample	Entire	Entire	Matched	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior	ROE
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Junior$_{t-1}$	1.602***	1.694***				
	(0.223)	(0.478)				
Majority-junior $_{t-1}$			0.623***	0.731***	1.123***	0.818***
			(0.146)	(0.149)	(0.232)	(0.135)
Performance $_{t-1}$	-0.798**	-0.605	-0.966*	-1.377***	-1.354**	-0.900*
	(0.372)	(0.518)	(0.546)	(0.494)	(0.673)	(0.492)
Tenure $_{t-1}$	0.00709	0.178***	-0.00979	-0.0161	-0.0300	-0.0135*
	(0.00579)	(0.0195)	(0.0113)	(0.0113)	(0.0183)	(0.00776)
Age $_{t-1}$	0.0849***	0.420***	0.0844***	0.0597***	0.0731***	0.0523***
	(0.0108)	(0.0329)	(0.0183)	(0.0129)	(0.0270)	(0.0117)
Board size $_{t-1}$	0.0212	-0.00299	-0.0273	0.00140	-0.0224	0.00283
	(0.0156)	(0.0360)	(0.0271)	(0.0209)	(0.0474)	(0.0186)
DirecOwn $_{t-1}$	-1.809**	-2.245	-3.202**	-7.797***	-4.275**	-5.735***
	(0.801)	(2.217)	(1.454)	(1.671)	(2.142)	(1.314)
ForeignOwn $_{t-1}$	0.746	1.141	0.658	0.250	1.570	0.453
	(0.528)	(1.826)	(1.162)	(0.910)	(1.423)	(0.985)
Loss $_{t-1}$	-0.130	0.0542	0.888***	0.285	0.915**	0.300
	(0.212)	(0.288)	(0.265)	(0.255)	(0.390)	(0.235)
Ln(Assets)	0.0455	0.711**	0.00723	0.0175	-0.103	0.0288
	(0.0495)	(0.337)	(0.0796)	(0.0649)	(0.111)	(0.0617)
R&D	7.648***	23.36*	5.696	2.555	7.261	-0.752
	(2.851)	(12.05)	(4.751)	(4.373)	(6.385)	(3.231)
R&D dummy	-0.0771	-0.0178	0.0670	-0.219	-0.0602	-0.0618
	(0.159)	(0.488)	(0.226)	(0.212)	(0.328)	(0.189)
Constant	-9.098***		-7.572***	-6.290***	-5.400***	-5.957***
	(0.964)		(1.427)	(0.972)	(1.875)	(0.956)
Observations	10,567	4,958	1,656	2,504	888	3,028
ME % Junior	0.053					
ME Majority-junior			0.056	0.053	0.064	0.059
ME Performance	-0.027		-0.111	-0.135	-0.124	-0.090
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 15
Regression of Tobin's Q: Firms with and without controlling shareholders

This table presents results of regressions of Tobin's Q (Total capitalization and book value of liabilities divided by book value of assets). Panel A presents results for firms without controlling shareholders (shareholders who own 20 percent or more of outstanding shares), while Panel B indicates results for firms without controlling shareholders. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Models (3) through (5) run estimations for matched samples. Firm-years of which % Junior (proportion of inside directors younger than the top manager over all non-manager directors) is equal to or greater than 85% are labeled as Majority-junior firms. For every Majority-junior firm-year, we select as a matched company the Minority-junior firm (firm-years of which % Junior is equal to or lower than 50%) from same year, industry, and the category (with or without controlling shareholders) that is closest in Age (Model (3)), Tenure (Model (4)), or the predicted value of % Junior estimated by an OLS regression using all control variables in Table 4 as independent variables (Model (5)). In the Age (Tenure) matching, we require matched Minority-junior firm to have Age (Tenure) equal to or greater than the Majority-junior firm's value minus one. In the predicted value matching, matched Minority-junior firm needs to have the predicted value equal to or greater than the Majority-junior firm's value minus 0.05. We do not allow a single Minority-junior firm to be matched with multiple Majority-junior firms, and drop Majority-junior firms that have no matched firms from the analysis. Therefore, sample size varies across those models. % Junior is the proportion of inside directors younger than the top manager over all non-manager directors. Majority-junior is a dummy variable that takes on a value of one for Majority-junior firms and zero for matched Minority-junior firms. % Outsider is the proportion of outside directors over all board members. Tenure and Age are top manager's tenure and age. Board size is the number of directors. DirecOwn is percentage ownership by directors. ForeignOwn is percentage ownership by foreigners. Ln(Assets) is natural logarithm of assets. SGR is sales growth ratio. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. LEVERAGE is computed by total liabilities over assets. FirmAge is the length of years since the firm's IPO. ROA is return on assets computed by current income over assets. TSE 1st dummy takes on a value of one for firm-years listed on the 1st section of Tokyo Stock Exchange. Please see detailed definition of variables for Appendix 2. Subscript $t - 1$ indicates that one-year lagged data are used for the variable. Standard errors are presented in parentheses. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 15

(Continued)

Panel A: Firms without controlling shareholders					
	(1)	(2)	(3)	(4)	(5)
VARIABLES	model 1	model 2	model 3	model 4	model 5
Sample	Entire	Entire	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE
% Junior$_{t-1}$	0.255***	0.0436*			
	(0.0311)	(0.0255)			
Majority-junior $_{t-1}$			0.112***	0.149***	0.139***
			(0.0306)	(0.0301)	(0.0325)
% Outsider $_{t-1}$	0.607***	0.0243	0.583***	0.482***	0.519***
	(0.0771)	(0.0550)	(0.156)	(0.106)	(0.196)
Tenure $_{t-1}$	0.000148	0.00140*	-0.00303	-0.000144	-0.00399*
	(0.00101)	(0.000841)	(0.00219)	(0.00178)	(0.00241)
Age $_{t-1}$	-0.0146***	-0.00235	-0.0176***	-0.0115***	-0.0185***
	(0.00159)	(0.00156)	(0.00342)	(0.00200)	(0.00616)
Board size $_{t-1}$	0.000526	-0.00334*	-0.0109**	-0.00443	-0.00674
	(0.00225)	(0.00176)	(0.00545)	(0.00289)	(0.00573)
DirecOwn $_{t-1}$	0.120	0.0165	0.212	0.213*	0.0562
	(0.0814)	(0.126)	(0.159)	(0.125)	(0.189)
ForeignOwn $_{t-1}$	1.462***	0.606***	1.718***	1.484***	1.794***
	(0.123)	(0.125)	(0.343)	(0.171)	(0.296)
Ln(Assets)	-0.113***	-0.276***	-0.116***	-0.0991***	-0.129***
	(0.0105)	(0.0338)	(0.0271)	(0.0143)	(0.0272)
R&D	4.453***	-0.582	3.970***	4.714***	3.745***
	(0.671)	(1.084)	(1.169)	(0.958)	(1.334)
R&D dummy	-0.00122	0.0293	0.0232	0.00965	-0.0183
	(0.0228)	(0.0306)	(0.0458)	(0.0316)	(0.0579)
LEVERAGE	45.80***	74.69***	51.57***	54.61***	48.36***
	(4.516)	(8.491)	(10.45)	(6.290)	(12.24)
FirmAge $_{t-1}$	0.000117	0.0657***	0.000324	0.00115	0.000432
	(0.000520)	(0.0243)	(0.00102)	(0.000816)	(0.00114)
ROA $_{t-1}$	2.290***	2.018***	3.259***	2.966***	2.969***
	(0.226)	(0.150)	(0.468)	(0.314)	(0.538)
TSE 1st dummy $_{t-1}$	0.165***	0.0525	0.151***	0.123***	0.157***
	(0.0188)	(0.0331)	(0.0397)	(0.0252)	(0.0472)
Constant	3.012***	1.506*	2.630***	2.008***	3.699***
	(0.157)	(0.847)	(0.273)	(0.172)	(0.426)
Observations	24,890	24,890	3,602	6,786	2,186
R-squared	0.335	0.217	0.374	0.379	0.380
Year FE	Yes	Yes	Yes	Yes	Yes

Table 15

(Continued)

Panel B: Firms with controlling shareholders					
	(1)	(2)	(3)	(4)	(5)
VARIABLES	model 1	model 2	model 3	model 4	model 5
Sample	Entire	Entire	Matched	Matched	Matched
Matching variable			Age	Tenure	Predicted % Junior
Estimation	Industry FE	Firm FE	Industry FE	Industry FE	Industry FE
% Junior$_{t-1}$	0.244***	0.0558			
	(0.0450)	(0.0383)			
Majority-junior $_{t-1}$			0.0351	0.114***	0.0840**
			(0.0349)	(0.0360)	(0.0392)
% Outsider $_{t-1}$	0.495***	-0.0991	0.367***	0.197	0.411
	(0.0952)	(0.0806)	(0.131)	(0.121)	(0.292)
Tenure $_{t-1}$	0.000813	-0.00104	-0.00282	-0.00295	-0.00122
	(0.00111)	(0.00142)	(0.00279)	(0.00217)	(0.00318)
Age $_{t-1}$	-0.0177***	-0.00128	-0.0129***	-0.0128***	-0.00862
	(0.00240)	(0.00245)	(0.00471)	(0.00290)	(0.00735)
Board size $_{t-1}$	0.00386	-0.00128	0.00118	-0.00243	0.00272
	(0.00411)	(0.00250)	(0.00657)	(0.00442)	(0.00907)
DirecOwn $_{t-1}$	-0.0282	-0.191	0.184	0.232	-0.0223
	(0.173)	(0.173)	(0.258)	(0.243)	(0.338)
ForeignOwn $_{t-1}$	1.099***	0.556**	1.223***	0.697***	1.145***
	(0.196)	(0.230)	(0.276)	(0.184)	(0.316)
Ln(Assets)	-0.0978***	-0.215***	-0.103***	-0.0902***	-0.138***
	(0.0146)	(0.0475)	(0.0235)	(0.0168)	(0.0321)
R&D	2.723***	0.831	2.525**	2.353***	1.742
	(0.764)	(0.927)	(0.987)	(0.870)	(1.413)
R&D dummy	-0.0526	-0.00349	-0.0901	-0.0495	-0.0620
	(0.0323)	(0.0389)	(0.0555)	(0.0427)	(0.0714)
LEVERAGE	55.53***	49.11***	61.23***	60.51***	48.09***
	(6.545)	(11.81)	(10.14)	(7.665)	(15.28)
FirmAge $_{t-1}$	-0.00121*	0.0561	-0.00167	-0.00172*	0.000236
	(0.000648)	(0.0512)	(0.00112)	(0.000904)	(0.00109)
ROA $_{t-1}$	3.177***	1.845***	3.202***	3.273***	3.053***
	(0.364)	(0.212)	(0.505)	(0.469)	(0.869)
TSE 1st dummy $_{t-1}$	0.168***	0.0438	0.147***	0.196***	0.199***
	(0.0293)	(0.0502)	(0.0478)	(0.0382)	(0.0506)
Constant	2.740***	1.522	2.480***	2.131***	2.584***
	(0.196)	(1.505)	(0.392)	(0.291)	(0.477)
Observations	10,567	10,567	1,658	2,508	908
R-squared	0.368	0.232	0.380	0.383	0.386
Year FE	Yes	Yes	Yes	Yes	Yes

Table 16

Board co-option and forced turnover – performance sensitivity

This table presents results of logit regressions of forced management turnovers. Forced turnovers are identified when the top manager is replaced and the out-going top manager disappears from the board. The dependent variable takes on a value of one for firm-years of forced turnovers, and zero for others. All estimations include industry- and year-fixed effects except Model (2), which adopts firm- and year-fixed effects. Model (2) has small sample size since there are companies that conduct no management turnovers during the sample period. Models (3) and (4) run estimations for subsamples created by % Co-opted (high (low) % Co-opted consists of firm-years for which the % Co-opted falls in the top (bottom) one-third in the entire sample) while Models (1) and (2) are for the entire sample. Industry-adjusted ROE, which is the firm's ROE (net income over book value of net assets) minus industry average ROE (computed by excluding the firm under consideration), is used as a proxy for firm performance. % Co-opted is the proportion of directors who joined the board simultaneously or after the current top manager appointment over non-top manager directors. Tenure and Age are top manager's tenure and age. Board size is the number of directors. Loss is a dummy variable that takes on a value of one when the firm reported negative net income for two consecutive years. Ln(Assets) is natural logarithm of assets. R&D is R&D expenditures scaled by assets (zero is assigned for firm-years with missing R&D expenditures). R&D dummy takes on a value of one for firm-years with non-missing R&D expenditures and zero for those with missing R&D expenditures. Please see detailed definition of variables for Appendix 2. Standard errors are presented in parentheses. Subscript *t – 1* means one-year lagged data is used. ME (marginal effect) indicates the change in the probability of total turnovers associated with one unit change of the designated variable. Asterisks ***, **, and * indicate significant at the 1 percent level, 5 percent level, and 10 percent level, respectively.

Table 16

(Continued)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Sample	Entire	Entire	Low % Co-opted	High % Co-opted
Estimation	Industry FE	Firm FE	Industry FE	Industry FE
Performance	Adjusted ROE	Adjusted ROE	Adjusted ROE	Adjusted ROE
% Co-opted $_{t-1}$	0.971***	1.091***	1.124***	1.443**
	(0.108)	(0.133)	(0.387)	(0.663)
Performance $_{t-1}$	-1.409***	-0.951***	-1.520***	-0.939***
	(0.338)	(0.338)	(0.371)	(0.361)
Performance $_{t-1}$*% Co-opted $_{t-1}$	0.201	-0.100		
	(0.478)	(0.492)		
Tenure $_{t-1}$	-0.0868***	0.0247***	0.0129	-0.0852***
	(0.00678)	(0.00841)	(0.0186)	(0.00862)
Age $_{t-1}$	0.0638***	0.0832***	0.0519***	0.0730***
	(0.00454)	(0.00644)	(0.00669)	(0.00784)
Board size $_{t-1}$	-0.0333***	0.0338**	-0.0572***	-0.0221
	(0.0113)	(0.0171)	(0.0203)	(0.0221)
DirecOwn $_{t-1}$	-1.864***	-0.608	-0.483	-2.800***
	(0.367)	(0.564)	(0.580)	(0.613)
ForeignOwn $_{t-1}$	0.331	0.456	1.529***	-0.521
	(0.327)	(0.610)	(0.449)	(0.639)
Loss dummy $_{t-1}$	0.310***	0.262**	0.134	0.545***
	(0.0960)	(0.107)	(0.181)	(0.177)
Ln(Assets)	-0.112***	-0.0366	-0.138***	-0.0859
	(0.0301)	(0.111)	(0.0471)	(0.0572)
R&D	0.995	6.940	1.621	1.392
	(1.780)	(4.428)	(3.141)	(2.888)
R&D dummy	-0.0581	0.425**	-0.204	-0.00356
	(0.0905)	(0.192)	(0.154)	(0.166)
Constant	-5.464***		-5.362***	-5.943***
	(0.464)		(1.054)	(1.382)
Observations	35,457	13,000	11,286	11,993
ME % Co-opted	0.035		0.039	0.034
ME Performance	-0.050		-0.052	-0.022
Year FE	Yes	Yes	Yes	Yes