Three Essays on Executives and Boards of Directors

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Three Essays on Executives and Boards of Directors

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School of Banking and Finance

UNSW Business School

University of New South Wales

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This thesis consists of three essays on corporate executives and boards of directors. In the first essay, using comprehensive executive data from 5,886 U.S. firms from 2000 to 2015, I document that the promotion rate for women is 31% lower than the promotion rate for men. While sorting into executive positions in different functional areas explains a substantial portion of the promotion gap, a gap of 20% remains unexplained. Consistent with the presence of taste-based discrimination, the promotion gap is lower in firms in more competitive product markets. I find no evidence that the gap is lower in firms with more female directors, which suggests that board gender quotas may not increase female management representation.

In the second essay, I study CEOs' decisions to fire or retain their subordinates by taking advantage of item 401(b) of Regulation S-K, which requires a company to disclose its executive officers. I find that non-CEO executive departures are highly sensitive to performance. This pattern is stronger for firms that face more stringent monitoring. Contrary to findings in prior literature, this pattern is not simply driven by the CEOs who lose their jobs. In fact, CEOs are more likely to keep their jobs after bad firm performance when their subordinates leave, and executive departures are associated with improvements in future firm performance. My results are consistent with the conjecture that some CEOs fire their subordinates following poor performance and are then rewarded for initiating changes. This study improves our understanding of the factors driving executive and CEO turnover decisions.

In the third essay, I examine whether CEO duality facilitates board decision-making and find that CEO duality is associated with shorter M&A completion time and higher announcement returns. The beneficial effect is more pronounced in firms that lack lead independent directors, firms that are lightly scrutinized by boards and institutional investors, and firms that operate in competitive and fast-paced environment. While shareholders and regulators advocate splitting the CEO and chair-of-the-board titles, my results suggest that CEO duality is not always detrimental, and intense monitoring restricts CEO chairs' ability to make speedy and superior decisions.

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Dedication

To my parents and Anshu

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Abstract

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In the second essay, I study CEOs' decisions to fire or retain their subordinates by taking advantage of item 401(b) of Regulation S-K, which requires a company to disclose its executive officers. I find that non-CEO executive departures are highly sensitive to performance. This pattern is stronger for firms that face more stringent monitoring. Contrary to findings in prior literature, this pattern is not simply driven by the CEOs who lose their jobs. In fact, CEOs are more likely to keep their jobs after bad firm performance when their subordinates leave, and executive departures are associated with improvements in future firm performance. My results are consistent with the conjecture that some CEOs fire their subordinates following poor performance and are then rewarded for initiating changes. This study improves our understanding of the factors driving executive and CEO turnover decisions.

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Contents

Chapter 1

Introduction

Senior executives and boards of directors manage firms. Studying their incentives and decision-making processes is essential to understanding and improving corporate governance. This dissertation consists of three essays on the mobility of senior executives and the leadership structure of boards of directors.

In the first essay, I exploit newly available data on corporate positions to examine a longstanding question, why so few executives are women. I document that female executives are promoted at a lower rate than their male peers. While much of the promotion gap can be attributed to supply-side factors such as the sorting of executives into positions with different functional expertise, a significant portion of the gap can be attributed to taste-based discrimination as proposed by Becker (1957). The study has important implications for board gender quota policies and popular debates on gender diversity in corporate leadership positions.

The second essay examines CEOs' decisions to fire or retain their subordinates. Using disclosures under item 401(b) of Regulation S-K, which requires a company to disclose its executive officers, I observe changes in top management teams. My results are consistent with the conjecture that some CEOs fire their subordinates following poor performance and are then rewarded for initiating changes. This essay sheds light on information that boards use when evaluating CEOs; it also reveals the often-overlooked heterogeneity of badly performing CEOs who are retained.

In the last essay, I study a controversial board leadership structure, CEO duality, and its relation to board decision-making time. I find that CEO duality is associated with shorter M&A completion time and higher announcement returns. Contrary to conventional wisdom, this study suggests that CEO duality can be beneficial to shareholders. Its findings are of interest to policy-makers, institutional investors, and corporate governance experts.

Chapter 2

Gender Gap in Executive Promotions

2.1 Introduction

Women comprise almost half of the total labor force. Yet in 2017, only 5.2% of CEOs in the largest U.S. companies are female.[1] While the absence of women at the top is a serious policy concern, there is still relatively little systematic evidence on supply- and demand-side factors that explain this absence. One reason is that it is difficult to obtain data on the corporate hierarchy. I exploit newly available data on corporate positions to document that female executives are promoted at a lower rate than their male peers. While a substantial portion of the promotion gap can be attributed to supply-side factors such as the sorting of executives into positions with different functional expertise, the remaining gap appears to suggest taste-based discrimination.

Despite the importance of promotions in policy discussions on diversity – and on governance more generally – few studies analyze executive promotions. Studying promotions requires panel data on executives, the firms in which they work, and detailed job titles indicating corporate ranks. The most common dataset for studying executives, ExecuComp, is not suitable for studying promotions below the CEO

[1] www.catalyst.org/knowledge/womenceossp500

level because it generally includes only five executives, and the criterion for inclusion is pay rather than rank. While rank is often correlated with pay, there is evidence that this correlation is weaker for women. For example, Newton and Simutin (2015) document that female executives earn less than male executives in the same jobs. This means women are likely to be underrepresented in ExecuComp even if they have a high rank; therefore, their promotions may not be observed. As a result, the promotion patterns of both women and men may be mismeasured.

To provide a complete picture of the pipeline of executive promotions, I use a dataset that has only recently become available, the BoardEx Senior Manager and Disclosed Earners dataset. BoardEx compiles information on directors and senior managers who are at or above the vice president level. My sample period extends from 2000 to 2015. Compared to ExecuComp, BoardEx has more firms (5,886 in BoardEx versus 2,957 in ExecuComp), a higher number of executives in each firm-year (8.3 in BoardEx versus 5.7 in ExecuComp), and a higher share of women (12.6% in BoardEx versus 7.5% in ExecuComp). I classify the executive positions into five corporate levels: vice president (VP), senior vice president (SVP), executive vice president (EVP), president, and CEO. Executives are internally promoted when their corporate level increases in the following year.

Even with accurate data on executive positions, it is difficult to study gender differences in executive promotions because job allocations are endogenous. Men and women have different attributes and preferences, which leads them to sort themselves into different industries and companies. For example, some argue that women are generally more risk averse, which may lead them to avoid firms with high employee turnover. Such firms may promote employees frequently, since positions are often available. If women usually avoid working for these firms, their average promotion rate will be lower.

Men and women are also sorted into different functional areas. In the general workforce in 2010, Blau and Kahn (2017) find that occupation explains 33% of the gender wage gap and is the largest single factor. In top management teams, female executives are also disproportionately represented in staff positions, i.e., functions that support the organization, such as human resources and public relations. Unlike positions with profit-and-loss responsibility, staff positions do not prepare managers well for the role of president or CEO (Helfat et al., 2006, McKinsey, 2017); thus the upward mobility of women is naturally lower.

To address these identification challenges, I estimate a linear probability model for predicting executive promotion with three sets of fixed effects: firm fixed effects, corporate-level fixed effects, and functional expertise fixed effects. Firm fixed effects account for differential sorting by gender into industries and firms. Corporate-level fixed effects account for the fact that women are usually in junior executive positions, which may have a different promotion rate than senior executive positions. Given the importance of functional expertise in explaining gender differences in wages, I first quantify to what extent functional expertise can explain gender differences in promotions. I then include functional expertise fixed effects in the rest of my analysis.

I show that the share of female executives varies greatly across functional areas and corporate levels. Women represent over 30% of executives in human resources and public relations, whereas they represent less than 7% in operations and sales. 15.4% of VPs are female, while the percentage of women declines to 3.8% at CEO positions.

Multivariate analysis reveals that women are promoted at a lower rate than men. After taking functional expertise into account, I find that the promotion gap decreases from 31.3% to 20.2%. The results suggest that women's functional expertise is an important factor that hinders their advancement to leadership positions. Further analysis of promotions from each corporate level shows that functional expertise becomes increasingly important when an executive moves up the corporate ladder.

However, even after accounting for potential sorting, the unexplained promotion gap is still large. There are several possible explanations for this finding. The unexplained gap may result from gender differences in unmeasured characteristics, such as preference or ambition, or it may result from discrimination. Since data on preferences are difficult to obtain, I focus on the latter explanation and investigate whether the gap reflects taste-based discrimination.

Becker (1957) defines taste-based discrimination (hereafter, discrimination) as follows: "[i]f an individual has a 'taste for discrimination', he must act as if he were willing to pay something, either directly or in the form of reduced income, to be associated with some persons instead of others." Becker (1957) argues that discrimination raises costs and is difficult to sustain in a competitive market. The argument implies that firms should reduce discriminatory behavior when competition goes up. On the other hand, if promotion decisions are grounded in valid business reasons, then the promotion gap should remain unchanged. Motivated by this theory, I examine whether the gender promotion gap reflects discrimination by studying how it responds to product market competition.

I use industry concentration, product similarity, and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014) to measure competition. Despite that gender differences in confidence and preference indicate that women shy away from competition (Niederle and Vesterlund, 2007), I find that the gender promotion gap is larger in firms that are relatively protected from competitive pressure. For example, the gender promotion gap is 25.4% in firms that have high market power, whereas it is 14.2% in firms that have low market power. The results are consistent with the conjecture that discrimination still plays a role in holding women back from leadership positions.

Even though there is little evidence to date on the importance of discrimination in explaining why so few women are in leadership positions, my evidence is consistent with some regulators' intuition that discrimination may be important. Some regulators respond to the lack of gender diversity in management by instituting board gender quotas because such quotas give firms less discretion in exercising discrimination. But the merits of quotas have been hotly debated. To examine whether these policies are likely to be effective, I examine whether the gender promotion gap is smaller in firms with more female directors. My analysis reveals no evidence that the gender gap is significantly correlated with board gender diversity, consistent with the argument that board gender quotas may not be sufficient to increase female representation in management.

My paper adds to the small literature of gender differences in executive promotions. Using a sample of executives in both ExecuComp and Marquis Who's Who, Gayle et al. (2012) find that female executives are promoted at a higher rate than male executives in U.S. companies. As I suggested above, women tend to earn less than men, and they might have to outperform men by a substantial margin to appear in the ExecuComp data. Because selection into the ExecuComp sample plausibly varies by gender, such estimates of promotion rates using ExecuComp data are likely to be biased for executives as a whole. Since ExecuComp contains no information of educational and employment background, Gayle et al. (2012) use such information from Who's Who. Who's Who collects biography on prominent people; therefore, their sample captures more senior executives than relatively junior ones.[2]My results also show that the gender promotion gap is insignificant in the top rank. The selection issue and disappearing gender promotion gap in the top attribute to the inconsistent results. Additionally, Smith et al. (2011) find little gender gap in VP and CEO appointments in Denmark after taking child-related decisions and functional expertise into account. Keloharju et al. (2017) report that women are less likely to become CEOs and top executives in Sweden and that slow career progression in the five years after the first childbirth explains most of the female disadvantage. Due to lack of data, I cannot control for child-related factors, which leads to a downward omitted variable bias, i.e., a larger gender gap. However, it is unlikely that this bias explains the entire gap documented in my study; otherwise the gender gap could not respond to changes in competition.

I also contribute to the literature on discrimination. Black and Strahan (2001),

[2]The average total compensation is 2.6 million for executives who are in both ExecuComp and Who's Who during, whereas it is 1.4 million.

Black and Brainerd (2004), and Heyman et al. (2013) document evidence of ongoing discrimination in the general workforce. My study focuses on executives and adds to the debate on what mechanisms hold women back from business leadership positions. In a contemporaneous work, Heyman et al. (2017) find that higher product market competition is associated with a smaller gender wage gap and a higher percentage of female managers in Sweden. While their results may indicate that more women are hired or promoted in firms that face high competition, they may also reflect the possibility that fewer women exit their firms. Their results on the female manager representation are based on firm-level data without controlling for individual characteristics, such as functional expertise. One concern is that their results may reflect that some female-dominated functions become in demand when competition goes up. In addition, my study also examines promotions from different corporate levels within the top management team and sheds light on the relative magnitude of the gender gap across these corporate levels.

My study also yields insight into the quality of current corporate governance. It suggests that product market competition, an external corporate governance mechanism, is associated with management gender diversity. It thereby adds to the corporate governance literature on the disciplinary effect of product market competition (Giroud and Mueller, 2011, Dasgupta et al., 2014).

Finally, this study contributes to the literature on the influence of female directors on management gender diversity. Bertrand et al. (2017) find little evidence that better female representation on boards has a discernible impact on women's workplace equality in Norway. In addition, Smith et al. (2013) find an insignificant or even negative effect of female leaders on the probability that a female candidate will be promoted to a VP position in Denmark. My results are consistent with those of Bertrand et al. (2017) and Smith et al. (2013). But as La Porta et al. (1999) suggest, there are significant differences in ownership structure across countries. Family firms are more prevalent in Scandinavian countries, where gender equality is high. It's not clear that the results from Scandinavian countries can easily extend to the

United States. Matsa and Miller (2011) also focus on firms in the United States and find that board gender diversity has a positive effect on female executive representation. To address the issue that some executives are also directors, Matsa and Miller (2011) exclude "the individuals who are ever top executive at the same company" when calculating the proportion of female directors. Their board diversity variable essentially measures the proportion of female outside directors. My sample is at the individual level instead of the firm level, and I address the overlapping issue by controlling for the inside director status. I find that the gender promotion gap and the female director ratio are not materially associated. I also find that the higher female inside director ratio is significantly associated with a larger gender gap. The results suggest that the negative effect of inside director diversity counterbalances the positive effect of outside director diversity; thus I find insignificant results when I examine the effect of female share of all directors on management diversity.

2.2 Data

I use the unbalanced manager-firm-year panel data from the May 2016 version of the BoardEx Senior Manager and Disclosed Earner Summary dataset and the Board Summary dataset. I take the following steps to construct my sample:

1) The original data extend from 1999 to 2016. Since only 84 firms are covered in 1999 and the data for 2016 are incomplete, I restrict my sample period to the period from 2000 to 2015.

2) I restrict the sample to firms that are listed in the United States.

3) I exclude financial (SIC 4900-4999) and utility firms (SIC 6000-6999).

4) Though BoardEx tracks managers who are at the corporate level of VP or above, it sometimes backfills the career history and includes some junior positions. I infer the manager's seniority from the job title and exclude positions that are below the corporate title VP.

5) Because 65 is a common full retirement age for many companies' retirement plans, I restrict the sample to executives who are less than 65 years old and over 30 years old.[3]

6) If a manager holds more than one full-time position in a year, perhaps because of changing jobs, I keep the position in which the manager has a longer tenure. This step essentially converts manager-firm-year data to manager-year data.

7) I merge the BoardEx dataset with other data.

Measures for product market competition are from the Hoberg-Phillips data library.[4] The financial and stock return data are from Compustat and CRSP. Takeover data are from the Securities Data Corporation's (SDC) Mergers and Acquisitions database.[5]

I use the BoardEx variable Individual Role to identify corporate-level and functional expertise. I classify executives into five corporate levels: VP, SVP, EVP, president, and CEO. The executives whose corporate levels are not clearly specified are deemed to be as senior as VPs. My ranking system is generally consistent with that of Bertrand and Hallock (2001).[6] Since corporate levels are not comparable across firms, I focus on internal promotions that I can identify accurately. Executives are considered to be internally promoted when they stay with the firm and their corporate level increases in the following year. CEOs cannot be internally promoted; thus the promotion variable is set as missing for CEOs. It is also set as missing when an executive leaves the firm in the following year.

Following Helfat et al. (2006) and Guadalupe et al. (2014), I classify the functional areas into fourteen mutually exclusive categories: accounting, administration, finance, IT, general manager, HR, legal, marketing, operations, PR, R&D, sales,

[3]The results remain robust if I do not filter the observations by positions and ages.

[4]10-K text-based Network Industry Concentration (TNIC) data and 10-K based Product Market Fluidity data December 2016 version.

[5]I restrict the takeover sample to the takeovers in which the target is a U.S. company, in which the deal value is more than USD 5 million, and after which control of the target is changed. The results remain robust if I use a USD 10 million as the cut-off of the deal value.

[6]I do not distinguish divisional and regional titles, though the results are similar if I do distinguish them.

secretary, and strategy.[7] I consider a manager whose functional expertise is not specified to be a general manager. As the next section reports, these executives have a high probability of promotion. Since general managers are well equipped for the role of president or CEO, the high promotion rate supports my classification method.

I construct the experience variables from the BoardEx employment dataset. I do not use observations that miss the start date or the end date because I cannot observe the duration.[8] Industry experience measures the number of years a manager worked in an industry, including years of experience in private firms.[9] Since the average age when an executive's first job is recorded in the BoardEx employment dataset is 30 years, I assume that BoardEx covers all employment history and set the industry experience as zero if an individual has no experience recorded in a given industry. I use the same method to calculate CEO experience. My sample includes 5,886 companies, and the average number of executives in a firm-year is 8.3. These are larger than the corresponding figures from ExecuComp: during my sample period, ExecuComp covers 2,957 companies, and the average number of executives in a firm-year is 5.7.

Table 2.2 reports cross-sectional mean values of sample size and female representation for each year. Panel A details the sample size. BoardEx increases its firm coverage significantly over time. The number of firms in the BoardEx data increases from 1,230 in 2000 to 3,165 in 2015, and the number of executives per firm remains relatively constant, ranging from 7.3 in 2015 to 9.3 in 2002.

Panel B details the female representation in each functional area. Five functions have more than 20% female managers: human resources, public relations, secretary,

[7]These categories are not exactly the same as those of Helfat et al. (2006) and Guadalupe et al. (2014) because in my sample, some categories have few observations. For example, Helfat et al. (2006) include real estate as a functional area category, but in my sample, only 0.25% of managers specialise in real estate.

[8]About 20% positions are excluded for this reason.

[9]I exclude experience as an outside director because that is a part-time position. While constructing the industry experience measure, I use the FTSE international industry classification, which is the industry classification used by BoardEx. Some companies in BoardEx, such as private firms, are not in Compustat. Thus, using SIC from Compustat would understate some executives' industry experience.

legal, and administrative positions. The proportion of female managers in such functions varies from 21.2% to 43.5%. In contrast, there are only a few female executives in operations, sales, R&D, general management, strategy, and information technology, in which less than 10% of managers are female.

Panel C details the female representation at each corporate level. 15.4% of VPs are female, while the percentage of women declines to 3.8% at the CEO level. The percentage of women increases across all corporate levels in my sample period. For instance, 1.9% of CEOs are female in 2000, and the percentage rises to 5.6% in 2015.

Table 2.3 displays the female executive industry representation. For brevity, it reports female representation only for those industries that have more than 3,000 observations in my sample. The percentage of female executives varies from 7.5% in primary metal industries to 27.5% in apparel and accessory stores.

Table 2.4 shows the characteristics by gender. There are 9,114 unique female executives and 62,414 unique male executives.[10] The average age of male and female executives is 50.5 and 48.7, respectively. Female executives usually work for bigger firms.[11]

2.3 Results

2.3.1 Gender gap and functional expertise

Academic studies on gender differences in top management team usually focus on gender differences in wages (e.g., Bertrand and Hallock (2001), Newton and Simutin (2015)). Although career opportunity is also an important factor, it is underexplored. In this section, I attempt to fill the gap by studying the gender differences in executive promotions.

A benefit of studying executive promotions is that executives have self-selected

[10]These figures include CEOs who are not in the multivariate analysis because they cannot be internally promoted. But the CEO observations help in identifying promotions to CEO positions.

[11]Bertrand and Hallock (2001) study executives in ExecuComp during 1992 to 1997 and report that female executives manage smaller firms. I find the same results when I use ExecuComp data in the period from 1992 to 1997, but I find that female executives manage bigger firms when I use ExecuComp data in my sample period.

into senior managerial positions based on their ability and ambition, which suggests that men and women in this group are more homogenous (Adams and Funk, 2012, Adams et al., 2016, Kaplan and Sorensen, 2017).

Someone may suggest that there are more male executives in the candidate pool, and therefore I should expect more male executives promoted. Using the executive-level data, I compare the average promotion probability of female executives with the average promotion probability of male executives, and the difference should not be correlated with the gender composition of the candidate pool. I use a simple example to illustrate this point. In a candidate pool with 5 women and 5 men of equal quality, the promotion rate of each candidate is 10%, and there is no gender promotion gap. In another candidate pool with 1 woman and 9 men of equal quality, the promotion rate of each executive is also 10%, and there is still no gender promotion gap.[12]

Table 2.4 displays the descriptive statistics of promotion rates for men and women. On average, the promotion probability of a woman in any given year is 4.9%, and the promotion probability of a man in any given year is 5.8%. The promotion rate for women is also lower in each subsample of executives at the corporate level.

Next, I compare the promotion rates for men and women in a multivariate analysis. Table 2.5 reports gender differences in promotion probability using linear probability models with various specifications. The dependent variable is a dummy variable, promotion, that indicates an internal promotion in year t+1. I control for a set of observable characteristics, including age, education, industry experience, CEO experience, firm tenure, insider director status, and firm size. Education and experience are standard human capital determinants. Insider directorship indicates the executive's competency and seniority. Large firms, which are under public scrutiny and have sufficient resources, may implement pro-family employment policies and thereby attract female executives. These control variables are measured at year t.

The negative and statistically significant coefficients on the female dummies in

[12]Furthermore, in Table 2.13, I show that the results are robust when I control for industry-level female executive representation.

each column indicate that the promotion rate for women is lower than the promotion rate for men. In column (1), I include only control variables and year fixed effects. The coefficient of the female dummy is -1.24, which implies a 21.2% (-1.24/5.85) promotion gap.

Men and women have different attributes and preferences, which leads them to choose different industries and firms. The choice of firms explains a large portion of gender differences in wage. Goldin et al. (2017) document that 44% of the increase in the gender wage gap from age 26 to 39 is because men and women sort themselves into different firms. Women may choose firms where the promotion rate is lower, perhaps because of low turnover. It can lead to a lower gender promotion gap in the specification with firm fixed effects. In column (2), I add firm fixed effects to account for selection into industries and firms. The coefficient on the female dummy is of a similar magnitude to the coefficient in column (1). It is likely that the cross-sectional variations in promotion rates and in the gender promotion gap are small in comparison with the cross-sectional variations in wages and in the gender wage gap.

In column (3), I add in the corporate-level fixed effects. The coefficient on the female dummy changes from -1.36 to -1.83. We usually expect the gender gap to decrease when we account for more personal characteristics, so this increase in the gender gap may seem counterintuitive. In fact, it indicates that women are clustered in junior positions for which the promotion rate is higher.

Column (4) includes functional expertise fixed effects. Both supply- and demand-side factors can explain the disproportionate female representation in staff positions. For instance, women make different job choices from men partly because of differences in preferences and psychological factors (Bertrand et al., 2010, Pande and Ford, 2012). On the other hand, perceptions of a glass ceiling can discourage women from aspiring to a career in leadership. In the general workforce in 2010, Blau and Kahn (2017) find that occupation explains 33% of the gender wage gap and is the largest single contributing factor. Given the importance of functional expertise in explaining gender differences in wages, I attempt to quantify to what extent the gender promotion gap can be explained by the gender differences in functional expertise.

After controlling for functional expertise, I find that the magnitude of the coefficient on the female dummy is reduced by 35.5% (1-1.18/1.83), but it still indicates a 20.2 percentage point (-1.18/5.85) gender promotion gap. The coefficients on the functional expertise indicators are generally consistent with my intuition. General managers are in the omitted group, and their promotion rate is higher than that of all other executives except for executives in operations, sales, and marketing.

My finding of a large gender promotion gap differs from that of Gayle et al. (2012), who use a sample of executives in both ExecuComp and Marquis Who's Who and find that female executives are promoted more quickly. The inconsistent results may be because we use different executive data. A potential problem of using ExecuComp data is that selection into the ExecuComp sample may vary by gender.

2.3.2 Gender gap and discrimination

Even after I account for potential sorting, the unexplained promotion gap is large. My next question is whether the unexplained gap at least partially reflects discrimination.

There are several possible explanations for the unexplained gender promotion gap. It may result from gender differences in unmeasured characteristics. For instance, women may be less willing to expand their professional responsibilities because they carry a disproportionately heavy load of domestic duties. Therefore, it may be optimal for firms to promote fewer female executives.

On the other hand, the unexplained gender promotion gap may also result from discrimination. Anecdotal evidence and academic research document that discrimination against women is an ongoing concern (Altonji and Blank, 1999, Goldin and Rouse, 2000, Blau and Kahn, 2017).

Becker (1957) argues that discrimination increases costs and is hard to sustain in a competitive market. Prior studies have used this strategy to examine discrimination in the general workforce. Black and Strahan (2001) use deregulation in the banking industry as a shock to competition and find that as competition increases, the ability of firms to discriminate declines.[13] Black and Brainerd (2004) document that competitive pressure from globalization increases the relative wage of women in manufacturing industries. Heyman et al. (2013) interpret takeovers as a disciplinary force that is similar to competitive and find that the share of female employees rises as a result of takeovers.

Here, I focus on senior executives and test whether the gender promotion gap indicates discrimination, at least partially, by examining how the gender gap responds to product market competition. If promotion decisions are well grounded, the gender promotion gap should remain unchanged as the competitive threat increases. If discrimination plays a role in executive promotions, I expect to observe that the gender promotion gap narrows as competition intensifies.

I use three variables from the Hoberg-Phillips data library to measure product market competition, including industry concentration, product similarity, and product market fluidity (Hoberg and Phillips, 2016, Hoberg et al., 2014). All three variables are based on textual analysis of annual reports. Industry concentration is the Herfindahl-Hirschman index (HHI), which measures firms' market power. Product similarity captures how similar a given firm's products are to the products of all other firms in a given year. Lower product similarity means that a firm's products cannot be easily substituted by the products of its rivals; thus the firm faces a lower competitive threat. The third measure, fluidity, measures the structure and evolution of the product space. Higher fluidity indicates a fast-changing environment that keeps a firm on its toes; therefore the firm faces higher pressure from its competitors.

To capture large changes in competition, I transform these continuous variables into a dummy variable, high competition. The high competition indicator equals one when a firm's industry concentration is below the median, or its product similarity or

[13] They also examine the changes in women's wages in managerial positions and conclude that the improvement is less compelling.

fluidity is above the median. Since product market competition captures industry-wide characteristics, I cluster the standard errors at the industry level.

Table 2.6 reports the results of the linear probability model estimates of the effect of competition on the gender promotion gap. The coefficients on the female dummy variables are significantly negative in all columns. The key variable of interest is the interaction term between the female dummy and the high competition dummy. In column (1), high competition is measured by HHI. The coefficient on the female dummy is -1.49, which indicates a gender promotion gap of 25.4%(-1.49/5.85) in firms that have high market power. The gap declines to 14.2% ((-1.49+0.66)/5.85) in firms that have low market power.

Columns (2) and (3) use alternative measures of product market competition, product similarity, and fluidity to examine whether the results are sensitive to the competition measure. The coefficients of interest remain positive and statistically significant. The economic magnitudes are similar as well. The results are consistent with the conjecture that discrimination still plays a role in holding women back from leadership positions. Because in the long term discrimination discourages women from investing in their own human capital, the effect of discrimination on female executives may be even higher than what I document here.

In a contemporaneous work, Heyman et al. (2017) study the effect of product market competition on wages and the representation of female managers in Sweden. They also find that product market competition and the percentage of female managers are positively correlated, consistent with ongoing discrimination. Compared to the United States, Sweden has high gender equality in general, and family-controlled businesses are the norm there. These country-level differences may make it hard to extend the results based on Sweden companies to American companies, especially the economic magnitudes. While their results may suggest that more women are hired or promoted in firms that face high competition, they may also reflect the fact that fewer women exit their firms. Furthermore, their results on the representation of female managers are based on firm-level data, which does not allow them to control individual characteristics such as functional expertise. Thus, one concern is that a demand shift favoring female-dominated functions may drive their results.

2.3.3 Promotions from each corporate level

Until now, I have been studying gender differences in executive promotions using pooled data that include executives at all levels. In this section, I split the sample into subsamples according to corporate level and examine the relative magnitude of the gender promotion gap across different corporate levels.

Table 2.7 shows the promotions from each corporate level. Each column corresponds to a subsample of executives at a certain corporate level. This specification essentially allows me to compare executives who are at a given corporate level of the same firm. The significantly negative coefficients on the female dummies indicate a gender gap of 21.0% (-1.53/7.27), 27.3% (-1.71/6.26), and 21.3% (-0.84/3.95) in promotions from VP, SVP, and EVP positions, respectively. The magnitude of the female dummy in promotions from the president position is significantly lower at 2.5% (-0.11/4.38), and it is statistically insignificant.

I then focus on columns (2) – (5) in which executives' seniority can be clearly identified and disregard column (1) in which executives' corporate levels are not specified. The results show an inverted U-shaped relationship between the gender promotion gap and seniority.[14] The promotion rate of women who successfully advance to president positions is similar to the promotion rate of their male peers.

I also examine the effect of functional expertise on the promotion gap. The magnitude of the coefficient on the female dummy declines after I add functional area fixed effects to all regressions. The reduction increases with seniority. Functional expertise explains 24.6% of the gender gap in the subsample of VPs, while it accounts for 67.6% of the gender gap in the subsample of presidents. The results suggest that

[14] The seniority of executives whose corporate levels are unspecified is unclear. As the promotion rate generally decreases with seniority, and the promotion rate of executives whose corporate titles are unspecified lies between the promotion rates of SVP and EVP, I can reasonably assume that the seniority of these executives is between SVP and EVP. In this case, the results still suggest an inverted U-shaped relationship between the gender promotion gap and seniority.

functional expertise contributes more to the gender promotion gap as executives move up the corporate ladder.

Next, I study the relationship between the gender gap and competition at each corporate level and report the results in Table 2.8. The results suggest that the overall effect of competition on the gender gap is driven by promotions from EVP positions. EVPs are candidates for the most senior jobs, i.e., president or CEO positions. It is likely that a senior executive contributes more to the overall firm performance than a junior executive; thus, as competition intensifies, it is more critical to choose the right senior executive.

2.3.4 Spillover effect of a gender diverse board

Even though there is little evidence to date on the importance of discrimination in explaining why so few women are in leadership positions, my evidence is consistent with the intuition of board gender quota advocates that discrimination may be important. Board gender quotas are a popular policy response to the dearth of female business leaders, because they give firms less discretion in exercising discrimination (for a summary of countries that have implemented board gender quotas, see Adams and Kirchmaier (2015)). However, the merits of quotas have been hotly debated. To examine whether these policies are likely to be effective, I examine whether the gender promotion gap is smaller in firms with more female directors.

Female directors may improve management gender diversity through various channels. For instance, they can help build networks among female managers; they can assist in overcoming discrimination; they can entice women to compete (Niederle et al., 2013); they can serve as role models for other aspiring women (Pande and Ford, 2012). However, there are reasons to be sceptical of the positive effects of a diverse board. Female directors may also have gender stereotypes and associate certain leadership traits with men. In addition, as Bagues et al. (2017) suggest, the presence of more female directors can induce male directors to be less favorable towards female candidates.

To test whether female directors improve the gender diversity of the top management team, I analyze the association between the gender promotion gap and board gender diversity. Because an executive can be promoted to an executive position and become a new director in the same year, using contemporaneous measures of board diversity and promotion introduces a bias. Hence, I measure board diversity in year t and promotion in year t+1.

Table 2.9 reports the results of the linear probability model estimates. In column (1), I use the percentage of female directors to proxy for board diversity. The interaction term of the female dummy and board diversity is insignificant, showing no evidence that board diversity and the gender promotion gap are materially correlated.

Kramer et al. (2006) suggest that reaching a critical mass is important in group dynamics, and having three or more women on a board can create a critical mass. Therefore, in columns (2) – (4), I use a dummy variable indicating the presence of at least one (two or three) female director(s) to measure board diversity. Again, I observe no material association between board gender diversity and the gender promotion gap.

Furthermore, the disciplinary effect of product market competition may be supplementary to the potential positive effect of board diversity on management diversity. Tate and Yang (2015), for instance, find that women hired by firms with female leaders have smaller gender wage gaps, especially in concentrated industries. Thus, I restrict my sample to firms where the competitive threat is low. I still observe no evidence that the gender promotion gap is smaller in firms where the board is more diverse (see Table 2.22).

Matsa and Miller (2011) find that board gender diversity has a positive effect on female executive representation in the United States. My results are inconsistent with those of Matsa and Miller (2011) because we measure board diversity differently. To address the issue that some executives are directors, Matsa and Miller (2011) exclude "the individuals who are ever top executive at the same company" when calculating the proportion of female directors. Their key independent variable, female share of board, essentially measures the proportion of female outside directors. My data are at the individual level, and I address the overlapping issue by controlling for the inside director status. The results show that the gender promotion gap and the female director ratio are not materially associated (Table 2.9 column (6)), and the higher female inside director ratio is significantly associated with a larger gender gap (Table 2.9 column (7)). The results suggest that the negative effect of the inside director diversity counterbalances the positive effect of the outside director diversity; thus I find insignificant results when I examine the effect of the full board diversity on management diversity.

A potential explanation of the negative association of the share of female inside directors and the magnitude of gender promotion gap is that firms hire female inside directors externally because internal female candidates are not in the pipeline. However, Table 2.25 shows female and male inside directors have similar years of firm experience, which does not indicate the female directors are disproportionately hired externally. Another potential explanation is that having a female inside director serves as moral licensing; therefore decision makers are less conscious of discriminatory behaviors.

2.4 Robustness

2.4.1 The glass cliff phenomenon

One concern about my interpretation of the competition results is that certain unobserved attributes may be correlated with competition and gender promotion gap. For example, women may have certain attributes and skills that make them well suited to highly competitive situations. A strand of literature documents the glass cliff phenomenon, i.e. the tendency to appoint women to leadership positions that are risky. So far, it is unclear what drives the glass cliff phenomenon. It may be because women are perceived as communal, and communality is in demand when a firm is dealing with a crisis.Ryan et al. (2016) On the other hand, Ryan et al. (2016) also suggest that women have fewer opportunities to become leaders, and therefore they may incline to accept leadership positions in times of crisis. This argument implies that the glass cliff phenomenon is partially due to discrimination.

Increases in competition do not necessarily mean that a firm is in crisis. But to ensure that my results do not pick up the glass cliff effect, I re-run the regressions with extra controls for accounting-based and stock-based firm performance measures (ROA and stock return). The results, reported in Table 2.12, still show a large gender promotion gap and a lower gender gap in firms facing a higher competitive threat.

Although these additional analyses suggest that the poor firm performance is unlikely to drive my results, I acknowledge that I cannot completely rule out that the effect of competition on gender promotion gap is though other channels rather than reducing discrimination.

2.4.2 Other market disciplinary force

One limitation of measuring competition based on annual reports filed with the SEC is that it does not capture competition from private or foreign rivals. In this subsection, I examine how the gender promotion gap responds to a takeover threat. Though it is not a direct measure of product market competition, the market for corporate control also has a disciplinary effect on inefficient management behaviors (see, for example, Bertrand and Mullainathan (2003)). Considering discrimination as a particular form of inefficient management behavior, I expect that the takeover threat can reduce it.[15] Heyman et al. (2013) document that firm takeovers are associated with a reduction in the gender wage gap in the general workforce.

It is well documented that takeovers are sometimes clustered at the industry level.(Betton et al., 2008) When there is a takeover event, a firm in the same industry may be more likely to become a target. I exploit the spillover effect of a takeover

[15]A takeover may also indicate the entrance of a rival and thus increased competition. For example, Amazon's acquisition of Whole Foods in 2017 put competitive pressure on other grocery companies such as Trader Joe's and Target.

event to the firms in the same industry. I use the log of the number of takeovers in an industry to measure the takeover threat. Firms that are takeover targets are excluded from this analysis.

Table 2.11 displays the results of the linear probability model estimates of the effect of takeover threat on the gender promotion gap. I include one extra control variable, industry size, in this set of regressions because a large industry is likely to have more takeover events and may also have a different promotion rate. Column (1) studies the gender promotion gap in the pooled sample. The coefficient on the interaction term between the female dummy and the number of takeovers is significantly positive, which suggests that the gap is smaller in firms facing a higher takeover threat. In columns (2)–(6), I study the gender gap in promotions from each corporate level. The results show that promotions from EVP positions drive the overall results, consistent with the results in Table 2.8. I also use an alternative measure of takeover threat, a dummy variable indicating that the industry has at least one takeover event in a given year. The results are similar (see Table 2.18).

2.4.3 Willingness to increase professional responsibilities

In the baseline specification, one omitted variable is the willingness to increase professional responsibilities. It is plausible that some female executives refrain from supplying more labor because they bear a disproportionately heavy load of domestic duties. Though this argument can explain the gender promotion gap, it cannot explain the narrowing gap as competition goes up. It may even predict that the gender gap is larger in firms facing a higher competitive threat, because in a firm where the competitive threat is high, a position entails a higher level of responsibility than a similar position in a firm where competition is chilled.

To address this concern, I study the promotions of executives who are less restricted by family duties. All executives who are over 50 years old are less likely to have young children, and female executives over 50 are usually beyond childbearing age; thus both male and female executives can focus more on their careers. I therefore use a dummy variable indicating that an executive is over 50 as a proxy for willingness to supply labor.

Table 2.14 column (1) examines whether the gender gap is smaller for executives who are over 50 years old. The coefficient on the age-over-50 dummy is insignificant, suggesting that the promotion rates for male executives who are over 50 and male executives who are under 50 are similar. However, the coefficient on the interaction term between the female dummy and the age-over-50 dummy is significantly positive, suggesting that the gender promotion gap is lower for women who are over 50 years old.

In columns (2) to (4), I restrict the sample to executives who are over 50 years old and examine the association between the gender gap and the competitive threat. The coefficients on the interaction terms between the female dummy and each competition measure are all positive, and two are statistically significant, consistent with the results of the baseline test.

2.4.4 Promotions in the C-suites

Although I have highlighted the advantages of BoardEx data over ExecuComp data for studying the gender promotion gap, the BoardEx dataset has its own limitation: It may include some lower-level managers who voluntarily disclosed their information. This self-reporting issue is less of a concern for the ExecuComp data.

To alleviate the self-reporting concern, I restrict the sample to C-suite executives. A C-Suite executive is an executive whose job title contains the word "Chief". The "Chief" positions are obviously senior; thus this sub-sample has fewer junior managers who are not candidates for senior executive positions. The results, reported in Table 2.15, show similar patterns to the baseline tests.

Furthermore, the self-reporting issue may be more severe among executives whose corporate titles are not specified. In Tables 2.7 and 2.8, the regressions in each corporate level subsample show that my results are not driven by these executives.

2.4.5 Turnover

Another unobserved variable that may lead to biases is competency. If on average female executives underperformed relative to male executives, their promotion rate would naturally be lower. But this argument cannot explain the lower gender promotion gap in firms facing a higher competitive threat.

I examine the possibility that female executives systematically underperform by analyzing the sensitivity of executive turnover to firm performance. Fee and Hadlock (2004) document that badly performing firms weed out incompetent executives. If female managers are generally of lower quality, I expect to observe that their turnover is more sensitive to performance.

The evidence, displayed in Table 2.16, does not support this argument. The variable of interest is the interaction term between the female dummy and the performance measure, ROA or stock return. The coefficients on these interaction terms are either statistically insignificant or significantly positive; thus they do not support the argument that female executives' turnover is more sensitive to firm performance.

2.5 Conclusion

I examine the gender differences in promotions to top leadership positions in U.S. public companies. I find a large gender promotion gap and explore two explanations: executives' functional expertise and gender discrimination. Female executives are clustered in staff positions, which limits their advancement to leadership positions. This effect becomes increasingly important for promotions to more senior positions. Furthermore, I find that the promotion gap is smaller in firms where product market competition is higher. These results are consistent with those of Becker (1957), and they suggest that discrimination may still play a role in executive promotions.

2.6 Appendix 1 for Chapter 2

Table 2.1: Variable definitions

Variable	Definition	Source
Female	Dummy variable: 1 if an executive is female. 0 otherwise.	BoardEx
Functional expertise	A set of dummy variables including accounting, administration, finance, general manager, HR, IT, legal, marketing, operations, PR, R&D, sales, secretary, and strategy.	BoardEx
Corporate level	A set of dummy variables including VP, SVP, EVP, president, CEO and corporate level unspecified	BoardEx
Vice president (VP)	Dummy variable: 1 if an executive is a vice president. 0 otherwise.	BoardEx
Senior vice president (SVP)	Dummy variable: 1 if an executive is a senior vice president, including the divisional or regional senior vice president. 0 otherwise.	BoardEx
Executive vice president (EVP)	Dummy variable: 1 if an executive is an executive vice president, including the divisional or regional executive vice president. 0 otherwise.	BoardEx
President	Dummy variable: 1 if an executive is a president, including the divisional or regional president. 0 otherwise.	BoardEx
CEO	Dummy variable: 1 if an executive is a chief executive officer. 0 otherwise.	BoardEx

Table 2.1: Variable definitions (Continue)

Variable	Definition	Source
Promotion_to_SVP	Dummy variable: 1 if an executive is promoted internally to senior vice president position in the following year. 0 otherwise.	BoardEx
Promotion_to_EVP	Dummy variable: 1 if an executive is promoted internally to executive vice president position in the following year. 0 otherwise.	BoardEx
Promotion_to_president	Dummy variable: 1 if an executive is promoted internally to president position in the following year. 0 otherwise.	BoardEx
Promotion_to_CEO	Dummy variable: 1 if an executive is promoted internally to CEO position in the following year. 0 otherwise.	BoardEx
Promotion	Dummy variable: 1 if an executive is promoted internally in the following year. 0 otherwise.	BoardEx
Age	Age	BoardEx
Age squared	Age squared	BoardEx
Ivy league	Dummy variable: 1 if an executive graduated from an Ivy League university. 0 otherwise.	BoardEx
MBA	Dummy variable: 1 if an executive has an MBA degree. 0 otherwise.	BoardEx
Inside director	Dummy variable: 1 if an executive is an insider director. 0 otherwise.	BoardEx
CEO experience	The number of years that an executive worked in CEO positions.	BoardEx

Table 2.1: Variable definitions (Continue)

Variable	Definition	Source
Industry experience	The number of years that an executive worked on full time positions in an industry, including experience in private firms. Industry is defined as FTSE international industry classification, the classification in BoardEx.	BoardEx
Firm tenure	The number of years that an executive worked in a firm	BoardEx
Log assets	Total assets (ln)	Compustat
Stock return	Buy and hold return over 12 months before the fiscal year end	CRSP monthly
ROA	Operating income before depreciation over total assets	Compustat
Turnover	Dummy variable: 1 if an executive departs from the firm in the following year. 0 otherwise.	BoardEx
High competition (HHI)	Dummy variable: 1 if a firm's HHI is below median in a year. 0 otherwise.	Hoberg-Phillips Data Library
High competition (similarity)	Dummy variable: 1 if a firm's product similarity score is above median in a year. 0 otherwise.	Hoberg-Phillips Data Library
High competition (fluidity)	Dummy variable: 1 if a firm's product market fluidity is above median in a year. 0 otherwise.	Hoberg-Phillips Data Library
HHI	Industry concentration	Hoberg-Phillips Data Library

Table 2.1: Variable definitions (Continue)

Variable	Definition	Source
Similarity	Total product similarity	Hoberg-Phillips Data Library
Fluidity	Product market fluidity	Hoberg-Phillips Data Library
Log No takeovers	No takeovers measures the number of takeover events in an industry (ln)	SDC
Industry size	The number of firms in an industry (four digit SIC) in a given year	BoardEx
Female director ratio	The number of female directors / the number of directors	BoardEx
Female outside director ratio	The number of female outside directors / the number of outside directors	BoardEx
Female inside director ratio	The number of female inside directors / the number of inside directors	BoardEx

Table 2.2: Summary statistics of sample size and female representation

My sample includes managers who are at corporate level vice president or above, and observations are at manager-year level over the period 2000-2015.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Panel A: sample size																	
No. of firms	1,230	1,379	1,436	2,873	3,267	3,424	3,437	3,561	3,415	3,226	3,152	3,152	3,195	3,253	3,336	3,165	5,886
No. of obs	10,664	12,487	13,361	22,480	25,968	28,742	29,785	29,927	29,341	27,596	27,133	26,999	26,808	26,451	25,793	23,208	386,743
Panel B: share of female managers in each functional area (pp)																	
Accounting	11.7	11.9	12.7	12.0	12.0	13.0	12.9	13.5	14.0	14.3	15.1	15.7	16.5	16.5	16.8	17.2	14.4
Admin	11.9	15.7	15.9	19.0	19.3	19.2	19.6	20.0	20.4	21.1	20.6	23.9	24.9	25.8	26.9	24.9	21.2
Finance	9.8	10.1	10.4	9.9	11.2	11.7	12.3	13.3	13.8	14.0	13.5	14.0	13.5	13.7	13.7	14.5	12.7
Gen Mgr	7.3	7.6	7.7	7.4	7.6	7.7	8.1	8.5	8.7	8.8	9.3	9.1	9.2	9.6	9.6	9.8	8.6
HR	30.7	34.0	32.4	37.4	41.1	42.4	43.3	42.8	42.2	44.9	45.2	45.3	45.1	47.3	49.8	53.7	43.5
IT	8.6	8.7	8.9	8.7	9.1	9.6	10.0	10.5	9.9	9.9	9.6	10.1	9.3	8.8	9.8	9.3	9.6
Legal	15.2	17.0	17.3	18.8	19.7	19.7	20.1	21.0	20.7	20.6	22.7	23.0	23.9	23.8	24.6	24.9	21.4
Marketing	13.3	16.1	16.4	13.3	15.4	15.6	16.4	16.6	16.9	18.3	19.2	20.7	20.1	21.1	23.0	23.4	18.0
Operations	5.9	5.2	5.4	5.2	6.2	6.1	5.9	6.0	6.4	6.7	6.7	7.0	7.2	7.6	8.0	8.5	6.6
PR	38.1	39.5	37.9	36.4	36.4	35.5	35.3	34.7	34.0	35.0	33.6	35.3	35.1	37.7	35.6	35.8	35.6
RD	5.8	6.2	5.5	6.9	7.8	8.5	7.8	8.2	8.9	9.3	9.3	8.4	8.2	9.2	10.2	10.0	8.5
Sales	5.0	5.9	8.8	6.6	6.0	4.6	5.5	5.6	5.1	7.0	6.7	6.8	7.2	8.1	9.0	9.6	6.7
Secretary	20.4	20.7	21.4	23.9	26.0	26.6	28.0	29.8	28.0	26.5	26.7	29.7	30.3	30.1	28.4	25.3	27.0
Strategy	8.8	8.2	10.9	11.1	9.5	10.3	9.3	8.9	8.5	8.0	7.2	8.1	8.2	8.3	10.3	10.5	9.0
Panel C: share of female managers in each position (pp)																	
VP	13.0	13.5	14.0	13.7	14.4	14.7	14.5	14.9	15.1	15.5	15.8	16.3	16.6	17.0	17.9	18.6	15.4
SVP	11.0	11.8	12.3	11.8	12.7	13.3	14.0	15.0	15.4	15.7	16.2	16.1	15.7	16.2	16.8	17.3	14.8
EVP	8.8	9.6	9.8	9.5	10.0	10.5	10.7	11.2	11.1	11.8	12.5	13.3	14.0	14.2	14.3	14.9	11.9
President	4.5	4.9	4.8	4.2	4.6	4.9	5.4	5.9	6.0	6.1	6.1	6.4	6.6	6.8	7.2	7.6	5.9
CEO	1.9	2.3	2.4	2.7	2.9	3.1	3.4	3.6	3.6	4.1	4.4	4.0	4.3	4.3	4.8	5.6	3.8
CorpLevel unspecified	11.4	11.6	12.5	12.5	13.5	13.3	13.9	14.3	14.4	14.6	14.9	15.5	15.4	16.1	16.2	16.1	14.5

Table 2.3: Summary statistics of female representation in each industry
This table represents the female representation in industries that have more than 3,000 observation in my sample. My sample includes managers who are at corporate level vice president or above, and observations are at manager-year level over the period 2000-2015.

Industry	N	% women
Primary Metal Industries	4,655	7.5
Electronic & Other Electric Equipment	32,475	8.0
Oil & Gas Extraction	17,277	8.4
Fabricated Metal Products	5,002	9.3
Petroleum & Coal Products	3,114	9.3
Wholesale Trade – Nondurable Goods	5,851	9.5
Industrial Machinery & Equipment	24,982	9.6
Wholesale Trade – Durable Goods	8,698	10.2
Transportation Equipment	12,661	11.2
Instruments & Related Products	25,975	11.3
Rubber & Miscellaneous Plastics Products	3,631	12.1
Furniture & Fixtures	3,023	12.3
Transportation by Air	3,698	12.7
Business Services	53,497	12.8
Amusement & Recreation Services	4,000	13.6
Paper & Allied Products	4,192	13.7
Food & Kindred Products	11,874	13.8
Engineering & Management Services	8,576	14.5
Chemical & Allied Products	46,584	14.9
Communications	15,090	15.5
Health Services	8,042	15.8
Eating & Drinking Places	6,732	16.9
Miscellaneous Retail	8,118	17.7
Apparel & Other Textile Products	3,536	18.8
General Merchandise Stores	4,297	18.9
Printing & Publishing	4,453	19.7
Apparel & Accessory Stores	6,467	27.5

Table 2.4: Summary statistics of characteristics, positions, and promotions
My sample includes managers who are at corporate level vice president or above, and Observations are at manager-year level over the period 2000-2015. The promotion probability is calculated based on a candidate pool for each position. The candidate pool consists the managers whose incumbent position is not more senior than the position for which they are considered.

	Female	Male
Age	48.7	50.5
MBA (in pp)	24.8	29.5
Ivy league (in pp)	12.5	13.5
Firm tenure (in years)	8.9	9.7
CEO experience (in years)	0.4	1.6
Industry experience (in years)	8.8	9.5
Turnover (in pp)	12.0	11.8
CEO turnover (in pp)	13.6	12.5
Total assets (in $million)	12,675.9	9,197.3
Promotions (in pp)	4.9	5.8
Promotions from (in pp)		
VP	6.7	7.3
SVP	4.9	6.3
EVP	2.6	3.9
President	3.0	4.4
CorpLevel unspecified	3.0	5.0
No of executives	9,114	62,414

Table 2.5: The gender promotion gap - baseline
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Promotions				
	(1)	(2)	(3)	(4)	(5)
Female	-1.24***	-1.36***	-1.83***	-1.18***	-0.71***
	(8.87)	(10.06)	(12.76)	(8.83)	(2.85)
MBA	0.65***	0.76***	0.90***	0.72***	0.73***
	(6.11)	(7.33)	(8.31)	(6.40)	(6.42)
Ivy league	0.52***	0.61***	0.86***	0.89***	0.89***
	(2.99)	(3.65)	(4.98)	(5.03)	(5.01)
Inside dir	4.50***	5.80***	7.10***	6.58***	6.57***
	(11.99)	(13.13)	(14.89)	(14.50)	(14.45)
Age (10 yrs)	6.17***	6.71***	9.39***	8.43***	8.45***
	(8.12)	(7.90)	(11.02)	(10.10)	(10.10)
Age squared	-0.81***	-0.86***	-1.09***	-0.99***	-0.99***
	(10.70)	(10.31)	(12.92)	(11.91)	(11.90)
CEO exp (10 yrs)	0.26	0.22	0.43	0.12	0.11
	(1.02)	(0.87)	(1.64)	(0.44)	(0.43)
Industry exp (10 yrs)	0.20	0.05	0.12	-0.03	-0.03
	(1.25)	(0.33)	(0.83)	(0.23)	(0.21)
Firm tenure (10 yrs)	-0.33**	0.05	0.07	0.12	0.12
	(2.14)	(0.33)	(0.45)	(0.78)	(0.78)
Log assets	0.15***	0.37**	0.50***	0.52***	0.52***
	(4.39)	(2.45)	(3.29)	(3.35)	(3.36)
SVP			-3.65***	-3.83***	-3.69***
			(13.10)	(14.02)	(13.15)
EVP			-7.09***	-7.71***	-7.61***
			(20.18)	(21.79)	(22.04)
President			-5.58***	-7.23***	-7.11***
			(20.15)	(24.57)	(23.64)
CorpLevel unspecified			-3.72***	-3.67***	-3.60***
			(14.86)	(14.87)	(14.12)
Female * SVP					-0.93**
					(2.42)
Female * EVP					-0.73*
					(1.71)
Female * President					-1.03*

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Table 2.5 – *Continued from previous page*

	Promotions				
	(1)	(2)	(3)	(4)	(5)
					(1.75)
Female * CorpLevel unspecified					-0.42
					(1.08)
Accounting				-2.75***	-2.76***
				(11.71)	(11.72)
Administration				-1.37***	-1.38***
				(2.95)	(2.97)
Finance				-0.36*	-0.37*
				(1.77)	(1.82)
HR				-2.60***	-2.61***
				(11.74)	(11.66)
IT				-2.97***	-2.97***
				(11.46)	(11.49)
Legal				-1.58***	-1.58***
				(7.78)	(7.80)
Marketing				0.26	0.27
				(0.94)	(0.96)
Operations				4.87***	4.87***
				(14.61)	(14.59)
PR				-4.45***	-4.49***
				(12.15)	(12.19)
R&D				-1.44***	-1.43***
				(5.44)	(5.41)
Sales				0.87*	0.87*
				(1.80)	(1.80)
Secretary				-3.41***	-3.44***
				(7.28)	(7.32)
Strategy				-0.77**	-0.77**
				(2.47)	(2.48)
Firm FE	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	229,565	229,406	229,406	229,406	229,406
R^2	0.01	0.02	0.03	0.03	0.03
Distinct female	6,799	6,799	6,799	6,799	6,799
Distinct male	42,093	42,093	42,093	42,093	42,093
No. female obs	32,136	32,136	32,136	32,136	32,136
No. male obs	197,429	197,429	197,429	197,429	197,429

Table 2.6: Gender promotion gap and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions		
High competition measures	HHI	Similarity	Fluidity
	(1)	(2)	(3)
Female	-1.49***	-1.41***	-1.49***
	(8.00)	(7.53)	(6.88)
High competition	0.30	0.05	0.03
	(1.25)	(0.16)	(0.15)
Female * High competition	0.66**	0.53*	0.66**
	(2.29)	(1.93)	(2.27)
MBA	0.73***	0.73***	0.76***
	(6.12)	(6.13)	(6.31)
Ivy league	0.92***	0.92***	0.98***
	(4.96)	(4.96)	(5.29)
Inside dir	6.83***	6.83***	6.75***
	(13.19)	(13.20)	(12.61)
Age (10 yrs)	9.25***	9.25***	9.19***
	(10.41)	(10.41)	(10.22)
Age squared	-1.08***	-1.08***	-1.07***
	(12.17)	(12.16)	(11.96)
CEO exp (10 yrs)	0.30	0.30	0.35
	(1.00)	(1.00)	(1.16)
Industry exp (10 yrs)	-0.04	-0.04	-0.01
	(0.25)	(0.26)	(0.06)
Firm tenure (10 yrs)	0.15	0.15	0.14
	(0.96)	(0.96)	(0.82)
Log assets	0.54***	0.56***	0.54***
	(3.15)	(3.25)	(2.99)
SVP	-3.91***	-3.91***	-3.89***
	(14.66)	(14.65)	(14.36)
EVP	-7.81***	-7.81***	-7.81***
	(22.20)	(22.17)	(22.46)
President	-7.38***	-7.38***	-7.33***
	(23.72)	(23.74)	(23.54)
Corptitle unspecified	-3.76***	-3.76***	-3.75***

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Table 2.6 – *Continued from previous page*

	Dependent variable: Promotions		
High competition measures	HHI	Similarity	Fluidity
	(1)	(2)	(3)
	(14.35)	(14.33)	(14.13)
Accounting	-2.79***	-2.79***	-2.75***
	(11.72)	(11.72)	(11.29)
Administration	-1.33***	-1.34***	-1.31**
	(2.65)	(2.66)	(2.55)
Finance	-0.32	-0.32	-0.27
	(1.58)	(1.57)	(1.27)
HR	-2.60***	-2.60***	-2.63***
	(11.14)	(11.13)	(10.83)
IT	-3.00***	-3.00***	-2.99***
	(11.01)	(11.01)	(10.57)
Legal	-1.51***	-1.51***	-1.43***
	(6.83)	(6.82)	(6.40)
Marketing	0.37	0.37	0.34
	(1.29)	(1.29)	(1.16)
Operations	5.01***	5.01***	4.98***
	(14.40)	(14.40)	(14.21)
PR	-4.44***	-4.44***	-4.39***
	(12.19)	(12.15)	(12.06)
R&D	-1.52***	-1.52***	-1.48***
	(5.65)	(5.67)	(5.27)
Sales	1.01*	1.01*	1.02*
	(1.94)	(1.94)	(1.84)
Secretary	-3.47***	-3.47***	-3.34***
	(7.02)	(7.03)	(6.77)
Strategy	-0.61*	-0.61*	-0.64*
	(1.78)	(1.78)	(1.81)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	210,156	210,156	203,108
R^2	0.03	0.03	0.03

Table 2.7: Promotions from a corporate level
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions				
Sample	Corptitle unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)
Female	-1.42***	-1.53***	-1.71***	-0.84**	-0.11
	(3.47)	(5.45)	(5.15)	(2.16)	(0.24)
MBA	1.26***	0.47**	0.98***	0.57*	-0.20
	(3.26)	(2.03)	(3.49)	(1.71)	(0.57)
Ivy league	0.57	1.15***	0.48	0.87**	1.13**
	(1.13)	(3.11)	(1.53)	(2.30)	(2.13)
Inside dir	3.80***	2.74**	5.92***	5.59***	13.91***
	(4.46)	(2.46)	(3.98)	(6.07)	(11.07)
Age (10 yrs)	9.63***	13.22***	7.98***	8.09***	11.00***
	(5.38)	(7.27)	(3.72)	(3.64)	(4.04)
Age squared	-1.03***	-1.45***	-0.98***	-0.92***	-1.13***
	(5.48)	(8.01)	(4.63)	(4.24)	(4.24)
CEO exp (10 yrs)	-0.79	2.81***	1.44*	1.22	1.90***
	(1.48)	(3.11)	(1.81)	(1.53)	(2.67)
Industry exp (10 yrs)	0.01	0.03	-0.26	-0.00	0.60*
	(0.01)	(0.10)	(0.72)	(0.00)	(1.92)
Firm tenure (10 yrs)	0.42	0.71***	0.45	0.11	-0.29
	(0.91)	(2.61)	(1.21)	(0.31)	(0.95)
Log assets	0.22	0.51	1.43***	0.12	0.44
	(0.75)	(1.29)	(4.34)	(0.38)	(0.95)
Accounting	-2.83***	-3.94***	-3.90***	-4.82***	-4.97
	(4.92)	(9.12)	(6.82)	(7.48)	(0.95)
Administration	-0.06	-0.20	-1.47	-3.39***	10.86
	(0.04)	(0.17)	(1.35)	(4.44)	(0.83)
Finance	-1.09**	-1.02**	0.93*	-3.55***	5.97***
	(2.12)	(2.28)	(1.82)	(8.04)	(2.92)
HR	-1.11	-2.02***	-3.89***	-4.69***	5.24**
	(0.91)	(4.34)	(8.25)	(9.99)	(2.01)
IT	-2.10***	-4.85***	-2.98***	-3.81***	0.09
	(3.21)	(9.91)	(5.36)	(7.09)	(0.04)
Legal	-1.44**	-1.09**	-2.72***	-4.73***	3.26
	(2.32)	(2.43)	(5.81)	(10.40)	(0.49)

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Table 2.7 – *Continued from previous page*

	Dependent variable: Promotions				
Sample	Corptitle unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)
Marketing	1.11	-0.20	-0.40	-0.26	1.31
	(1.27)	(0.39)	(0.64)	(0.38)	(0.47)
Operations	7.70***	0.82	1.57**	4.20***	11.76***
	(10.50)	(1.48)	(2.15)	(7.17)	(11.87)
PR	-4.80***	-5.94***	-5.00***	-4.60***	
	(4.47)	(10.05)	(6.00)	(5.63)	
R&D	-1.90**	-1.76***	-1.67**	-3.13***	-7.76**
	(2.48)	(3.30)	(2.32)	(3.55)	(2.37)
Sales	1.93	0.87	-0.43	0.64	0.44
	(1.32)	(1.07)	(0.49)	(0.61)	(0.35)
Secretary	-3.64***	-4.36***	-3.49***	-3.82**	5.53
	(4.48)	(4.47)	(2.61)	(2.37)	(1.28)
Strategy	-0.56	-1.46**	-1.19**	-2.83***	2.49
	(0.65)	(2.27)	(2.25)	(5.15)	(1.64)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Obs	36,067	78,708	54,652	33,747	24,138
R^2	0.07	0.06	0.05	0.06	0.16
Promotion Prob (women)	2.96	6.74	4.89	2.59	3.02
Promotion Prob (men)	4.96	7.27	6.26	3.95	4.38
Coeff. (female) W/O FuncArea	-1.81	-2.03	-2.42	-1.43	-0.34

Table 2.8: Promotions from each corporate level and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). All regressions include year FE, firm FE, and functional expertise FE. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions				
Sample	CorpLevel unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)
			Panel A		
Female	-1.60***	-1.78***	-2.20***	-1.42***	-0.54
	(2.86)	(4.72)	(5.42)	(3.47)	(0.85)
High competition (HHI)	-0.08	0.86*	-0.09	0.07	-0.49
	(0.20)	(1.92)	(0.23)	(0.19)	(1.26)
Female * High competition (HHI)	0.09	0.47	0.88	1.37**	1.00
	(0.14)	(0.81)	(1.49)	(2.14)	(0.93)
Observations	31,712	72,973	50,324	30,970	22,177
R^2	0.07	0.07	0.05	0.07	0.17
			Panel B		
Female	-1.83***	-1.72***	-1.97***	-1.38***	-0.65
	(3.45)	(4.66)	(4.60)	(2.85)	(1.12)
High competition (Similarity)	-0.52	0.25	-0.49	0.56	-1.04*
	(0.80)	(0.43)	(0.96)	(1.09)	(1.86)
Female * High competition (Similarity)	0.72	0.39	0.42	1.31**	1.65
	(1.01)	(0.73)	(0.65)	(2.00)	(1.57)
Observations	31,712	72,973	50,324	30,970	22,177
R^2	0.07	0.07	0.05	0.07	0.17
			Panel C		
Female	-1.93***	-1.86***	-1.99***	-0.97*	-0.56
	(2.87)	(4.44)	(4.44)	(1.73)	(0.82)
High competition (Fluidity)	-0.01	-0.17	0.42	0.09	-0.17
	(0.03)	(0.38)	(0.99)	(0.20)	(0.38)
Female * High competition (Fluidity)	0.93	0.55	0.44	0.27	0.92
	(1.12)	(1.02)	(0.75)	(0.32)	(1.04)
Observations	30,609	70,756	48,517	29,918	21,295
R^2	0.07	0.07	0.05	0.07	0.17

Table 2.9: Gender promotion gap and board gender diversity
This table presents the estimates linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level

	Promotions						
Board diversity var	Female dir ratio	Female dir >=1	Female dir >=2	Female dir >=3	Female CEO	Female outside dir	Female inside dir
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female	-1.17***	-0.97***	-1.25***	-1.24***	-1.15***	-1.35***	-1.08***
	(-6.62)	(-4.34)	(-7.95)	(-8.79)	(-8.31)	(-7.68)	(-7.94)
Board diversity	-0.26	-0.13	0.36	-0.31	-0.80	0.37	-0.73
	(-0.21)	(-0.56)	(1.47)	(-0.76)	(-1.62)	(0.36)	(-1.03)
Female * Board diversity	-0.13	-0.30	0.16	0.40	-0.49	1.19	-1.50**
	(-0.11)	(-1.06)	(0.56)	(0.94)	(-0.89)	(1.18)	(-1.97)
MBA	-3.83***	-3.83***	-3.83***	-3.83***	-3.83***	-3.84***	-3.81***
	(-14.01)	(-14.02)	(-14.02)	(-14.03)	(-14.03)	(-14.01)	(-14.16)
Ivy league	-7.71***	-7.71***	-7.71***	-7.72***	-7.72***	-7.72***	-7.69***
	(-21.77)	(-21.79)	(-21.79)	(-21.81)	(-21.81)	(-21.73)	(-22.24)
Inside dir	-7.23***	-7.23***	-7.23***	-7.23***	-7.23***	-7.25***	-7.27***
	(-24.59)	(-24.59)	(-24.57)	(-24.60)	(-24.62)	(-24.68)	(-25.00)
Age (10 yrs)	-3.67***	-3.67***	-3.67***	-3.67***	-3.67***	-3.67***	-3.65***
	(-14.91)	(-14.90)	(-14.87)	(-14.87)	(-14.86)	(-14.93)	(-14.86)
Age squared	0.72***	0.73***	0.72***	0.73***	0.73***	0.72***	0.73***
	(6.41)	(6.42)	(6.40)	(6.41)	(6.42)	(6.39)	(6.43)
CEO exp (10 yrs)	0.89***	0.89***	0.89***	0.89***	0.90***	0.90***	0.90***
	(5.01)	(5.03)	(5.03)	(5.02)	(5.05)	(5.04)	(5.03)
Industry exp (10 yrs)	6.58***	6.59***	6.57***	6.57***	6.58***	6.62***	6.63***
	(14.49)	(14.54)	(14.47)	(14.49)	(14.49)	(14.36)	(14.65)
Firm tenure (10 yrs)	8.45***	8.44***	8.42***	8.43***	8.42***	8.45***	8.37***
	(10.15)	(10.11)	(10.09)	(10.10)	(10.09)	(10.12)	(9.97)
Log assets	-0.99***	-0.99***	-0.99***	-0.99***	-0.99***	-0.99***	-0.98***
	(-11.97)	(-11.91)	(-11.89)	(-11.90)	(-11.90)	(-11.93)	(-11.73)
SVP	0.12	0.12	0.12	0.12	0.11	0.12	0.11
	(0.46)	(0.43)	(0.44)	(0.44)	(0.43)	(0.43)	(0.40)
EVP	-0.03	-0.03	-0.04	-0.04	-0.04	-0.03	-0.08
	(-0.23)	(-0.23)	(-0.23)	(-0.24)	(-0.24)	(-0.23)	(-0.50)
President	0.12	0.12	0.12	0.12	0.12	0.12	0.16
	(0.78)	(0.78)	(0.80)	(0.80)	(0.78)	(0.79)	(1.01)
Corptitle unidentified	0.52***	0.53***	0.51***	0.52***	0.51***	0.52***	0.54***

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Table 2.9 – *Continued from previous page*

Board diversity var	Female dir ratio	Female dir >=1	Female dir >=2	Female dir >=3	Female CEO	Female outside dir	Female inside dir
	Promotions						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(3.34)	(3.40)	(3.28)	(3.36)	(3.30)	(3.35)	(3.48)
Accounting	-2.75***	-2.75***	-2.75***	-2.75***	-2.75***	-2.77***	-2.77***
	(-11.72)	(-11.71)	(-11.71)	(-11.71)	(-11.73)	(-11.78)	(-11.61)
Administration	-1.37***	-1.37***	-1.37***	-1.37***	-1.38***	-1.38***	-1.41***
	(-2.95)	(-2.96)	(-2.93)	(-2.94)	(-2.96)	(-2.96)	(-3.04)
Finance	-0.36*	-0.36*	-0.36*	-0.36*	-0.36*	-0.37*	-0.36*
	(-1.79)	(-1.79)	(-1.76)	(-1.77)	(-1.79)	(-1.80)	(-1.76)
HR	-2.60***	-2.60***	-2.60***	-2.60***	-2.60***	-2.61***	-2.61***
	(-11.75)	(-11.75)	(-11.72)	(-11.73)	(-11.77)	(-11.77)	(-11.83)
IT	-2.97***	-2.97***	-2.97***	-2.97***	-2.97***	-2.99***	-2.98***
	(-11.47)	(-11.47)	(-11.47)	(-11.47)	(-11.45)	(-11.54)	(-11.39)
Legal	-1.58***	-1.58***	-1.57***	-1.57***	-1.58***	-1.58***	-1.59***
	(-7.78)	(-7.77)	(-7.77)	(-7.78)	(-7.79)	(-7.76)	(-7.79)
Marketing	0.26	0.27	0.26	0.26	0.26	0.25	0.22
	(0.94)	(0.95)	(0.94)	(0.94)	(0.93)	(0.88)	(0.78)
Operations	4.87***	4.87***	4.87***	4.87***	4.87***	4.86***	4.88***
	(14.61)	(14.61)	(14.61)	(14.59)	(14.62)	(14.56)	(14.77)
PR	-4.45***	-4.45***	-4.46***	-4.45***	-4.45***	-4.49***	-4.46***
	(-12.12)	(-12.11)	(-12.14)	(-12.14)	(-12.15)	(-12.31)	(-12.07)
R&D	-1.44***	-1.44***	-1.44***	-1.44***	-1.44***	-1.45***	-1.45***
	(-5.44)	(-5.43)	(-5.43)	(-5.44)	(-5.44)	(-5.47)	(-5.36)
Sales	0.87*	0.87*	0.87*	0.87*	0.87*	0.85*	0.84*
	(1.80)	(1.80)	(1.80)	(1.79)	(1.80)	(1.76)	(1.71)
Secretary	-3.42***	-3.42***	-3.41***	-3.41***	-3.42***	-3.43***	-3.43***
	(-7.28)	(-7.29)	(-7.28)	(-7.27)	(-7.30)	(-7.27)	(-7.31)
Strategy	-0.77**	-0.77**	-0.77**	-0.77**	-0.77**	-0.78**	-0.77**
	(-2.47)	(-2.47)	(-2.47)	(-2.48)	(-2.47)	(-2.48)	(-2.43)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,403	229,406	229,406	229,406	229,406	228,978	227,205
R^2	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 2.10: Gender promotion gap and gender equality

This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *Wage* ratio is the median earning of women who are fulltime employees over the median earning of men who are fulltime employees. *Employment* ratio measures the female participation in the workforce. *Education* ratio is the percentage of women who has a bachelor's degree or higher over the percentage of men who has a bachelor's degree or higher. *Wage*, *Employment* and *Education* are county level data from 2010 American Community Survey. The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions		
Gender equality measures	Wage	Employment	Education
	(1)	(2)	(3)
Female	-0.60	-5.65***	-1.30***
	(-0.35)	(-3.24)	(-7.94)
Gender equality	-2.21	3.05	0.48
	(-0.52)	(0.83)	(1.62)
Female & Gender equality	-0.69	4.08**	0.08*
	(-0.31)	(2.59)	(1.71)
SVP	-3.88***	-3.88***	-3.87***
	(-14.46)	(-14.44)	(-14.31)
EVP	-7.82***	-7.83***	-7.83***
	(-22.04)	(-22.07)	(-22.03)
President	-7.46***	-7.47***	-7.50***
	(-24.40)	(-24.42)	(-24.42)
Corportitle unidentified	-3.80***	-3.80***	-3.78***
	(-14.21)	(-14.18)	(-14.11)
MBA	0.74***	0.73***	0.74***
	(5.89)	(5.89)	(5.89)
Ivy league	0.94***	0.94***	0.93***
	(5.20)	(5.20)	(5.18)
Inside dir	6.74***	6.74***	6.74***
	(13.59)	(13.58)	(13.61)
Age (10 yrs)	9.06***	9.07***	9.16***
	(10.06)	(10.11)	(10.23)
Age squared	-1.06***	-1.06***	-1.07***
	(-11.78)	(-11.83)	(-11.97)
CEO exp (10 yrs)	0.24	0.24	0.25
	(0.88)	(0.88)	(0.92)
Industry exp (10 yrs)	-0.05	-0.05	-0.04
	(-0.35)	(-0.35)	(-0.28)

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Table 2.10 – *Continued from previous page*

	Dependent variable: Promotions		
Gender equality measures	Wage	Employment	Education
	(1)	(2)	(3)
Firm tenure (10 yrs)	0.16	0.16	0.15
	(0.98)	(0.98)	(0.94)
Log assets	0.53***	0.52***	0.53***
	(3.02)	(2.98)	(2.98)
Accounting	-2.76***	-2.77***	-2.78***
	(-11.35)	(-11.35)	(-11.33)
Administration	-1.34***	-1.35***	-1.36***
	(-2.73)	(-2.75)	(-2.77)
Finance	-0.38*	-0.38*	-0.39*
	(-1.82)	(-1.84)	(-1.89)
HR	-2.61***	-2.61***	-2.63***
	(-11.71)	(-11.69)	(-11.72)
IT	-3.02***	-3.01***	-3.03***
	(-11.07)	(-11.05)	(-11.07)
Legal	-1.57***	-1.58***	-1.59***
	(-7.39)	(-7.40)	(-7.39)
Marketing	0.35	0.35	0.35
	(1.25)	(1.24)	(1.22)
Operations	4.94***	4.93***	4.93***
	(14.22)	(14.21)	(14.20)
PR	-4.42***	-4.41***	-4.46***
	(-11.58)	(-11.52)	(-11.60)
R&D	-1.43***	-1.43***	-1.46***
	(-5.05)	(-5.04)	(-5.12)
Sales	0.94*	0.95*	0.93*
	(1.83)	(1.85)	(1.80)
Secretary	-3.39***	-3.39***	-3.44***
	(-6.73)	(-6.77)	(-6.83)
Strategy	-0.70**	-0.69**	-0.72**
	(-2.15)	(-2.13)	(-2.20)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	214,079	214,042	213,489
Adjusted R-squared	0.03	0.03	0.03

Table 2.11: Promotions and takeover threat
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *Log N^otakeovers* measures the number of takeover events in an industry. The value is set to missing if a company is the takeover target. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions					
Sample	All	CorpLevel unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-1.49***	-1.49**	-1.51***	-1.97***	-1.56***	-0.43
	(7.03)	(2.41)	(3.63)	(4.48)	(3.11)	(0.62)
Log N^otakeovers	-0.19	0.21	-0.08	-0.44	0.10	-0.18
	(1.11)	(0.48)	(0.26)	(1.23)	(0.32)	(0.53)
Female * Log N^otakeovers	0.18**	0.00	-0.00	0.13	0.45**	0.22
	(2.45)	(0.02)	(0.01)	(0.73)	(2.23)	(0.76)
SVP	-3.85***					
	(14.49)					
EVP	-7.79***					
	(22.40)					
President	-7.35***					
	(24.28)					
CorpLevel unspecified	-3.73***					
	(14.50)					
MBA	0.74***	1.16***	0.52**	0.98***	0.59*	-0.20
	(6.16)	(3.00)	(2.12)	(3.45)	(1.70)	(0.57)
Ivy league	0.95***	0.84	1.21***	0.54	0.83**	1.16**
	(5.35)	(1.63)	(3.29)	(1.59)	(2.12)	(2.12)
Inside dir	6.69***	3.64***	2.67**	6.32***	5.53***	14.19***
	(13.98)	(4.18)	(2.35)	(4.08)	(5.92)	(11.08)
Age (10 yrs)	8.99***	11.05***	13.58***	8.64***	7.70***	11.01***
	(10.28)	(5.93)	(7.11)	(3.78)	(3.32)	(3.97)
Age squared	-1.05***	-1.17***	-1.49***	-1.05***	-0.89***	-1.14***
	(12.05)	(6.06)	(7.79)	(4.62)	(3.87)	(4.15)
CEO exp (10 yrs)	0.25	-0.62	2.94***	1.56*	1.22	1.85**
	(0.91)	(1.15)	(3.08)	(1.86)	(1.46)	(2.54)
Industry exp (10 yrs)	-0.04	-0.07	0.03	-0.31	-0.07	0.54*
	(0.25)	(0.13)	(0.09)	(0.82)	(0.20)	(1.67)
Firm tenure (10 yrs)	0.14	0.48	0.73***	0.48	0.16	-0.23
	(0.90)	(0.96)	(2.64)	(1.24)	(0.44)	(0.74)

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Table 2.11 – *Continued from previous page*

	Dependent variable: Promotions					
Sample	All	CorpLevel unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)	(6)
Log assets	0.50***	0.22	0.54	1.38***	0.10	0.33
	(2.91)	(0.71)	(1.29)	(4.08)	(0.30)	(0.71)
Industry size	0.00	-0.00	-0.00	0.02	0.01	0.02*
	(0.68)	(0.54)	(0.54)	(1.19)	(0.91)	(1.86)
Accounting	-2.78***	-2.73***	-4.02***	-3.97***	-4.85***	-7.41
	(11.47)	(4.57)	(8.99)	(6.77)	(7.30)	(1.45)
Administration	-1.42***	0.09	-0.19	-1.70	-3.51***	10.46
	(2.96)	(0.05)	(0.17)	(1.56)	(4.42)	(0.82)
Finance	-0.36*	-1.09**	-1.07**	0.99*	-3.65***	6.03***
	(1.74)	(2.06)	(2.39)	(1.94)	(8.06)	(2.87)
HR	-2.58***	-1.05	-2.01***	-3.95***	-4.74***	6.57**
	(11.35)	(0.85)	(4.28)	(8.15)	(9.95)	(2.12)
IT	-2.98***	-2.07***	-4.95***	-3.10***	-3.88***	-0.04
	(10.95)	(3.06)	(9.79)	(5.49)	(6.92)	(0.02)
Legal	-1.57***	-1.52**	-1.08**	-2.79***	-4.85***	1.58
	(7.39)	(2.34)	(2.36)	(5.77)	(10.54)	(0.26)
Marketing	0.30	1.13	-0.15	-0.49	-0.23	1.19
	(1.08)	(1.23)	(0.27)	(0.78)	(0.32)	(0.42)
Operations	4.98***	7.70***	0.76	1.62**	4.28***	11.78***
	(14.57)	(9.88)	(1.33)	(2.24)	(7.17)	(11.49)
PR	-4.44***	-4.81***	-6.01***	-5.06***	-4.85***	
	(11.86)	(4.50)	(10.02)	(5.99)	(5.74)	
R&D	-1.43***	-1.77**	-1.74***	-1.69**	-3.20***	-9.69***
	(5.13)	(2.35)	(3.14)	(2.23)	(3.40)	(3.01)
Sales	0.92*	1.86	0.78	-0.30	0.82	0.31
	(1.81)	(1.23)	(0.93)	(0.34)	(0.77)	(0.35)
Secretary	-3.49***	-3.66***	-4.46***	-3.65***	-3.85**	5.37
	(7.21)	(4.31)	(4.42)	(2.64)	(2.23)	(1.18)
Strategy	-0.71**	-0.50	-1.41**	-1.22**	-2.88***	2.40
	(2.22)	(0.59)	(2.16)	(2.24)	(5.05)	(1.57)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	220,941	34,355	76,233	52,441	32,398	23,401
R^2	0.03	0.07	0.06	0.05	0.07	0.16

Table 2.12: Gender promotion gap and product market competition - firm performance
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-1.21***	-1.52***	-1.40***	-1.49***
	(-8.37)	(-7.79)	(-7.36)	(-6.79)
High competition		0.25	0.05	0.05
		(0.98)	(0.16)	(0.23)
Female * High competition		0.68**	0.46	0.60**
		(2.26)	(1.57)	(2.00)
ROA	-0.31	-0.48	-0.48	-0.32
	(-0.33)	(-0.50)	(-0.50)	(-0.33)
Stock return	-0.13	-0.13	-0.13	-0.15
	(-0.80)	(-0.76)	(-0.78)	(-0.88)
MBA	0.72***	0.73***	0.73***	0.76***
	(6.02)	(6.00)	(6.01)	(6.15)
Ivy league	0.90***	0.92***	0.92***	0.99***
	(4.69)	(4.70)	(4.71)	(5.04)
Inside dir	6.99***	7.08***	7.09***	7.01***
	(13.91)	(13.43)	(13.44)	(12.86)
Age (10 yrs)	8.66***	9.24***	9.24***	9.21***
	(9.88)	(10.11)	(10.10)	(10.02)
Age squared	-1.02***	-1.08***	-1.08***	-1.08***
	(-11.65)	(-11.88)	(-11.87)	(-11.78)
CEO exp (10 yrs)	0.01	0.17	0.17	0.24
	(0.02)	(0.60)	(0.60)	(0.82)
Industry exp (10 yrs)	-0.05	-0.03	-0.03	-0.01
	(-0.30)	(-0.19)	(-0.20)	(-0.04)
Firm tenure (10 yrs)	0.13	0.12	0.12	0.11
	(0.79)	(0.75)	(0.76)	(0.66)
Log assets	0.52***	0.47***	0.48***	0.45**
	(3.11)	(2.60)	(2.68)	(2.34)
CorpTitle unspecified	-3.71***	-3.73***	-3.73***	-3.73***
	(-15.34)	(-14.86)	(-14.85)	(-14.38)
SVP	-3.75***	-3.81***	-3.81***	-3.81***
	(-14.16)	(-14.64)	(-14.64)	(-14.19)

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Table 2.12 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
EVP	-7.58***	-7.65***	-7.66***	-7.67***
	(-21.35)	(-21.92)	(-21.90)	(-21.96)
President	-7.23***	-7.33***	-7.34***	-7.30***
	(-23.93)	(-23.16)	(-23.18)	(-22.82)
Accounting	-2.77***	-2.83***	-2.82***	-2.79***
	(-11.25)	(-11.34)	(-11.34)	(-10.99)
Administration	-1.59***	-1.54***	-1.54***	-1.53***
	(-3.32)	(-3.07)	(-3.08)	(-3.00)
Finance	-0.30	-0.32	-0.32	-0.27
	(-1.47)	(-1.54)	(-1.53)	(-1.28)
HR	-2.61***	-2.63***	-2.63***	-2.64***
	(-11.18)	(-10.86)	(-10.85)	(-10.50)
IT	-3.08***	-3.09***	-3.08***	-3.09***
	(-11.41)	(-11.16)	(-11.16)	(-10.79)
Legal	-1.65***	-1.57***	-1.57***	-1.48***
	(-7.77)	(-6.94)	(-6.93)	(-6.50)
Marketing	0.37	0.46	0.46	0.41
	(1.21)	(1.51)	(1.51)	(1.31)
Operations	5.02***	5.12***	5.12***	5.08***
	(14.36)	(14.18)	(14.18)	(13.98)
PR	-4.56***	-4.48***	-4.48***	-4.44***
	(-12.01)	(-12.03)	(-12.00)	(-11.88)
R&D	-1.59***	-1.57***	-1.56***	-1.53***
	(-6.47)	(-6.12)	(-6.17)	(-5.76)
Sales	0.66	0.84*	0.84*	0.83*
	(1.49)	(1.81)	(1.81)	(1.72)
Secretary	-3.36***	-3.46***	-3.46***	-3.33***
	(-7.39)	(-7.10)	(-7.11)	(-6.87)
Strategy	-0.82**	-0.70*	-0.70*	-0.70*
	(-2.42)	(-1.94)	(-1.94)	(-1.89)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	212,341	200,433	200,433	193,584
R^2	0.03	0.03	0.03	0.03

Table 2.13: Gender promotion gap and product market competition - female executive industry representation
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-1.20***	-1.50***	-1.43***	-1.51***
	(-8.89)	(-8.08)	(-7.59)	(-6.94)
High competition		0.31	0.04	0.03
		(1.25)	(0.15)	(0.12)
Female * High competition		0.66**	0.54**	0.67**
		(2.31)	(1.97)	(2.30)
CorpTitle unspecified	-3.67***	-3.76***	-3.76***	-3.75***
	(-14.88)	(-14.36)	(-14.34)	(-14.13)
SVP	-3.83***	-3.91***	-3.91***	-3.89***
	(-14.02)	(-14.66)	(-14.65)	(-14.36)
EVP	-7.71***	-7.81***	-7.81***	-7.81***
	(-21.79)	(-22.19)	(-22.16)	(-22.45)
President	-7.23***	-7.38***	-7.38***	-7.33***
	(-24.58)	(-23.73)	(-23.75)	(-23.55)
Accounting	-2.75***	-2.79***	-2.79***	-2.75***
	(-11.71)	(-11.71)	(-11.71)	(-11.28)
Administration	-1.37***	-1.33***	-1.34***	-1.31**
	(-2.95)	(-2.64)	(-2.65)	(-2.55)
Finance	-0.36*	-0.33	-0.32	-0.27
	(-1.78)	(-1.59)	(-1.58)	(-1.28)
HR	-2.60***	-2.60***	-2.60***	-2.63***
	(-11.73)	(-11.13)	(-11.12)	(-10.82)
IT	-2.97***	-3.00***	-3.00***	-2.99***
	(-11.47)	(-11.02)	(-11.02)	(-10.57)
Legal	-1.58***	-1.51***	-1.51***	-1.43***
	(-7.78)	(-6.84)	(-6.83)	(-6.41)
Marketing	0.26	0.37	0.37	0.34
	(0.95)	(1.29)	(1.29)	(1.16)
Operations	4.87***	5.01***	5.01***	4.98***
	(14.61)	(14.40)	(14.40)	(14.21)
PR	-4.45***	-4.44***	-4.44***	-4.40***
	(-12.15)	(-12.19)	(-12.15)	(-12.05)

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Table 2.13 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
R&D	-1.44***	-1.53***	-1.52***	-1.48***
	(-5.44)	(-5.65)	(-5.67)	(-5.28)
Sales	0.87*	1.01*	1.01*	1.02*
	(1.80)	(1.94)	(1.94)	(1.84)
Secretary	-3.41***	-3.47***	-3.47***	-3.34***
	(-7.27)	(-7.01)	(-7.03)	(-6.76)
Strategy	-0.77**	-0.61*	-0.61*	-0.64*
	(-2.48)	(-1.79)	(-1.78)	(-1.82)
MBA	0.72***	0.73***	0.73***	0.76***
	(6.40)	(6.12)	(6.13)	(6.31)
Ivy league	0.89***	0.92***	0.92***	0.98***
	(5.02)	(4.96)	(4.96)	(5.29)
Inside dir	6.58***	6.83***	6.83***	6.75***
	(14.50)	(13.20)	(13.21)	(12.61)
Age (10 yrs)	8.43***	9.25***	9.25***	9.19***
	(10.08)	(10.40)	(10.39)	(10.20)
Age squared	-0.99***	-1.08***	-1.08***	-1.07***
	(-11.89)	(-12.15)	(-12.14)	(-11.94)
CEO exp (10 yrs)	0.12	0.30	0.30	0.35
	(0.45)	(1.01)	(1.01)	(1.16)
Industry exp (10 yrs)	-0.03	-0.04	-0.04	-0.01
	(-0.23)	(-0.25)	(-0.26)	(-0.06)
Firm tenure (10 yrs)	0.12	0.15	0.15	0.14
	(0.79)	(0.96)	(0.96)	(0.83)
Log assets	0.52***	0.54***	0.55***	0.53***
	(3.33)	(3.12)	(3.22)	(2.97)
Female executive industry representation	3.54	3.89	3.89	3.53
	(1.26)	(1.30)	(1.30)	(1.15)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	229,406	210,156	210,156	203,108
R^2	0.03	0.03	0.03	0.03

Table 2.14: Promotions in executives who are over 50 years old
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *Age over 50* is a dummy variable indicating that the manager is over 50 years old. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions			
Sample restriction	All		Age over 50	
	(1)	(2)	(3)	(4)
Female	-1.43***	-1.38***	-1.08***	-0.95***
	(8.32)	(4.55)	(3.69)	(2.82)
Age over 50	-0.20			
	(0.90)			
Female * Age over 50	0.64**			
	(2.44)			
High competition (HHI)		0.34		
		(1.22)		
Female * High competition (HHI)		1.43***		
		(3.03)		
High competition (Similarity)			-0.08	
			(0.25)	
Female * High competition (Similarity)			0.86*	
			(1.94)	
High competition (Fluidity)				0.12
				(0.47)
Female * High competition (Fluidity)				0.53
				(1.18)
MBA	0.72***	0.76***	0.76***	0.78***
	(6.38)	(4.08)	(4.07)	(4.03)
Ivy league	0.89***	0.29	0.29	0.29
	(5.04)	(1.10)	(1.11)	(1.06)
Inside dir	6.58***	6.01***	6.02***	5.89***
	(14.49)	(11.07)	(11.08)	(10.76)
Age (10 yrs)	8.31***	9.28	9.33	9.82
	(10.00)	(1.35)	(1.36)	(1.39)
Age squared	-0.97***	-1.03*	-1.03*	-1.08*
	(11.53)	(1.72)	(1.72)	(1.75)
CEO exp (10 yrs)	0.12	0.07	0.08	0.18
	(0.46)	(0.19)	(0.21)	(0.51)
Industry exp (10 yrs)	-0.03	-0.18	-0.19	-0.10
	(0.22)	(0.88)	(0.90)	(0.48)
Firm tenure (10 yrs)	0.12	0.01	0.01	-0.03

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Table 2.14 – *Continued from previous page*

	Dependent variable: Promotions			
Sample	All		Age over 50	
	(1)	(2)	(3)	(4)
	(0.79)	(0.05)	(0.06)	(0.15)
Log assets	0.52***	0.87***	0.90***	0.79***
	(3.37)	(3.66)	(3.79)	(3.35)
SVP	-3.83***	-3.47***	-3.47***	-3.48***
	(14.01)	(11.05)	(11.04)	(10.80)
EVP	-7.72***	-6.70***	-6.71***	-6.74***
	(21.81)	(17.63)	(17.61)	(17.12)
President	-7.23***	-5.84***	-5.84***	-5.78***
	(24.56)	(14.98)	(14.96)	(14.68)
CorpLevel unspecified	-3.67***	-2.69***	-2.69***	-2.71***
	(14.84)	(9.10)	(9.10)	(8.88)
Accounting	-2.75***	-2.19***	-2.18***	-2.02***
	(11.71)	(6.01)	(6.00)	(5.58)
Administration	-1.37***	-0.44	-0.45	-0.27
	(2.93)	(0.66)	(0.67)	(0.41)
Finance	-0.36*	0.47	0.47	0.59
	(1.76)	(1.31)	(1.33)	(1.62)
HR	-2.61***	-1.52***	-1.52***	-1.58***
	(11.73)	(4.48)	(4.47)	(4.45)
IT	-2.97***	-2.21***	-2.20***	-2.08***
	(11.46)	(5.11)	(5.10)	(4.59)
Legal	-1.58***	-1.12***	-1.11***	-0.95***
	(7.77)	(3.59)	(3.58)	(3.04)
Marketing	0.27	0.88*	0.89*	0.84*
	(0.95)	(1.83)	(1.86)	(1.71)
Operations	4.87***	5.38***	5.38***	5.51***
	(14.65)	(11.27)	(11.28)	(11.33)
PR	-4.46***	-3.83***	-3.81***	-3.60***
	(12.16)	(7.15)	(7.06)	(6.50)
R&D	-1.44***	-1.56***	-1.56***	-1.51***
	(5.41)	(3.61)	(3.62)	(3.44)
Sales	0.87*	1.51*	1.52*	1.64*
	(1.80)	(1.77)	(1.77)	(1.84)
Secretary	-3.44***	-3.21***	-3.22***	-3.03***
	(7.34)	(4.97)	(5.02)	(4.81)
Strategy	-0.77**	-0.89**	-0.89**	-0.84**
	(2.48)	(2.26)	(2.27)	(2.14)
Observations	229,406	91,625	91,625	88,173
R^2	0.03	0.03	0.03	0.03
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 2.15: Gender promotion gap and product market competition - C-suites executives

This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. It includes executives whose job title contains "Chief" except CEO because by definition a CEO cannot be internally promoted. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-1.31***	-2.66***	-2.21***	-1.51***
	(-3.56)	(-5.54)	(-4.45)	(-2.65)
High competition		-0.25	-0.25	-0.10
		(-0.59)	(-0.46)	(-0.24)
Female * High competition		2.89***	1.99***	0.19
		(4.15)	(2.92)	(0.26)
MBA	0.81***	0.75***	0.75***	0.83***
	(3.09)	(2.65)	(2.64)	(2.80)
Ivy league	1.62***	1.67***	1.68***	1.77***
	(4.06)	(3.94)	(3.94)	(4.04)
Inside dir	6.66***	6.69***	6.69***	6.59***
	(8.24)	(7.44)	(7.45)	(7.20)
Age (10 yrs)	11.06***	12.59***	12.57***	12.60***
	(6.05)	(6.10)	(6.09)	(6.12)
Age squared	-1.24***	-1.39***	-1.39***	-1.39***
	(-6.78)	(-6.72)	(-6.71)	(-6.72)
CEO exp (10 yrs)	1.34	1.68	1.68	1.68
	(1.45)	(1.62)	(1.61)	(1.60)
Industry exp (10 yrs)	0.03	0.03	0.03	0.06
	(0.08)	(0.09)	(0.08)	(0.17)
Firm tenure (10 yrs)	0.08	0.05	0.06	0.01
	(0.25)	(0.15)	(0.17)	(0.03)
Log assets	0.67***	0.76***	0.77***	0.79***
	(3.10)	(3.24)	(3.31)	(3.26)
CorpTitle unspecified	-3.31***	-3.27***	-3.28***	-3.16***
	(-6.32)	(-5.76)	(-5.76)	(-5.46)
SVP	-5.10***	-5.29***	-5.30***	-5.22***
	(-10.90)	(-10.80)	(-10.83)	(-10.36)
EVP	-11.39***	-11.76***	-11.77***	-11.63***
	(-22.06)	(-21.33)	(-21.35)	(-20.75)

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Table 2.15 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
President	-7.56***	-7.68***	-7.68***	-7.47***
	(-7.97)	(-7.46)	(-7.47)	(-7.28)
Accounting	-2.66***	-2.82***	-2.78***	-2.43***
	(-3.82)	(-3.77)	(-3.69)	(-3.22)
Administration	-0.63	-0.80	-0.79	-0.58
	(-0.68)	(-0.80)	(-0.78)	(-0.57)
Finance	0.70	0.68	0.72	1.08
	(1.00)	(0.92)	(0.95)	(1.43)
HR	-2.75***	-2.82***	-2.83***	-2.56***
	(-3.10)	(-2.94)	(-2.93)	(-2.61)
IT	-3.62***	-3.79***	-3.76***	-3.44***
	(-5.38)	(-5.26)	(-5.16)	(-4.67)
Legal	-3.50***	-3.71***	-3.68***	-3.29***
	(-4.61)	(-4.62)	(-4.57)	(-4.05)
Marketing	0.84	0.81	0.86	1.24
	(0.99)	(0.90)	(0.95)	(1.33)
Operations	10.26***	10.41***	10.43***	10.63***
	(11.95)	(11.17)	(11.16)	(11.68)
PR	-4.99***	-5.65***	-5.48***	-5.01***
	(-3.14)	(-3.60)	(-3.50)	(-3.16)
R&D	-2.58***	-2.74***	-2.72***	-2.49***
	(-3.71)	(-3.84)	(-3.80)	(-3.46)
Sales	0.47	0.78	0.62	1.08
	(0.17)	(0.27)	(0.21)	(0.37)
Secretary	-6.04***	-7.19***	-7.12***	-5.19**
	(-2.68)	(-3.02)	(-2.94)	(-2.16)
Strategy	0.23	0.66	0.71	0.81
	(0.20)	(0.54)	(0.58)	(0.66)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	66,188	59,557	59,557	57,518
R^2	0.05	0.06	0.05	0.05

Table 2.16: Executive turnover

This table presents the estimates of linear probability models of manager turnover. Observations are at manager-year level over the period 2000-2015. The dependent variable, *Turnover*, is a dummy variable that equals to one hundred if a manager departs from the firm in the following year. *ROA* measures operating income before depreciation over total assets. *Stock return* measures the buy and hold stock return over 12 months before the fiscal year end. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level

	Executive turnover			
	(1)	(2)	(3)	(4)
Female	0.55**	0.47**	0.43**	0.34
	(2.53)	(2.18)	(2.01)	(1.62)
ROA	-8.32***			
	(9.56)			
Female * ROA	-0.16		0.07	
	(0.16)		(0.08)	
Stock return		-2.81***		
		(16.79)		
Female * Stock return		0.79*		1.11***
		(1.94)		(2.63)
VP	-2.26***	-2.20***	-2.17***	-2.08***
	(10.31)	(9.57)	(9.90)	(9.01)
SVP	-2.18***	-2.13***	-1.95***	-1.89***
	(9.05)	(8.44)	(8.17)	(7.54)
EVP	-0.93***	-0.96***	-0.68**	-0.70**
	(3.43)	(3.39)	(2.55)	(2.48)
President	-2.38***	-2.34***	-2.14***	-2.11***
	(9.83)	(9.23)	(8.81)	(8.31)
CEO	-7.13***	-7.23***	-6.76***	-6.89***
	(18.81)	(17.84)	(17.57)	(16.77)
Accounting	-3.07***	-3.25***	-2.66***	-2.77***
	(12.06)	(12.33)	(10.46)	(10.54)
Administration	-4.04***	-3.86***	-3.90***	-3.77***
	(6.85)	(6.28)	(6.56)	(6.11)
Finance	-2.09***	-2.31***	-1.80***	-2.04***
	(8.91)	(9.46)	(7.67)	(8.31)
HR	-2.58***	-2.74***	-2.53***	-2.71***
	(7.35)	(7.56)	(7.23)	(7.51)
IT	-2.68***	-2.73***	-2.59***	-2.62***
	(7.92)	(7.77)	(7.70)	(7.54)
Legal	-5.92***	-6.03***	-5.57***	-5.65***
	(24.50)	(23.97)	(23.29)	(22.77)
Marketing	1.02***	1.03***	0.97***	1.01***
	(2.84)	(2.73)	(2.72)	(2.70)

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Table 2.16 – *Continued from previous page*

	Executive turnover			
	(1)	(2)	(3)	(4)
Operations	-1.41***	-1.54***	-1.40***	-1.51***
	(5.72)	(6.02)	(5.64)	(5.86)
PR	-4.11***	-4.49***	-3.73***	-4.08***
	(9.12)	(9.86)	(8.32)	(8.97)
R&D	-3.27***	-3.15***	-3.02***	-2.94***
	(8.49)	(7.87)	(7.87)	(7.35)
Sales	1.20**	1.25**	1.46***	1.47***
	(2.43)	(2.39)	(2.93)	(2.81)
Secretary	-3.28***	-3.39***	-3.04***	-3.13***
	(5.92)	(5.75)	(5.56)	(5.39)
Strategy	-0.95***	-1.20***	-0.88**	-1.10***
	(2.71)	(3.31)	(2.53)	(3.01)
MBA	1.32***	1.30***	1.33***	1.33***
	(9.08)	(8.68)	(9.29)	(9.06)
Ivy league	0.67***	0.55***	0.64***	0.51***
	(3.51)	(2.74)	(3.35)	(2.62)
Inside dir	0.03	0.09	0.09	0.17
	(0.11)	(0.26)	(0.28)	(0.48)
Age (decades)	-11.84***	-12.89***	-12.21***	-13.22***
	(9.52)	(9.87)	(9.61)	(9.94)
Age^2	1.59***	1.70***	1.63***	1.73***
	(12.46)	(12.68)	(12.50)	(12.70)
CEO exp (decades)	0.90***	0.96***	0.87***	0.98***
	(4.47)	(4.60)	(4.33)	(4.66)
Industry exp (decades)	0.86***	0.94***	0.82***	0.91***
	(4.90)	(5.08)	(4.68)	(4.94)
Firm tenure (decades)	-1.53***	-1.63***	-1.43***	-1.49***
	(8.70)	(8.83)	(8.06)	(8.06)
Log assets	1.17***	0.37		
	(5.35)	(1.62)		
Firm FE	Yes	Yes	No	No
Year FE	Yes	Yes	No	No
Firm-year FE	No	No	Yes	Yes
Observations	296,619	273,080	294,946	271,874
R^2	0.05	0.05	0.08	0.07

Table 2.17: Gender promotion gap and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. In columns (1)-(3), *Competition* variables are continuous variables from Hoberg-Philips data library.(Hoberg and Phillips, 2016, Hoberg et al., 2014) In columns (4)-(6), *Competition* variables are quartiles of each corresponding competition measure. The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of General Managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions					
Competition measures	HHI	Similarity	Fluidity	HHI4	Similarity4	Fluidity4
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.76***	-1.35***	-1.60***	-1.76***	-2.00***	-1.91***
	(3.41)	(7.97)	(4.65)	(5.07)	(5.82)	(5.28)
Competition	-0.49	8.90***	-0.01	0.11	0.05	-0.01
	(0.87)	(3.81)	(0.17)	(0.85)	(0.28)	(0.12)
Female * Competition	1.87**	3.66***	0.06	0.24*	0.35***	0.30**
	(2.42)	(3.21)	(1.49)	(1.81)	(2.68)	(2.40)
MBA	0.73***	0.73***	0.76***	0.73***	0.73***	0.76***
	(6.13)	(6.13)	(6.31)	(6.13)	(6.13)	(6.31)
Ivy league	0.92***	0.92***	0.98***	0.92***	0.92***	0.98***
	(4.96)	(4.98)	(5.29)	(4.96)	(4.96)	(5.29)
Inside dir	6.83***	6.83***	6.75***	6.83***	6.83***	6.75***
	(13.20)	(13.20)	(12.61)	(13.20)	(13.21)	(12.61)
Age (10 yrs)	9.25***	9.26***	9.19***	9.24***	9.25***	9.19***
	(10.41)	(10.43)	(10.18)	(10.39)	(10.43)	(10.20)
Age squared	-1.08***	-1.08***	-1.07***	-1.08***	-1.08***	-1.07***
	(12.16)	(12.18)	(11.92)	(12.14)	(12.18)	(11.94)
CEO exp (10 yrs)	0.30	0.30	0.35	0.30	0.30	0.35
	(0.99)	(1.01)	(1.16)	(1.00)	(0.99)	(1.15)
Industry exp (10 yrs)	-0.04	-0.05	-0.01	-0.04	-0.04	-0.01
	(0.26)	(0.32)	(0.06)	(0.26)	(0.25)	(0.06)
Firm tenure (10 yrs)	0.15	0.16	0.14	0.15	0.15	0.13
	(0.96)	(1.00)	(0.83)	(0.96)	(0.95)	(0.82)
log assets	0.56***	0.52***	0.54***	0.54***	0.55***	0.54***
	(3.27)	(2.91)	(2.97)	(3.13)	(3.19)	(2.98)
SVP	-3.91***	-3.92***	-3.89***	-3.91***	-3.91***	-3.89***
	(14.66)	(14.69)	(14.35)	(14.66)	(14.64)	(14.35)
EVP	-7.81***	-7.81***	-7.81***	-7.81***	-7.81***	-7.81***
	(22.19)	(22.27)	(22.45)	(22.19)	(22.20)	(22.45)
President	-7.38***	-7.38***	-7.33***	-7.37***	-7.38***	-7.33***
	(23.74)	(23.75)	(23.53)	(23.72)	(23.74)	(23.54)

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Table 2.17 – *Continued from previous page*

	Dependent variable: Promotions					
Competition measures	HHI	Similarity	Fluidity	HHI4	Similarity4	Fluidity4
	(1)	(2)	(3)	(4)	(5)	(6)
	(1)	(2)	(3)			
CorpTitle unspecified	-3.76***	-3.75***	-3.75***	-3.76***	-3.76***	-3.75***
	(14.35)	(14.29)	(14.10)	(14.34)	(14.32)	(14.11)
Accounting	-2.80***	-2.79***	-2.75***	-2.79***	-2.79***	-2.75***
	(11.70)	(11.73)	(11.30)	(11.72)	(11.72)	(11.29)
Administration	-1.33***	-1.34***	-1.31**	-1.34***	-1.34***	-1.31**
	(2.64)	(2.65)	(2.56)	(2.65)	(2.65)	(2.56)
Finance	-0.32	-0.33	-0.27	-0.32	-0.32	-0.27
	(1.58)	(1.59)	(1.28)	(1.58)	(1.58)	(1.27)
HR	-2.60***	-2.60***	-2.64***	-2.60***	-2.60***	-2.63***
	(11.15)	(11.15)	(10.86)	(11.14)	(11.10)	(10.84)
IT	-3.00***	-3.00***	-2.99***	-3.00***	-3.00***	-2.99***
	(11.02)	(11.02)	(10.57)	(11.01)	(11.01)	(10.56)
Legal	-1.51***	-1.52***	-1.43***	-1.51***	-1.51***	-1.43***
	(6.83)	(6.86)	(6.40)	(6.82)	(6.83)	(6.41)
Marketing	0.37	0.37	0.34	0.37	0.37	0.34
	(1.27)	(1.30)	(1.17)	(1.28)	(1.29)	(1.17)
Operations	5.01***	5.00***	4.98***	5.01***	5.01***	4.98***
	(14.40)	(14.35)	(14.20)	(14.39)	(14.41)	(14.21)
PR	-4.45***	-4.45***	-4.40***	-4.44***	-4.44***	-4.40***
	(12.17)	(12.17)	(12.06)	(12.16)	(12.16)	(12.06)
R&D	-1.53***	-1.52***	-1.48***	-1.53***	-1.51***	-1.48***
	(5.66)	(5.66)	(5.29)	(5.67)	(5.63)	(5.26)
Sales	1.01*	1.01*	1.01*	1.01*	1.02*	1.01*
	(1.94)	(1.94)	(1.84)	(1.94)	(1.95)	(1.84)
Secretary	-3.47***	-3.47***	-3.34***	-3.47***	-3.46***	-3.34***
	(7.00)	(7.02)	(6.77)	(7.03)	(7.04)	(6.76)
Strategy	-0.61*	-0.61*	-0.64*	-0.61*	-0.60*	-0.64*
	(1.78)	(1.78)	(1.82)	(1.78)	(1.77)	(1.81)
Obs	210,156	210,156	203,108	210,156	210,156	203,108
R^2	0.03	0.03	0.03	0.03	0.03	0.03
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.18: Promotions and takeover threat
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *Takeover indicator* equals to one when there is at least one takeover event in the industry. The value is set to missing if a company is the takeover target. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions					
Sample	All	CorpLevel unspecified	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-1.51***	-1.79**	-1.51***	-2.05***	-1.81***	-0.07
	(5.66)	(2.55)	(2.92)	(3.93)	(3.14)	(0.09)
Takeover indicator	-0.20	-0.23	0.32	-0.91	-0.30	0.80
	(0.63)	(0.32)	(0.48)	(1.65)	(0.53)	(1.31)
Female * Takeover indicator	0.50	0.47	-0.00	0.48	1.51**	-0.09
	(1.56)	(0.59)	(0.01)	(0.71)	(2.10)	(0.09)
SVP	-3.86***					
	(14.48)					
EVP	-7.79***					
	(22.39)					
President	-7.35***					
	(24.29)					
CorpTitle unspecified	-3.73***					
	(14.53)					
MBA	0.74***	1.16***	0.52**	0.98***	0.59*	-0.20
	(6.15)	(2.99)	(2.12)	(3.46)	(1.71)	(0.56)
Ivy league	0.95***	0.86	1.21***	0.54	0.83**	1.15**
	(5.35)	(1.65)	(3.30)	(1.58)	(2.12)	(2.11)
Inside dir	6.69***	3.65***	2.67**	6.33***	5.52***	14.19***
	(13.99)	(4.19)	(2.35)	(4.09)	(5.90)	(11.09)
Age (10 yrs)	8.99***	11.05***	13.58***	8.67***	7.67***	11.04***
	(10.29)	(5.92)	(7.12)	(3.79)	(3.30)	(3.98)
Age squared	-1.05***	-1.17***	-1.49***	-1.05***	-0.89***	-1.14***
	(12.06)	(6.05)	(7.80)	(4.63)	(3.86)	(4.16)
CEO exp (10 yrs)	0.25	-0.62	2.94***	1.57*	1.23	1.84**
	(0.91)	(1.15)	(3.08)	(1.87)	(1.47)	(2.53)
Industry exp (10 yrs)	-0.04	-0.07	0.03	-0.31	-0.06	0.53
	(0.25)	(0.13)	(0.09)	(0.82)	(0.18)	(1.65)
Firm tenure (10 yrs)	0.15	0.47	0.73***	0.48	0.15	-0.22
	(0.91)	(0.96)	(2.64)	(1.25)	(0.43)	(0.70)

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Table 2.18 – *Continued from previous page*

	Dependent variable: Promotions					
Sample	All	CorpLevel unspeci-fied	VP	SVP	EVP	President
	(1)	(2)	(3)	(4)	(5)	(6)
Log assets	0.49***	0.22	0.53	1.37***	0.10	0.32
	(2.90)	(0.71)	(1.28)	(4.08)	(0.30)	(0.69)
Industry size	0.00	-0.00	-0.00	0.02	0.01	0.02*
	(0.62)	(0.45)	(0.57)	(1.15)	(1.01)	(1.80)
Accounting	-2.79***	-2.73***	-4.02***	-3.97***	-4.84***	-7.36
	(11.45)	(4.55)	(8.98)	(6.77)	(7.26)	(1.44)
Administration	-1.41***	0.07	-0.19	-1.70	-3.49***	10.26
	(2.96)	(0.04)	(0.17)	(1.57)	(4.39)	(0.79)
Finance	-0.36*	-1.10**	-1.07**	0.99*	-3.64***	6.02***
	(1.74)	(2.06)	(2.40)	(1.94)	(8.06)	(2.86)
HR	-2.58***	-1.03	-2.01***	-3.95***	-4.74***	6.41**
	(11.37)	(0.83)	(4.28)	(8.15)	(9.92)	(2.09)
IT	-2.98***	-2.08***	-4.95***	-3.10***	-3.89***	0.01
	(10.96)	(3.06)	(9.79)	(5.49)	(6.92)	(0.01)
Legal	-1.57***	-1.52**	-1.08**	-2.78***	-4.84***	1.56
	(7.38)	(2.33)	(2.36)	(5.78)	(10.55)	(0.26)
Marketing	0.30	1.13	-0.15	-0.49	-0.23	1.17
	(1.08)	(1.23)	(0.28)	(0.77)	(0.32)	(0.42)
Operations	4.98***	7.70***	0.77	1.62**	4.28***	11.78***
	(14.58)	(9.88)	(1.33)	(2.24)	(7.19)	(11.51)
PR	-4.44***	-4.83***	-6.01***	-5.06***	-4.83***	
	(11.87)	(4.51)	(9.98)	(5.98)	(5.76)	
R&D	-1.43***	-1.77**	-1.74***	-1.69**	-3.20***	-9.71***
	(5.15)	(2.35)	(3.14)	(2.23)	(3.40)	(3.02)
Sales	0.92*	1.86	0.78	-0.29	0.84	0.35
	(1.82)	(1.23)	(0.93)	(0.33)	(0.78)	(0.38)
Secretary	-3.48***	-3.67***	-4.46***	-3.63***	-3.87**	5.34
	(7.18)	(4.32)	(4.43)	(2.63)	(2.25)	(1.17)
Strategy	-0.72**	-0.51	-1.41**	-1.22**	-2.89***	2.36
	(2.24)	(0.60)	(2.16)	(2.23)	(5.06)	(1.53)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	220,941	34,355	76,233	52,441	32,398	23,401
R^2	0.03	0.07	0.06	0.05	0.07	0.16

Table 2.19: Promotions to a corporate level - baseline

This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion to [CorpLevel]*, is a dummy variable that equals to one hundred if a manager is internally promoted to [CorpLevel] in the following year. The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

Dependent variable	Promo to SVP	Promo to EVP	Promo to President	Promo to CEO
	(1)	(2)	(3)	(4)
Female	-0.37**	-0.48***	-0.52***	-0.23***
	(2.23)	(4.14)	(6.74)	(6.00)
MBA	0.02	0.28***	0.35***	0.21***
	(0.15)	(3.26)	(4.95)	(5.02)
Ivy league	0.42*	0.25*	0.32***	0.10
	(1.84)	(1.73)	(3.21)	(1.60)
Inside dir	-1.37***	0.18	2.37***	2.78***
	(4.71)	(0.59)	(7.88)	(12.69)
Age (10 yrs)	5.31***	3.49***	3.29***	1.50***
	(6.13)	(6.45)	(7.28)	(5.28)
Age squared	-0.59***	-0.39***	-0.40***	-0.17***
	(6.86)	(6.92)	(8.63)	(5.84)
CEO exp (10 yrs)	-0.31	0.00	0.05	0.77***
	(1.53)	(0.01)	(0.33)	(4.80)
Industry exp (10 yrs)	0.02	-0.01	-0.08	0.02
	(0.12)	(0.07)	(0.82)	(0.46)
Firm tenure (10 yrs)	0.21	0.09	0.09	-0.03
	(1.37)	(0.78)	(0.99)	(0.53)
Log assets	0.18	0.43***	0.12*	0.06
	(0.91)	(3.60)	(1.72)	(0.98)
SVP	-8.64***	3.57***	0.63***	0.24***
	(24.59)	(22.52)	(7.01)	(5.52)
EVP		-4.41***	2.88***	0.90***
		(8.95)	(16.90)	(11.32)
President			-3.52***	0.79***
			(19.01)	(6.80)
CorpLevel unspecified	-4.13***	-0.22*	1.03***	0.63***
	(20.13)	(1.70)	(7.81)	(9.50)
Accounting	-0.61***	-0.51***	-2.46***	-0.22***
	(2.63)	(3.65)	(14.70)	(3.91)
Administration	-0.16	0.61	-2.31***	-0.27**
	(0.23)	(1.26)	(8.09)	(2.02)

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Table 2.19 – *Continued from previous page*

Dependent variable	Promo to SVP	Promo to EVP	Promo to President	Promo to CEO
	(1)	(2)	(3)	(4)
Finance	0.21	1.00***	-2.06***	0.01
	(0.83)	(5.79)	(13.05)	(0.17)
HR	0.47	-0.84***	-2.49***	-0.30***
	(1.27)	(5.05)	(14.21)	(6.31)
IT	-1.13***	-0.45**	-2.27***	-0.41***
	(3.21)	(2.33)	(12.26)	(6.53)
Legal	1.12***	-0.03	-2.61***	-0.27***
	(4.33)	(0.20)	(15.46)	(5.12)
Marketing	0.06	0.16	-0.29	-0.07
	(0.20)	(0.76)	(1.59)	(0.86)
Operations	0.26	0.54**	2.18***	1.35***
	(0.87)	(2.25)	(10.37)	(11.84)
PR	-2.54***	-1.43***	-2.08***	-0.24***
	(6.65)	(6.35)	(10.62)	(3.29)
R&D	0.11	-0.27	-1.64***	-0.35***
	(0.32)	(0.92)	(10.53)	(5.18)
Sales	1.16**	0.12	-0.39	-0.05
	(2.26)	(0.41)	(1.60)	(0.49)
Secretary	-0.89*	-0.75***	-2.42***	-0.73***
	(1.93)	(2.95)	(9.53)	(5.13)
	(1.20)	(1.66)	(8.31)	(3.54)
Observations	118,571	171,997	220,484	220,484
R^2	0.06	0.04	0.03	0.03
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 2.20: Promotions to each corporate level and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion to [CorpLevel]*, is a dummy variable that equals to one hundred if a manager is internally promoted to [CorpLevel] in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). All regressions include year FE, firm FE, corporate level FE, and functional expertise FE. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

Dependent variable	Promo to SVP	Promo to EVP	Promo to President	Promo to CEO
	(1)	(2)	(3)	(4)
		Panel A		
Female	-0.50**	-0.43***	-0.74***	-0.31***
	(2.19)	(3.03)	(7.32)	(5.94)
High competition (HHI)	0.47*	0.04	0.03	0.02
	(1.75)	(0.23)	(0.33)	(0.33)
Female * High competition (HHI)	0.28	-0.11	0.49***	0.16**
	(0.75)	(0.57)	(3.64)	(2.11)
Observations	108,266	157,437	202,114	202,114
R^2	0.06	0.05	0.03	0.03
		Panel B		
Female	-0.40*	-0.47***	-0.75***	-0.28***
	(1.83)	(3.31)	(7.16)	(5.16)
High competition (Similarity)	0.21	0.01	-0.09	-0.02
	(0.64)	(0.05)	(0.62)	(0.29)
Female * High competition (Similarity)	0.04	-0.03	0.55***	0.12
	(0.12)	(0.12)	(3.64)	(1.39)
Observations	108,266	157,437	202,114	202,114
R^2	0.06	0.05	0.03	0.03
		Panel C		
Female	-0.41*	-0.55***	-0.76***	-0.29***
	(1.75)	(3.78)	(6.60)	(5.17)
High competition (Fluidity)	-0.15	0.21	-0.09	-0.03
	(0.51)	(1.17)	(0.79)	(0.44)
Female * High competition (Fluidity)	0.13	0.11	0.50***	0.10
	(0.42)	(0.55)	(3.04)	(1.16)
Observations	104,832	152,286	195,363	195,363
R^2	0.06	0.05	0.03	0.03

Table 2.21: Gender promotion gap and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (icode300). *, ** and *** denote significant at the 10%, 5% and 1% level

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-1.20***	-1.50***	-1.41***	-1.51***
	(-7.94)	(-6.98)	(-7.05)	(-7.20)
High competition		0.26	0.06	0.03
		(1.16)	(0.18)	(0.14)
Female * High competition		0.64**	0.48	0.65**
		(2.26)	(1.63)	(2.11)
SVP	-3.85***	-3.92***	-3.92***	-3.90***
	(-14.90)	(-15.17)	(-15.15)	(-15.10)
EVP	-7.69***	-7.78***	-7.78***	-7.78***
	(-23.30)	(-23.15)	(-23.13)	(-23.43)
President	-7.27***	-7.37***	-7.37***	-7.32***
	(-26.92)	(-26.01)	(-26.04)	(-25.43)
Corportitle unidentified	-3.74***	-3.77***	-3.77***	-3.76***
	(-16.94)	(-16.02)	(-16.01)	(-16.05)
MBA	0.72***	0.73***	0.73***	0.76***
	(4.91)	(5.12)	(5.13)	(5.31)
Ivy league	0.87***	0.89***	0.89***	0.95***
	(4.63)	(4.56)	(4.56)	(4.86)
Inside dir	6.79***	6.89***	6.89***	6.82***
	(16.13)	(15.70)	(15.69)	(15.30)
Age (10 yrs)	8.61***	9.25***	9.26***	9.21***
	(9.66)	(9.88)	(9.86)	(9.63)
Age squared	-1.01***	-1.08***	-1.08***	-1.08***
	(-11.22)	(-11.30)	(-11.28)	(-11.02)
CEO exp (10 yrs)	0.11	0.27	0.27	0.32
	(0.35)	(0.80)	(0.81)	(0.96)
Industry exp (10 yrs)	-0.03	-0.02	-0.02	0.01
	(-0.17)	(-0.09)	(-0.10)	(0.06)
Firm tenure (10 yrs)	0.13	0.12	0.12	0.11
	(0.74)	(0.67)	(0.68)	(0.57)
Log assets	0.57***	0.51**	0.52***	0.49**
	(3.03)	(2.53)	(2.61)	(2.49)

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Table 2.21 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Accounting	-2.73***	-2.78***	-2.78***	-2.74***
	(-10.80)	(-11.01)	(-11.00)	(-10.67)
Administration	-1.40***	-1.36***	-1.36***	-1.33**
	(-2.91)	(-2.65)	(-2.66)	(-2.53)
Finance	-0.32	-0.33	-0.33	-0.28
	(-1.51)	(-1.55)	(-1.54)	(-1.28)
HR	-2.59***	-2.59***	-2.59***	-2.62***
	(-10.17)	(-9.86)	(-9.82)	(-9.64)
IT	-3.01***	-3.00***	-3.00***	-2.99***
	(-8.82)	(-8.80)	(-8.79)	(-8.59)
Legal	-1.58***	-1.51***	-1.51***	-1.42***
	(-7.45)	(-6.71)	(-6.69)	(-6.30)
Marketing	0.30	0.37	0.37	0.33
	(1.04)	(1.25)	(1.25)	(1.07)
Operations	4.95***	5.05***	5.05***	5.03***
	(14.20)	(13.97)	(13.97)	(13.80)
PR	-4.52***	-4.46***	-4.46***	-4.42***
	(-13.67)	(-13.72)	(-13.66)	(-13.42)
R&D	-1.57***	-1.54***	-1.54***	-1.49***
	(-6.62)	(-6.43)	(-6.43)	(-6.15)
Sales	0.87*	1.00**	1.00**	1.00**
	(1.75)	(2.03)	(2.04)	(1.99)
Secretary	-3.36***	-3.45***	-3.44***	-3.31***
	(-7.68)	(-7.36)	(-7.39)	(-7.04)
Strategy	-0.75***	-0.62**	-0.62**	-0.65**
	(-2.72)	(-2.09)	(-2.08)	(-2.13)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	219,066	207,752	207,752	200,823
R^2	0.03	0.03	0.03	0.03

Table 2.22: Gender promotion gap and board gender diversity in firms where competitive threat is low

This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. Column(1)-(3) include observations where the competition, measured by HHI, Similarity, and Fluidity respectively, is low. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level

	Dependent variable: Promotions		
	(1)	(2)	(3)
Female	-1.52***	-1.18***	-1.28***
	(-5.02)	(-4.08)	(-4.03)
Female director ratio	-0.54	-1.24	0.96
	(-0.30)	(-0.69)	(0.52)
Female * Female director ratio	1.12	-0.21	-0.19
	(0.58)	(-0.13)	(-0.10)
SVP	-3.58***	-3.47***	-3.47***
	(-10.42)	(-11.47)	(-9.98)
EVP	-7.52***	-7.18***	-7.23***
	(-15.92)	(-15.59)	(-15.91)
President	-7.48***	-7.47***	-7.24***
	(-18.44)	(-18.98)	(-17.88)
Corportitle unidentified	-3.45***	-3.51***	-3.62***
	(-10.85)	(-11.86)	(-11.49)
MBA	0.78***	0.81***	0.90***
	(4.71)	(5.22)	(5.50)
Ivy league	0.65***	0.78***	0.80***
	(2.84)	(3.32)	(3.37)
Inside dir	6.72***	7.07***	7.03***
	(10.93)	(12.21)	(12.04)
Age (10 yrs)	8.64***	8.92***	10.91***
	(7.14)	(7.18)	(8.76)
Age squared	-1.00***	-1.03***	-1.22***
	(-8.31)	(-8.36)	(-9.87)
CEO exp (10 yrs)	0.20	0.01	-0.08
	(0.71)	(0.03)	(-0.21)
Industry exp (10 yrs)	-0.09	0.14	-0.15
	(-0.43)	(0.68)	(-0.72)
Firm tenure (10 yrs)	0.14	-0.08	0.11
	(0.70)	(-0.38)	(0.49)
Log assets	0.38	0.57**	0.41
	(1.63)	(2.47)	(1.63)
Accounting	-3.15***	-3.10***	-3.25***

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Table 2.22 – *Continued from previous page*

	Dependent variable: Promotions		
	(1)	(2)	(3)
	(-10.33)	(-10.44)	(-10.76)
Administration	-0.92	-1.59***	-1.60**
	(-1.40)	(-2.72)	(-2.58)
Finance	-0.58**	-0.53**	-0.24
	(-2.37)	(-2.01)	(-0.80)
HR	-2.71***	-2.70***	-3.00***
	(-8.44)	(-9.08)	(-9.01)
IT	-3.57***	-3.66***	-3.64***
	(-10.61)	(-10.81)	(-9.49)
Legal	-1.99***	-2.11***	-2.04***
	(-7.58)	(-8.03)	(-7.14)
Marketing	0.50	0.44	0.15
	(1.31)	(1.14)	(0.36)
Operations	5.27***	5.62***	5.57***
	(13.56)	(13.54)	(13.16)
PR	-4.35***	-4.33***	-4.89***
	(-8.49)	(-8.66)	(-10.16)
R&D	-1.88***	-1.63***	-1.34***
	(-4.86)	(-3.73)	(-2.89)
Sales	0.91	1.16*	0.83
	(1.45)	(1.72)	(1.13)
Secretary	-3.42***	-3.32***	-3.53***
	(-5.74)	(-5.11)	(-5.84)
Strategy	-0.56	-0.66	-0.54
	(-1.28)	(-1.59)	(-1.21)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	120,099	129,349	113,090
Adjusted R-squared	0.04	0.03	0.03

Table 2.23: Reproduce using ExecuComp Data
This table presents the estimates of linear probability models of promotions. The sample includes executives who are in both BoardEx and ExecuComp. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-0.67	-1.35***	-1.01**	-0.70
	(-1.56)	(-2.62)	(-1.97)	(-1.15)
High competition		0.80*	-0.42	0.41
		(1.79)	(-0.64)	(0.88)
Female * High competition		1.57*	0.89	-0.06
		(1.94)	(1.12)	(-0.07)
MBA	1.14***	1.11***	1.10***	1.17***
	(3.72)	(3.56)	(3.56)	(3.69)
Ivy league	0.65*	0.70*	0.70*	0.73*
	(1.67)	(1.72)	(1.70)	(1.72)
Inside dir	8.61***	8.77***	8.77***	8.63***
	(12.12)	(11.88)	(11.86)	(11.51)
Age (10 yrs)	7.33***	8.72***	8.76***	9.41***
	(3.35)	(3.82)	(3.84)	(4.11)
Age squared	-0.96***	-1.11***	-1.11***	-1.18***
	(-4.43)	(-4.92)	(-4.94)	(-5.21)
CEO exp (10 yrs)	-1.22**	-1.18*	-1.20*	-1.07
	(-1.98)	(-1.82)	(-1.83)	(-1.62)
Industry exp (10 yrs)	-0.52*	-0.52*	-0.53*	-0.57*
	(-1.76)	(-1.70)	(-1.72)	(-1.81)
Firm tenure (10 yrs)	-0.04	-0.05	-0.04	0.03
	(-0.14)	(-0.15)	(-0.13)	(0.10)
Log assets	1.31***	1.31***	1.36***	1.28***
	(3.64)	(3.46)	(3.61)	(3.20)
CorpTitle unspecified	-9.62***	-9.56***	-9.57***	-9.55***
	(-11.99)	(-11.90)	(-11.88)	(-11.49)
SVP	-8.61***	-8.82***	-8.83***	-8.83***
	(-12.43)	(-13.03)	(-13.02)	(-12.46)
EVP	-16.09***	-16.22***	-16.23***	-16.20***
	(-22.32)	(-22.66)	(-22.65)	(-22.09)

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Table 2.23 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
President	-15.42***	-15.54***	-15.54***	-15.41***
	(-19.05)	(-18.72)	(-18.71)	(-18.18)
Accounting	-3.59***	-3.57***	-3.56***	-3.40***
	(-6.25)	(-6.04)	(-6.02)	(-5.56)
Administration	-2.48***	-2.55***	-2.56***	-2.52***
	(-3.25)	(-3.24)	(-3.26)	(-3.15)
Finance	-1.87***	-1.86***	-1.86***	-1.76***
	(-4.79)	(-4.53)	(-4.54)	(-4.26)
HR	-6.47***	-6.76***	-6.78***	-6.66***
	(-8.22)	(-8.33)	(-8.33)	(-7.55)
IT	-4.14***	-3.94***	-3.96***	-3.76***
	(-6.46)	(-5.64)	(-5.65)	(-5.33)
Legal	-5.32***	-5.24***	-5.25***	-4.99***
	(-12.01)	(-11.18)	(-11.18)	(-10.53)
Marketing	0.67	0.51	0.49	0.42
	(1.00)	(0.69)	(0.67)	(0.59)
Operations	7.57***	7.73***	7.72***	7.64***
	(12.97)	(12.35)	(12.33)	(12.05)
PR	-7.36***	-6.74***	-6.76***	-6.38***
	(-4.76)	(-4.30)	(-4.29)	(-4.05)
R&D	-2.40***	-2.29***	-2.29***	-2.10***
	(-3.37)	(-3.16)	(-3.16)	(-2.82)
Sales	0.31	0.59	0.59	0.62
	(0.30)	(0.55)	(0.55)	(0.55)
Secretary	-3.29*	-3.18*	-3.19*	-3.42*
	(-1.87)	(-1.78)	(-1.79)	(-1.92)
Strategy	-0.94	-0.72	-0.76	-0.73
	(-1.02)	(-0.73)	(-0.77)	(-0.72)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	58,781	55,790	55,790	53,925
R^2	0.05	0.05	0.05	0.05

Table 2.24: Gender promotion gap and product market competition
This table presents the estimates of linear probability models of promotions. Observations are at manager-year level over the period 2000-2015. The sample excludes any executive who leaves the firm or the sample in the following year. The dependent variable, *Promotion*, is a dummy variable that equals to one hundred if a manager is internally promoted in the following year. *High competition* measures are dummy variables based on industry concentration, product similarity and product market fluidity from Hoberg and Phillips (2016) and Hoberg et al. (2014). The omitted group for corporate level consists of vice presidents. The omitted group for the functional expertise consists of general managers. t-statistics, reported in the parentheses, are calculated with standard errors clustered at industry level (SIC 4 digits). *, ** and *** denote significant at the 10%, 5% and 1% level.

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
Female	-1.20***	-1.50***	-1.43***	-1.51***
	(-8.89)	(-8.08)	(-7.59)	(-6.94)
High competition		0.31	0.04	0.03
		(1.25)	(0.15)	(0.12)
Female * High competition		0.66**	0.54**	0.67**
		(2.31)	(1.97)	(2.30)
Female executive industry representation	3.54	3.89	3.89	3.53
	(1.26)	(1.30)	(1.30)	(1.15)
MBA	0.72***	0.73***	0.73***	0.76***
	(6.40)	(6.12)	(6.13)	(6.31)
Ivy league	0.89***	0.92***	0.92***	0.98***
	(5.02)	(4.96)	(4.96)	(5.29)
Inside dir	6.58***	6.83***	6.83***	6.75***
	(14.50)	(13.20)	(13.21)	(12.61)
Age (10 yrs)	8.43***	9.25***	9.25***	9.19***
	(10.08)	(10.40)	(10.39)	(10.20)
Age squared	-0.99***	-1.08***	-1.08***	-1.07***
	(-11.89)	(-12.15)	(-12.14)	(-11.94)
CEO exp (10 yrs)	0.12	0.30	0.30	0.35
	(0.45)	(1.01)	(1.01)	(1.16)
Industry exp (10 yrs)	-0.03	-0.04	-0.04	-0.01
	(-0.23)	(-0.25)	(-0.26)	(-0.06)
Firm tenure (10 yrs)	0.12	0.15	0.15	0.14
	(0.79)	(0.96)	(0.96)	(0.83)
Log assets	0.52***	0.54***	0.55***	0.53***
	(3.33)	(3.12)	(3.22)	(2.97)
CorpTitle unspecified	-3.67***	-3.76***	-3.76***	-3.75***
	(-14.88)	(-14.36)	(-14.34)	(-14.13)
SVP	-3.83***	-3.91***	-3.91***	-3.89***
	(-14.02)	(-14.66)	(-14.65)	(-14.36)
EVP	-7.71***	-7.81***	-7.81***	-7.81***

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Table 2.24 – *Continued from previous page*

	Dependent variable: Promotions			
High competition measures		HHI	Similarity	Fluidity
	(1)	(2)	(3)	(4)
	(-21.79)	(-22.19)	(-22.16)	(-22.45)
President	-7.23***	-7.38***	-7.38***	-7.33***
	(-24.58)	(-23.73)	(-23.75)	(-23.55)
Accounting	-2.75***	-2.79***	-2.79***	-2.75***
	(-11.71)	(-11.71)	(-11.71)	(-11.28)
Administration	-1.37***	-1.33***	-1.34***	-1.31**
	(-2.95)	(-2.64)	(-2.65)	(-2.55)
Finance	-0.36*	-0.33	-0.32	-0.27
	(-1.78)	(-1.59)	(-1.58)	(-1.28)
HR	-2.60***	-2.60***	-2.60***	-2.63***
	(-11.73)	(-11.13)	(-11.12)	(-10.82)
IT	-2.97***	-3.00***	-3.00***	-2.99***
	(-11.47)	(-11.02)	(-11.02)	(-10.57)
Legal	-1.58***	-1.51***	-1.51***	-1.43***
	(-7.78)	(-6.84)	(-6.83)	(-6.41)
Marketing	0.26	0.37	0.37	0.34
	(0.95)	(1.29)	(1.29)	(1.16)
Operations	4.87***	5.01***	5.01***	4.98***
	(14.61)	(14.40)	(14.40)	(14.21)
PR	-4.45***	-4.44***	-4.44***	-4.40***
	(-12.15)	(-12.19)	(-12.15)	(-12.05)
R&D	-1.44***	-1.53***	-1.52***	-1.48***
	(-5.44)	(-5.65)	(-5.67)	(-5.28)
Sales	0.87*	1.01*	1.01*	1.02*
	(1.80)	(1.94)	(1.94)	(1.84)
Secretary	-3.41***	-3.47***	-3.47***	-3.34***
	(-7.27)	(-7.01)	(-7.03)	(-6.76)
Strategy	-0.77**	-0.61*	-0.61*	-0.64*
	(-2.48)	(-1.79)	(-1.78)	(-1.82)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs	229,406	210,156	210,156	203,108
R^2	0.03	0.03	0.03	0.03

Table 2.25: Firm tenure of inside directors
This table displays the firm tenure of female inside directors and male inside directors.

Firm tenure	N	Mean	Min	P25	P50	P75	Max
Female inside directors	2,706	12.7	1	5	11	19	43
Male inside directors	56,710	12.5	1	4	10	19	50

Chapter 3

Decision to Fire Subordinates and CEO Turnover

3.1 Introduction

There is considerable evidence that boards use firm performance to evaluate their CEOs, but we know little about other factors that boards consider. Cornelli and Karakas (2013) suggest that non-performance-related information also plays an important role. In this study, I propose that one source of such information is CEOs' decisions to dismiss or retain their senior executives.

Top non-CEO executives are essential to CEOs' success and firm performance. Porter and Nohria (2010) report that CEOs spend 58% of their time with executives who directly report to them. Thus, a CEO may weed out incompetent executives, especially when the firm underperforms. In response to bad performance, the CEO may also adjust the firm's strategies, which may change the skill set required in the top management team.

On the other hand, CEOs may be reluctant or slow to make personnel changes, for several reasons. CEOs and their subordinates are socially connected, so firing close colleagues may impose a personal cost on CEOs (Landier et al., 2009). CEOs may also avoid changes because they prefer a "quiet life" (Bertrand and Mullainathan, 2003). CEOs may also be over-confident and slow to overturn their own decisions (Malmendier and Tate, 2005).

To study executive departures, I collect executive data from annual reports and proxy statements filed with the SEC. Item 401(b) of Regulation S-K requires a company to disclose its executive officers. An executive officer is defined as a "president, any vice president of the registrant in charge of a principal business unit, division or function (such as sales, administration or finance), any other officer who performs a policy making function or any other person who performs similar policy making functions for the registrant. Executive officers of subsidiaries may be deemed executive officers of the registrant if they perform such policy making functions for the registrant."[1] Because my goal is to infer CEOs' behavior, I examine the departures of non-CEO non-director executives (hereafter, executives). Such departures are usually a result of the CEO's rather than the board's decision.

Compared with data from ExecuComp, a commonly used source of data for studying executives, my dataset is larger. The average number of executives is 4 in ExecuComp and 7 in my data. Furthermore, a change in pay rank may be identified as a departure event in ExecuComp even if there is no change in job title. My data are free from such problems, so I can measure departures more accurately.

Using the executive data for S&P1500 firms during the period from 2005 to 2011, I document a negative relation between firm performance and the likelihood of subsequent executive departures. Fee and Hadlock (2004) also document this relation, but they conclude that the executives who leave with outgoing CEOs drive the results. If incumbent CEOs fire their subordinates, I expect to observe high executive departure-performance sensitivity even when CEOs retain their leadership. After taking CEO turnover into account, I still find a significantly negative relation between firm performance and executive departure probability. Compared with the executives in the top performance decile firms, executives in the bottom performance decile firms are 3.6% more likely to leave. Given that the average executive departure

[1]Securities Act of 1933, Rule 501(f), 17 C.F.R. § 230.501(f). The disclosed executives should be current officers, rather than those who held such positions during the last fiscal year.

rate is 15.6%, the increased turnover probability is economically meaningful.

There are several possible explanations for the high executive departure rate in badly performing firms. The executives may abandon ship and seek outside options, or they may be fired. It is not feasible to collect information about the nature of each executive departure because of the large sample size and low visibility of some executives. Jenter and Lewellen (2017) also argue that any turnover classification algorithm that relies on incomplete and often misleading information misclassifies some events. Therefore, similar to Jenter and Lewellen (2017), I do not draw a distinction between forced and voluntary departures.

To infer the nature of executive departures, I study CEOs' job security after executive departures. Because executives are salient players, it is plausible that the board considers the CEO's decisions to fire or retain them when evaluating the CEO. Executives abandoning the sinking ship are an indication of poor leadership; therefore, the CEO is likely to be punished. On the other hand, if the CEO fires executives in order to improve firm performance, the board may reward the CEO by retaining her. Anecdotal evidence supports this argument. One leadership consulting firm interviewed 1,087 directors from 286 organizations that fired their CEOs and found that 27% of CEOs lost their positions because they tolerated low performers.[2] My results show that CEOs with a higher executive departure rate are more likely to keep their jobs and have lower turnover-to-performance sensitivity, consistent with the conjecture that CEOs fire their subordinates when firm performance is poor.

If CEOs make changes in their top management teams in response to poor performance, what motivates these changes? The corporate governance literature documents that firms under intense external and internal scrutiny are likely to hold CEOs accountable. The same disciplinary force can motivate incumbent CEOs to overcome their inertia and initiate changes. I measure monitoring pressure via three channels. I use anti-takeover protections to measure the external pressure from the market for corporate control, board independence as a proxy for board monitoring,

[2]http://www.forbes.com/sites/markmurphy/2015/07/16/leadership-styles-are-often-why-ceos-get-fired

and institutional ownership to capture the scrutiny from institutional investors (Bebchuk et al., 2009, Weisbach, 1988, Denis et al., 1997, Shleifer and Vishny, 1997, Chakraborty et al., 2009). I use CEO ownership to measure CEO power. My results show that executive departure-performance sensitivity is higher in firms where CEOs are under more scrutiny and are less powerful.

While the results are consistent with the conjecture that CEOs dismiss their subordinates in order to improve firm performance, alternative stories can also explain these results. It is possible that badly performing CEOs engage in window dressing by conveying the appearance of changes. Another potential concern is that dismissed executives serve as scapegoats. These arguments predict that little will change in the business when executives leave; thus executive departures do not lead to improved firm performance. However, my results show that executive departures predict the likelihood of retrenchment events, and they are associated with improvement in operational performance. Therefore, these results do not support the window-dressing and scapegoat stories.

This study suggests that boards consider CEOs' decisions to fire or retain their subordinates when evaluating CEOs. It complements studies that suggest the important role of non-performance-related information in CEO evaluation (Cornelli and Karakas, 2013, Jacobsen, 2014).

Most empirical research treats retained badly performing CEOs as a homogeneous group and presumes that they are retained due to entrenchment. However, my results reveal their heterogeneity and suggest that some CEOs are retained because they can overcome inertia and actively make changes. This study therefore complements those of Fisman et al. (2014) and Bushman et al. (2010), who offer explanations for retaining badly performing CEOs from a non-agency-theory perspective.

Though non-CEO executives are essential to firm performance, most studies on management turnover in badly performing firms focus on CEO turnover, and in some cases turnover of the chairperson or president (Warner et al., 1988, Gilson, 1989, Denis and Kruse, 2000). My study fills this gap by focusing on non-CEO executive departures and provides new insight into CEO turnover. It differs from Fee and Hadlock (2004), another study on non-CEO executive departures, by documenting that executive departures are sensitive to performance even when CEOs are retained.

3.2 Data

My sample consists of companies that are S&P 1500 constituents between January 1, 2005, and December 31, 2011.[3] I collect the executive data from annual reports and proxy statements filed with the SEC. Item 401 (b) of Regulation S-K requires a company to list the names, ages, and experiences of all executive officers of the registrant and all persons chosen to become executive officers. I use a Ruby script to extract relevant information from the SEC filings. Appendix B provides a detailed description of the extraction process.

I collect board data from BoardEx, firm financial statement information from Compustat/CRSP merged data, monthly common stock price information from CRSP, institutional investor ownership from Thomson Reuters, anti-takeover protections and CEO ownership from International Shareholder Services (ISS, formerly RiskMetrics), CEO compensation from ExecuComp, and corporate events from Capital IQ key developments. Appendix A presents the variable definitions.

Capital IQ provides structured summaries of material news and events that may affect the market value of securities. I use the event type variable in Capital IQ to classify the events. For example, reorganization events are those with the event type ID 32. The event dummy equals one if a firm has at least one news item related

[3]If a company was dropped from or added to the S&P 1500 index during the sample period, I collected all available information from 2005 to 2011. I choose 2005 as the starting point to avoid the shock of the passage of the Sarbanes-Oxley Act and changes in stock exchange rules related to board composition. These changes may have affected the non-director senior management team. For instance, a company may have replaced an inside director with an independent director to increase board independence, which would increase the non-director senior management team size. 2011 is the ending year because the latest available data (at the time when I gathered the data) were for the 2011 fiscal year. I also collect executive data from 2004 filings so that I can identify the executive departures in 2005.

to such an event in a fiscal year. The only event that is not identified by Capital IQ event type is "layoff" because layoff is not an event type category. I identify layoffs as events whose news headline includes the words "cut" (or its synonyms) and "jobs" (or its synonyms).

Compared with ExecuComp, a commonly used data source for studying executives, my executive officer dataset has two benefits. First, it is larger. The average number of non-CEO non-director executives in my sample is 7, whereas it is 4 in ExecuComp. Second, it identifies turnovers more accurately. ExecuComp usually includes the CEO, CFO, and three most highly compensated executives, and a change in compensation rank may be considered a turnover even when there is no change in the job title. For example, Apple's executive officer disclosure shows that Phillip W. Shiller is a Senior Vice President, Worldwide Product Marketing, during my entire sample period. But he appears in ExecuComp only from 2004 to 2006, and a researcher might identify Mr. Shiller as a departed executive in 2007 when looking at the ExecuComp data alone. The average turnover rate of non-director executives is 16.2% in the ExecuComp, whereas the turnover rate is 13.6% for the comparable senior executives in my data.[4][5]

However, there are two limitations in my data. First, some companies change the definition of the executive officer over the sample period. For example, Werner Enterprises reported its vice presidents as executive officers on its Form DEF14A filed on March 9, 2005. The next year, however, it excluded its vice presidents from its executive list on its Form DEF14A filed on April 4, 2006. The inconsistency in reporting inflates the number of executive departures. To reduce the impact of such incidents, I drop the observation when the number of departing executives is

[4]The average executive departure rate is 15.5% in my full sample. This is higher than the corresponding figure for the sample of executives who are comparable with those in ExecuComp because my sample also includes more junior executives whose turnover rate is higher than that of the senior executives.

[5]Additionally, a few firms apply a team-based approach to executive compensation, awarding the same base salary, annual cash incentive, and long-term equity awards to each executive officer other than the CEO. Apple Inc. is one example. For such firms, the non-CEO executive compensation rank depends on other types of compensation such as corporate aircraft and relocation. Thus the rank is less informative of seniority, and inclusion in the ExecuComp database may be arbitrary.

over thirty. The second problem is an extraction error. The extracted data may be incorrect when a file format is not standard. It is plausible that the format selection, especially the underlying HTML structure, is not correlated with the variables of interest. Therefore, it is unlikely that these data errors lead to biases.

Table 3.2 reports the changes in sample size in the sample construction process. 2,140 companies are S&P 1500 constituents in the sample period, of which BoardEx covers 2,137 firms. The number of firm-year observations in the original BoardEx data is 14,477, and the number decreases to 13,898 after I merge the BoardEx data with the Compustat/CRSP data.[6] After I merge the financial and director data with the hand-collected executive officer data, my final sample includes 13,146 firm-year observations.

Table 3.3 reports the descriptive statistics at the company and individual level. On average, executives are 51 years old, younger than the average CEO of 55 years. 11.7% of executives are female, whereas only 3% of CEOs are female. The average CEO turnover rate and non-CEO non-director executive departure rate are 9.6% and 15.5%, respectively, comparable to the rates in Fee and Hadlock (2004).

3.3 Results

3.3.1 Executive departures and performance

This subsection examines the relation between firm performance and subsequent executive departures. Table 3.4 reports the results of the linear probability model estimates. The dependent variable, executive departure, is a dummy variable that equals one when an executive leaves in the next year, and the value is set as missing when a company exists in my sample in the next year. As in Jenter and Lewellen (2017), the performance measure is the decile of the market adjusted stock return. My variable definitions imply a lag of one year between departures and firm perfor-

[6] 435 out of 549 unmatched firm-year observations occur because BoardEx reports director data at the month when the security of a firm was delisted, whereas Compustat/CRSP may not have financial information for the year when the security was delisted.

mance, and departures due to delisting or takeover are excluded.

Control variables include age, gender, total assets and stock return volatility. I use firm fixed effects to control for time-invariant firm characteristics, such as corporate culture, that may be correlated to both performance and the probability of executive departure. I also include year fixed effects to take into account cross-sectional shocks. Standard errors are adjusted to allow for arbitrary within-firm correlations in the error term.

In column (1), I find that the coefficient on stock return is significantly negative. The point estimate implies that executives who work for firms in the bottom decile are 3.6% more likely to leave than executives who work for firms in the top decile. Compared with CEO departures, reported in Column (4), executive departures are less sensitive to firm performance. This is consistent with the idea that firm performance is more informative about a CEO than about an executive who is usually responsible for only a part of the business (Holmstrom, 1979).

The negative relation between firm performance and executive departures is also documented by Fee and Hadlock (2004). However, they conclude that executives who leave with their departing CEOs drive the results. To conclude that incumbent CEOs dismiss their subordinates, I need to ensure that the negative relation is not driven by executives who leave with their outgoing CEOs. In column (2), I add an indicator variable that equals one if CEO turnover takes place. The coefficient of the performance variable is still significantly negative. These results are not consistent with those of Fee and Hadlock (2004), who find that the sensitivity weakens dramatically, in some cases becoming insignificant, after they control for CEO turnover. As mentioned above, my sample has more executives than the corresponding ExecuComp sample, which is the source of the data in Fee and Hadlock (2004), and a larger sample gives higher statistical power. Moreover, the different sample periods may be another factor. Fee and Hadlock (2004) study management turnover from 1993 to 1998, and my sample period is from 2005 to 2011. Kaplan and Minton (2012) examine CEO turnovers from 1992 to 2005 and find that CEO turnover increases in the more recent period since 1998, which suggests that CEO jobs have become less secure in recent years. CEOs with less job security may react more aggressively to poor performance and thus be more likely to replace their subordinates. I test this hypothesis formally in a later part of this study.

The coefficients on other variables conform to the conventional views. The coefficients on the CEO turnover dummies are positive, suggesting that executives are more likely to leave in the year when the CEO leaves. The coefficients on age are positive, suggesting that older executives are more likely to leave, perhaps because of retirement.

One omitted variable, executive competency, can potentially lead to bias. Executive competency is positively associated with firm performance and negatively associated with dismissal probability, which leads to a downward bias. To address this concern, I use individual-firm fixed effects in column (3), capturing time-invariant personal characteristics such as competency. As expected, the economic magnitude of the coefficient on firm performance declines after I correct for the downward bias (from 0.004 to 0.002), but it remains statistically significant at the 1% level.[7]

3.3.2 Executive departures and CEO turnover

While Table 3.4 shows that senior executives are likely to leave badly-performing firms, it's not clear how to infer CEO behavior from these results. On one hand, firms may lose their talents when they approach financial distress (Baghai et al., 2016), indicating poor CEO leadership. On the other hand, it may show CEO's efforts to improve performance by dismissing incompetent executives or executives whose skills are no longer in demand because of changes in strategies. Due to the large sample size and low visibility of some executives, it is not feasible to collect whether each departure is forced or voluntary. Moreover, Jenter and Lewellen (2017) argue that the CEO turnover classification algorithm relies on incomplete and often

[7]The age variable measures an individual's age at the date of reporting. Though the standard reporting interval is one year, some reporting intervals deviate from the norm. Thus, the coefficients on age are significantly reduced, but they are not completely captured by person-firm fixed effects.

misleading information and thus misclassifies some events. To disentangle these two interpretations, I examine how boards view executive departures. If a board considers them as an indicator of poor leadership, it may punish the CEO by firing him. In contrast, if the board views that the CEO demonstrates his ability to overcome inertia and make changes, it may reward the CEO by retaining him.

Table 3.5 reports the results of the linear probability model estimates of the relation of executive departures on subsequent CEO turnover. The sample contains CEOs only. The dependent variable is the CEO turnover dummy indicating that the CEO leaves the position in year t+1. I control for the stock return in year t and t-1. CEO turnover at year t is not controlled because by definition a CEO who leaves a firm in current year cannot leave the same position again in the next year.

In column (1), the main variable of interest is the executive departure rate, measuring the number of departing executives over the total number of executives. The coefficient on the executive departure rate is negative and statistically significant. One executive departure in an average team (team size 7) implies a 0.6% decrease in the probability of CEO turnover. Given the average CEO turnover at 9.6%, the effect of executive departures on CEO turnover is moderate.

Next, I examine the relation between executive departures and CEO turnover-performance sensitivity. The main variable of interest is the interaction term between the executive departure rate and firm performance. Some executives may leave due to poor leadership, leading to a negative response in the stock market. To ensure that an executive departure is triggered by bad performance, I measure firm performance in the year preceding the executive departure. Column (2) shows that the coefficient of the interaction term is positive, consistent with the conjecture that CEOs are more likely to keep their jobs after bad firm performance when they fire their subordinates. Alternatively, the results may suggest that in low performing firms, executive departure decreases the likelihood of CEO departure to performance sensitivity. But in high performing firms, executive departure may be voluntary and indicative of an inability of CEOs to retain high performing executives, and therefore may result in no effect or even have a positive effect on CEO departure. This relation is robust to controlling for the interaction term between the executive departure rate and contemporaneous firm performance, reported in column (3).

Executive departures are usually publicly announced. The contemporaneous stock return can incorporate any information that is related to an executive departure. The results suggest that executive departures are more informative to boards than to the public. It is possible that boards know the context and reasons of the dismissals, whereas the market accesses no such information. Moreover, firms sometimes disguise departure events, making them less informative to the public.

3.3.3 What motivates the changes?

In Table 3.4, I show that executive departures are sensitive to firm performance. A natural follow-up question is what factors influence this relation. The literature documents that firms under intense scrutiny are more likely to fire badly performing CEOs (Weisbach, 1988, Denis et al., 1997). The same disciplinary effect may also force CEOs to react to bad performance. This argument predicts that the higher a dismissal threat the CEO faces, the more likely he or she is to adjust his top management team.

I use five measures to proxy for the dismissal risk faced by CEOs: the anti-takeover index (e-index), board independence, institutional investor ownership, CEO ownership, and CEO total compensation. An extensive literature documents the disciplinary effect of the market on corporate control (see, e.g., Bertrand and Mullainathan (2003), Bebchuk et al. (2009)). Weisbach (1988) reports that boards with a higher proportion of independent directors are more likely to fire underperforming CEOs. Shareholder ownership empowers shareholders, whereas management ownership insulates them from scrutiny(Shleifer and Vishny, 1997, Denis et al., 1997). Therefore, I use institutional investor ownership and CEO ownership to proxy for institutional investor monitoring and CEO power.

Table 3.6 presents the results of the linear probability model estimates of the effect of the CEO dismissal risk on executive departure-performance sensitivity. The dependent variable is the dummy variable indicating that the executive leaves in the next year. The main variables of interest are the interaction terms between firm performance and each proxy for CEO dismissal risk. The results generally show a positive association between executive departure-performance sensitivity and CEO dismissal risk, consistent with my hypothesis that CEOs facing higher dismissal risk react to poor performance more actively.

3.3.4 Firm performance after executive departures

While the results are consistent with the conjecture that CEOs dismiss their subordinates following poor performance, it is unclear why CEOs initiate the changes. It is possible that badly performing CEOs engage in window dressing by making a show of changes. Another possibility is that dismissed executives serve as scapegoats. Khanna and Poulsen (1995) study firms that filed for Chapter 11 and find evidence suggesting that when managers are fired for financial distress, they serve as scapegoats. In contrast, Fee and Hadlock (2004) find that dismissed executives are punished in the labor market, inconsistent with the scapegoat hypothesis. The window dressing and scapegoat arguments predict that few changes occur in the business when executives leave, and executive departures do not lead to improvement in firm performance. I examine the effect of executive departures on changes in firm performance in this subsection and other corporate events in the next subsection.

The window dressing and scapegoat hypotheses argue that executive departures are not genuine efforts to improve firm performance; therefore, I expect to observe no subsequent improvement. Moreover, another alternative hypothesis is that executive departures are voluntary. High voluntary departures usually indicate a leadership problem, and thus I expect firm performance to deteriorate ever more after such departures. On the other hand, if executive departures suggest organizational changes in response to declining performance, I expect to observe improvement in firm performance.

I use ROA to proxy for operating performance, which is defined as the operating income before depreciation scaled by total assets. The dependent variable is the change in ROA instead of the level of ROA because it is unlikely that a poorly performing firm fully recovers immediately after restructuring, however its performance should deteriorate to a less extent or even start to recover. This measure is similar to those used in Denis and Denis (1995) and Fisman et al. (2014), who evaluate firm performance after forced CEO turnovers.

Table 3.9 shows the results of the ordinary least squares estimates of the effect of executive departures on changes in operating performance. In columns (1) and (3), the change in ROA is measured by ROA_{t+1} minus ROA_{t-1}. In columns (2) and (4), the change in ROA is measured by ROA_{t+2} minus ROA_{t-1}. In columns (3) and (4), I include corporate event indicators. The results generally show a positive relation between executive departures and changes in ROA. The coefficients on the executive departure rate are statistically significant in columns (2) and (4), consistent with the idea that the effect of any changes may take a few years to materialize. The results provide suggestive evidence that executive departures are associated with subsequent improvement in performance.

In column (2), the coefficient on CEO turnover indicator is significantly positive. It suggests that CEO turnover is associated with 0.6% improvement in operating performance, whereas the coefficient on executive departure ratio suggests that one executive departure in an average team is associated with 0.2% (=0.013/7) improvement in operating performance. The larger improvement after CEO turnover is consistent with the more important role that a CEO plays. On the other hand, the searching cost for a CEO is also higher than the searching cost for an executive. Thus, it may be optimal for some firms with high CEO searching cost to replace executives.

In column (3) and (4), I include the corporate event indicators. I find similar results, which suggests that they are not driven by these corporate events that occur at the same time when executives leave. But I cannot exclude the possibility that some unobserved corporate events are correlated with both executive departures and improvement in firm performance, leading to omitted variable biases.

3.3.5 Other corporate events

While the results are consistent with the conjecture that CEOs dismiss their subordinates following poor performance, it is unclear why CEOs initiate the changes. It is possible that badly-performing CEOs engage in window dressing by showing an appearance of changes. Another possibility is that dismissed executives service as scapegoats. Khanna and Poulsen (1995) study the firms that filed for Chapter 11 and find evidence suggesting that when managers are blamed for financial distress, they are serving as scapegoats. In contrast, Fee and Hadlock (2004) find that dismissed executives are punished in the labor market, inconsistent with the scapegoat hypothesis. The window dressing and scapegoat arguments predict that few changes in the business when executives leave, and executive departures do not lead to improvement in firm performance. I examine the corporate events in this subsection and the effect of executive departures on changes in firm performance in next subsection.

I identify a wide range of corporate events from news releases and classify them into retrenchment events, expansion events, and events that indicate changes without clear impact on firm size. Retrenchment events include downsizing, layoff, spinoff, and seeking to sell assets. Expansion events include seeking to buy assets, M&A, and expansion. Reorganization and considering alternative strategies are events that line between retrenchment and expansion.[8]

Table 3.3 reports the descriptive statistics of the corporate events. 21.0% of firms reported discontinuing unit or downsizing in a year, 5.8% announced layoff, and 33.9% announced intentions to buy assets.

[8]These events are similar to events studied in Denis and Kruse (2000). Denis and Kruse (2000) study divestitures, spin-offs, plant closing, liquidations, layoff and cost-cutting programs. In my sample, the event type "seek to sell" includes divestitures; the event type "downsize" includes plant closings.

Table 3.7 presents the results of the linear probability models predicting the likelihood of other corporate events. First of all, I document that bad firm performance predicts the retrenchment events, consistent with John et al. (1992) and Denis and Kruse (2000).[9] I find that the executive departure rate is positively associated with the likelihood of retrenchment events. On the other hand, the relation between the executive departure rate and the likelihood of an expansion event is significantly negative or insignificant.

Next I analyze the relation between executive departures and other corporate events from a difference perspective. Replacing a badly-performing CEO is usually recognized as a strong disciplinary initiative. One reason is that a new CEO is believed to have better incentives to make changes (Weisbach, 1995). But replacing a CEO can be expensive and disruptive. It may be optimal for a board to retain the CEO who overcomes the inertia and actively changes the strategies. Thus, I compare actions taken by new CEOs, retained CEOs who actively make personnel changes (hereafter, active CEOs), and retained CEOs who make no changes in their executive teams (hereafter, passive CEOs).

Table 3.8 displays the results. The dummy variable, active CEO, equals to one if the CEO tenure is over two years and two or more executives leave. The dummy variable, passive CEO, equals to one if the CEO tenure is over two years and less than two executives leave. Here the cutoff for the executive departure rate is two because the departure is likely to be voluntary when there is only one. The omitted group in this set of regressions consists of new CEOs, whose tenure is not more than two years.

In comparison with new CEOs, passive CEOs are less likely to initiate retrenchment events. The actions of active CEOs are generally in line with the actions of new CEOs, though new CEOs are less likely to engage in M&A and more likely to seek to sell assets. The results are consistent with the idea that some badly-performing CEOs retain their jobs because they can overcome inertia and quickly revamp their

[9] John et al. (1992) also find no evidence of abnormal high levels of top management turnover following bad performance. Their top management includes the top two managers.

firms.

3.3.6 Executive team size

This subsection examines whether executive departures have a long-lasting effect on executive team size. When executives are fired for incompetency or leave voluntarily, the effect of their departures will be temporary, as CEOs will fill the vacancies. However, when executives leave due to strategy changes, such as divestiture or discontinuing a business unit, these positions are permanently eliminated, and the executives' departures will have a long-term effect on team size.

Table 3.10 presents the ordinary least squares estimates of the effect of executive departures on the executive team size. The dependent variable, team size, is the total number of non-CEO non-director executives when the annual report or proxy statement is filed, usually shortly after the fiscal year end. The main variable of interest is the executive departure ratio, which measures the percentage of departing executives during the year. In column (1), the coefficient on the executive departure rate is significantly negative, suggesting that a higher departure rate is associated with a smaller team size. In columns (2) and (3), I add the executive departure ratio from the year before and the ratio from the two years before, and the coefficients on the past departure rate variables are significantly negative. Not surprisingly, the economic magnitude of the executive departure rate is higher when the departures are closer to the time when the team size is measured.

The results show evidence that executive departures are associated with smaller team size in the two subsequent years. Two years is a reasonable period for the CEO to find a replacement if the CEO intends to do so. Therefore, the results suggest that some executives are dismissed as a part of retrenchment and are not replaced, which is consistent with the results showing that executive departures and firm retrenchments take place at the same time. Furthermore, they provide evidence against the notion that executive departures are voluntary.

3.4 Conclusion

Using a unique executive dataset collected from SEC filings, I document that executives are more likely to leave underperforming firms. The effect is not driven by executives who leave with outgoing CEOs. After executive departures, CEOs have a higher chance of keeping their jobs, and firms have lower turnover-to-performance sensitivity. The sensitivity of executive departures to performance increases in firms whose CEOs face higher dismissal risk. In addition, I find that executives depart at the same time as firms retrench.

The results suggest that when firms underperform, their executives are more likely to be fired by CEOs. Boards recognize these changes and reward CEOs by retaining them. Overall, this study provides insights into what CEOs do in response to poor performance, how boards evaluate CEOs, and why some badly performing CEOs retain their leadership.

3.5 Appendix 1 for Chapter 3

In this Appendix, I describe my procedure to collect executive officer data from SEC filings.

I first download relevant files from SEC Edgar website. I start with the SEC indices files, which contain the link to each file submitted to SEC. Then I use a Ruby script to download all Form 10-K and DEF14A filed by companies in the S&P 1500 index during 2005 and 2012.

The second step is to extract executive information. A company shall disclose its executive officers under an appropriate caption, such as "Executive Officers of the Registrant/Company", in any of the three places: Form 10-K Item 10, Form 10-K Item 1 or Form DEF14A. I identify the relevant table or text using the caption right on top of a table or a section of text. The common captions include "Executive Officers of the Registrant/Company" and "Directors and Executive Officers of [Company Name]". Because majority companies disclose their executive officers in

Form 10-K, I check From 10-K first, and only check Form DEF14A if I cannot find the relevant information in Form 10-K. My script checks Form 10-K first because majority companies disclose executive officer information in Form 10-K, and it only checks Form DEF14A if it cannot find executive officer information in Form 10-K. I extracted executive information for 95% of my original sample. Two reasons contribute to the failure of extraction: (1) a form is not at a format that my script can parse; (2) a company didn't file Form 10-K or Form DEF14A in a particular year.

For executives whose gender is not clearly disclosed, I use the below procedure to identify their gender. If an executive's title is "Mr/Messrs" or the pronoun "he" is used in the sentences describing the executive's experience, the executive is identified as a male; if the title is "Mrs/Miss/Ms" or the pronoun "she" is used in the sentences describing the executive's experience, the executive is identified as a female. For the executives whose gender is not identified by this method, I use first names and U.S. Census Bureau data to decide their gender. I code the gender variable as a missing value if a first name is unisex.

The hand-collected data has a few problems. The first problem is that extraction may not be accurate. To check the accuracy of extraction, I merge my dataset with ExecuComp dataset. Ideally, my dataset shall cover all executives in ExecuComp. Out of 55,284 executive-year observations in ExecuComp, 47,365 (85.6%) are matched with my data. The reasons for the discrepancies are mainly threefold. First, the different timing between ExecuComp and the extracted dataset results in the majority of the discrepancies. Item401(b) of Regulation S-K requires the companies to list the names and ages of all executive officers of the registrant and all persons chosen to become executive officers, who are current officers rather than officers who held the position in the last fiscal year.[10] For the compensation disclosure, a company must disclose information concerning CEO, CFO and three highly paid executives even if they no longer hold the positions at the time of the filing.

The second reason is that ExecuComp sometimes backdates observations. For

[10]Regulation S-K, May 17, 2013, accessed 3 September 2013, ⟨*www.sec.gov*⟩

example, Actuant Corporation starts to report Brian K. Kobylinski's compensations since the fiscal year 2008. On 2008 Form DEF14A it discloses Mr. Kobylinski's compensations of the two most recent years, 2007 and 2008. ExecuComp has Mr. Kobylinski's compensation information from 2007 despite he became a top highly paid executive from 2008. 51.5% unmatched observations are for executives appearing in ExecuComp for the first time.

Third, as stated before, my script doesn't extract executive information for some firm-years and it contributes to 18.5% unmatched observations. In addition, I manually checked the extracted data for 100 documents and find 1 document is not extracted properly. Errors occur when my script is not flexible enough to handle a format.

The second problem is inconsistent disclosure. Some companies change their definition of Executive Officer over years. For example, Werner Enterprises includes its vice presidents in the list of executive officers in Form DEF14A filed on March 9, 2005, However, in the next year, it didn't report any vice president as its executive officer on Form DEF14A filed on April 4, 2006. The inconsistent reporting leads to inaccurate identification of departures.

It is plausible that these two limitations are not systematic. They reflect a firm's decision on form format and definition of executive officer; thus it is unlikely that these data errors lead to biases.

3.6 Appendix 2 for Chapter 3

Table 3.1: Variable definitions

Variable	Definition	Source
Individual characteristics		
CEO	Dummy variable: 1 if an individual holds a CEO position on a continuous basis. 0 otherwise. Interim CEOs are excluded	BoardEx
Executive	Dummy variable: 1 if an individual is a non-CEO executive officer who is not an insider director	SEC filings
CEO tenure (0-5)	Dummy variable: 1 if CEO tenure is equal to or shorter than 5 years. 0 otherwise.	BoardEx
CEO tenure (6-10)	Dummy variable: 1 if CEO tenure is between 6 years (inclusive) and 10 years (inclusive). 0 otherwise.	BoardEx
Age	Age	BoardEx and SEC filings
Female	Dummy variable: 1 if an individual is a female. 0 otherwise.	BoardEx and SEC filings
Firm characteristics		
Total Assets (ln)	ln(total assets)	Compustat and CRSP merged file
Volatility (12m)	Annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end.	CRSP
Stock return	The firm's 12 month stock return before the fiscal year end minus CRSP value weighted market return in the same period.	CRSP
ROA	Operating income before depreciation scaled by total assets (oibdp/at)	Compustat and CRSP merged file
CEO turnover	Dummy variable: 1 if the CEO departs in the following year. 0 otherwise	BoardEx
Executive turnover	Dummy variable: 1 if the executive departs in the following year. 0 otherwise	SEC filings
No. of departing executives	The number of departing executives in current year.	SEC filings
Executive turnover ratio	The number of departing executives in current year / total number of executives	SEC filings
E-index	Anti-takeover index	RiskMetrics
Board independence	The percentage of independent director on the board.	BoardEx
CEO ownership	Dummy variable: 1 if CEO own more than 5\% of shares. 0 otherwise.	RiskMetrics

Table 3.1: Variable definitions (Continue)

Variable	Definition	Source
CEO compensation	CEO total compensation	ExecuComp
Institutional ownership	The total value of stocks owned by institutional investors (in billion)	Thomson Reuters
Female director ratio	The percentage of female directors on the board	BoardEx
Other strategic events		
Downsizing	Dummy variable: 1 if the firm has a downsize event. 0 otherwise.	Capital IQ (keydeveventtypeid 21)
Restructure	Dummy variable: 1 if the firm has a restructure event. 0 otherwise.	Capital IQ (keydeveventtypeid 32)
Spin-off	Dummy variable: 1 if the firm has a spin-off event. 0 otherwise.	Capital IQ (keydeveventtypeid 137)
Expansion	Dummy variable: 1 if the firm has an expansion event. 0 otherwise.	Capital IQ (keydeveventtypeid 31)
Seek sell	Dummy variable: 1 if the firm seeks to sell or divest. 0 otherwise.	Capital IQ (keydeveventtypeid 1)
Seek buy	Dummy variable: 1 if the firm seeks to acquisitions or investments. 0 otherwise.	Capital IQ (keydeveventtypeid 3)
M & A Acquiror	Dummy variable: 1 if the firm is the acquirer in a completed M & A deal. 0 otherwise.	Capital IQ (keydeveventtypeid 81 & keydev-toobjectroletypeid 3)
Alternative strategy	Dummy variable: 1 if the firm is considering multiple strategic alternatives. 0 otherwise.	Capital IQ (keydeveventtypeid 63)
Layoff	Dummy variable: 1 if the news headline contains "cut/reduce/lay off/axe/eliminate" and "jobs/workforce/workers/employees". 0 otherwise.	Capital IQ

Table 3.2: Changes in sample size

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 to December 31, 2011. If a company is dropped from or added to the S&P 1500 index during the sample period, I collect all available information from 2005 to 2011.

	No. of firms	No. of firm-year obs
S&P 1500 constituents from 2005 to 2011	2140	
S&P 1500 constituents & BoardEx	2091	14,477
S&P 1500 constituents & BoardEx & Compustat/CRSP Merged File	2058	13,898
S&P 1500 constituents & BoardEx & Compustat/CRSP Merged File & executive officers	2007	13,144

Table 3.3: Summary statistics
My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an individual who is disclosed as an executive officer in Annual Report or Proxy Statement and is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Other definitions are listed in Appendix B.

	N	Mean	S.D.	Median
Firm characteristics				
Total assets (million)	13,144	16,550	97,631	1,989
ROA	12,931	0.143	0.121	0.130
Stock return	12,784	0.064	0.605	0.002
Volatility	12,582	0.910	1.185	0.633
Executive team size	13,144	7.003	3.690	6
Executive departures (No.)	11,013	1.038	1.510	1
Executive departure ratio	11,013	0.137	0.173	0.100
CEO turnover	12,949	0.110	0.313	0
Anti-takeover index	10,867	2.953	1.372	3
Board independence ratio	13,144	0.786	0.113	0.8
CEO ownership above 5%	13,144	0.135	0.341	0
CEO total tompensation	11,574	0.005	0.008	0.003
Instit. ownership (billion)	12,923	0.150	0.403	0.048
Corporate events				
Downsizing	13,131	0.210	0.407	0
Layoff	13,131	0.058	0.233	0
Spin-off	13,131	0.012	0.107	0
Seek sell	13,131	0.082	0.275	0
Reorganization	13,131	0.090	0.287	0
Alter strategy	13,131	0.037	0.189	0
Seek buy	13,131	0.339	0.473	0
M&A Acquiror	13,131	0.418	0.493	0
Expansion	13,131	0.409	0.492	0
Executive characteristics				
Age	87,507	50.814	6.908	51
Female	87,293	0.117	0.322	0
Matched with EC	92,048	0.499	0.500	0
Departure	79,057	0.155	0.362	0
CEO characteristics				
Age	12,795	55.455	7.346	55
Female	12,922	0.030	0.172	0
Matched with EC	12,924	0.908	0.288	1
Daparture	12,924	0.096	0.295	0
Total compensation	11,648	5,424	7,618	3,424

Table 3.4: Linear probability models of CEO and executive turnovers

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer disclosed in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. All other definitions are given in Appendix 2. The dependent variable is executive turnover in column (1) - (3); it is CEO turnover in column (4). In column (3), executive-firm and year fixed effect are used. In all other columns, firm and year fixed effect are used. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

	Executive Departure			CEO Dept.
	(1)	(2)	(3)	(4)
Stock return	-0.004***	-0.004***	-0.002***	-0.005***
	(-5.523)	(-4.839)	(-3.071)	(-5.302)
Total assets	0.018**	0.015*	-0.038***	0.001
	(2.083)	(1.720)	(-3.436)	(0.122)
Volatility	-0.001	-0.002	-0.002	-0.004
	(-0.595)	(-1.021)	(-0.885)	(-1.445)
Age	0.006***	0.006***	0.003	0.014***
	(24.818)	(24.691)	(1.147)	(11.804)
Female	0.008*	0.010**		-0.085*
	(1.803)	(2.036)		(-1.897)
CEO Turnover		0.048***	0.032***	
		(6.927)	(4.202)	
CEO tenure (1-5)				-0.219***
				(-14.601)
CEO tenure (6-10)				-0.092***
				(-7.707)
Observations	68,336	67,531	62,141	12,150
Adjusted R-squared	0.064	0.065	0.150	0.108
Firm FE	Yes	Yes		Yes
Individual-firm FE			Yes	
Year FE	Yes	Yes	Yes	Yes

Table 3.5: Linear probability models of CEO turnovers
My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer disclosed in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. All other definitions are given in Appendix 2. In all regressions, firm and year fixed effect are used. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

	CEO Departure (t+1)		
	(1)	(2)	(3)
Executive departure ratio (t)	-0.044**	-0.111***	-0.068
	(-2.142)	(-2.776)	(-1.235)
Executive departure ratio (t) * Stock return (t-1)		0.013**	0.013**
		(2.087)	(2.110)
Executive departure ratio (t) * Stock return(t)			-0.009
			(-1.325)
Stock return (t-1)	-0.002*	-0.004***	-0.004***
	(-1.960)	(-2.945)	(-2.923)
Stock return (t)	-0.005***	-0.005***	-0.004***
	(-4.275)	(-4.326)	(-2.668)
Total assets	-0.009	-0.008	-0.008
	(-0.662)	(-0.646)	(-0.641)
Volatility	-0.004	-0.004	-0.004
	(-1.161)	(-1.244)	(-1.239)
Age	0.014***	0.014***	0.014***
	(9.642)	(9.636)	(9.624)
Female	-0.122**	-0.121**	-0.121**
	(-2.399)	(-2.357)	(-2.373)
CEO tenure (1-5)	-0.243***	-0.243***	-0.243***
	(-13.993)	(-14.003)	(-13.995)
CEO tenure (6-10)	-0.101***	-0.101***	-0.101***
	(-7.398)	(-7.417)	(-7.404)
Observations	10,267	10,267	10,267
Adjusted R-squared	0.116	0.116	0.116
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 3.6: Linear probability models of executive turnovers
My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer disclosed in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. In all regressions, firm and year fixed effect are used. All other definitions are given in Appendix 2. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

Dependent variable	Executive turnover				
Key Depend. Var.	E-index	Independence	Instit. Own	CEO Own	CEO Compensation
	(1)	(2)	(3)	(4)	(5)
Stock return	-0.007***	0.006	-0.004***	-0.004***	0.008
	(-3.576)	(1.225)	(-4.739)	(-5.629)	(1.420)
Var	-0.003	0.030	0.022	-0.015	-0.001
	(-0.758)	(0.528)	(1.308)	(-0.920)	(-0.240)
Stock return * Var	0.001	-0.013**	-0.003*	0.003	-0.001**
	(1.446)	(-2.045)	(-1.749)	(1.322)	(-1.961)
Total assets	0.017	0.019**	0.018**	0.019**	0.024**
	(1.640)	(2.198)	(2.033)	(2.175)	(2.466)
Volatility	-0.000	-0.001	-0.001	-0.001	-0.002
	(-0.045)	(-0.558)	(-0.572)	(-0.526)	(-1.259)
Age	0.006***	0.006***	0.006***	0.006***	0.006***
	(23.119)	(24.822)	(24.901)	(24.821)	(23.989)
Female	0.009*	0.008*	0.008*	0.008*	0.008
	(1.754)	(1.795)	(1.745)	(1.801)	(1.580)
CEO turnover	0.022***	0.018**	0.019**	0.019***	0.017**
	(2.786)	(2.419)	(2.542)	(2.595)	(2.112)
Observations	58,797	68,336	68,161	68,336	61,150
Adjusted R-squared	0.067	0.065	0.065	0.065	0.067
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Table 3.7: Ordinary least squares models of the number of departing executives

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer disclosed in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. The change dummy equals to one if news of the particular corporate event is reported in a year. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. All other definitions are given in Appendix 2. In all regressions, firm and year fixed effect are used. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

Dependent var	Downsizing (1)	Layoff (2)	Spinoff (3)	SeekSell (4)	Reorg. (5)	ChangeStrat. (6)	SeekBuy (7)	M&A acquirer (8)	Expansion (9)
Executive departure %	0.114***	0.059***	0.024***	0.062***	0.060***	0.025*	-0.050**	0.003	0.009
	(4.785)	(4.128)	(2.930)	(3.717)	(3.107)	(1.905)	(-2.006)	(0.114)	(0.343)
Stock return	-0.011***	-0.003***	0.000	-0.004***	-0.001	-0.004***	0.004***	0.008***	0.002
	(-8.417)	(-3.906)	(0.407)	(-4.252)	(-1.251)	(-5.430)	(2.813)	(5.174)	(1.336)
Total assets	0.031**	0.004	-0.017***	0.041***	0.018	0.009	0.078***	0.187***	0.062***
	(1.986)	(0.445)	(-3.458)	(3.971)	(1.536)	(0.970)	(4.274)	(10.558)	(3.525)
Volatility	-0.007**	-0.002	-0.002**	-0.000	-0.005*	-0.000	-0.011***	-0.018***	-0.007*
	(-2.055)	(-1.455)	(-2.133)	(-0.064)	(-1.727)	(-0.121)	(-2.991)	(-3.820)	(-1.821)
CEO turnover	0.032***	0.012	0.007*	0.031***	0.019*	0.027***	-0.003	-0.053***	0.020
	(2.605)	(1.527)	(1.811)	(3.191)	(1.894)	(3.319)	(-0.258)	(-3.756)	(1.428)
Observations	10,573	10,573	10,573	10,573	10,573	10,573	10,573	10,573	10,573
Adjusted R-squared	0.341	0.232	0.089	0.243	0.165	0.185	0.336	0.297	0.373
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.8: Ordinary least squares models of the number of departing executives

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer disclosed in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. The change dummy equals to one if news of the particular corporate event is reported in a year. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. All other definitions are given in Appendix 2. In all regressions, firm and year fixed effect are used. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

Dependent var	Downsize (1)	Layoff (2)	Spinoff (3)	SeeKSell (4)	Reorg. (5)	ChangeStrat. (6)	SeekBuy (7)	M&A acquirer (8)	Expansion (9)
Active CEO	0.009	-0.001	0.003	-0.020	-0.006	-0.017*	-0.014	0.001	0.006
	(0.554)	(-0.108)	(0.592)	(-1.569)	(-0.486)	(-1.835)	(-0.845)	(0.082)	(0.341)
Passive CEO	-0.012	-0.017*	-0.006	-0.036***	-0.021*	-0.012	-0.003	-0.002	0.008
	(-0.933)	(-1.908)	(-1.514)	(-3.509)	(-1.949)	(-1.524)	(-0.223)	(-0.108)	(0.502)
Stock return	-0.011***	-0.003***	-0.000	-0.004***	-0.001	-0.004***	0.005***	0.008***	0.002
	(-8.350)	(-3.600)	(-0.094)	(-4.169)	(-0.902)	(-5.370)	(3.141)	(4.952)	(1.270)
Total assets	0.031**	0.005	-0.018***	0.039***	0.015	0.010	0.078***	0.190***	0.058***
	(1.965)	(0.591)	(-3.488)	(3.660)	(1.196)	(1.114)	(4.229)	(10.535)	(3.290)
Volatility	-0.007**	-0.003	-0.002**	0.000	-0.005*	-0.001	-0.011***	-0.018***	-0.007*
	(-2.008)	(-1.565)	(-2.183)	(0.020)	(-1.671)	(-0.186)	(-2.990)	(-3.628)	(-1.840)
CEO turnover	0.032**	0.004	0.008	0.009	0.010	0.017*	-0.010	-0.055***	0.030*
	(2.152)	(0.452)	(1.442)	(0.714)	(0.744)	(1.647)	(-0.597)	(-3.075)	(1.692)
Observations	10,317	10,317	10,317	10,317	10,317	10,317	10,317	10,317	10,317
Adjusted R-squared	0.339	0.231	0.095	0.241	0.165	0.182	0.337	0.297	0.375
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3.9: Ordinary least squares models of changes in operation performance
My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. In column (1) and (3), the change in ROA is ROA_{t+1} minus ROA_{t-1}, where t is the year when executive turnover occurs. In column (2) and (4), the change in ROA is ROA_{t+2} minus ROA_{t-1}, where t is the year when executive turnover occurs. An executive is an individual who is an executive officer disclosed on Annual Report or Proxy Statement and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Corporate events are the events analysed in Table 3.7. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. In all regressions, firm and year fixed effect are used. All other definitions are given in Appendix 2. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

Dependent variable	Change in ROA			
	(1)	(2)	(3)	(4)
Executive departure ratio(t)	0.007	0.013*	0.007	0.012*
	(0.936)	(1.877)	(0.954)	(1.717)
Stock return (t)	0.008***	0.005***	0.008***	0.005***
	(19.847)	(10.540)	(19.872)	(10.670)
Total assets	-0.091***	-0.095***	-0.091***	-0.094***
	(-11.839)	(-10.771)	(-11.761)	(-10.666)
Volatility	0.004	0.002	0.003	0.002
	(1.373)	(0.584)	(1.324)	(0.531)
CEO turnover	0.004	0.006*	0.004	0.005
	(1.291)	(1.666)	(1.173)	(1.482)
Observations	10,200	9,658	10,192	9,650
Adjusted R-squared	0.189	0.235	0.190	0.238
Corporate events	No	No	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 3.10: Ordinary least squares models of executive team size

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an individual who is disclosed as an executive officer in Annual Report or Proxy Statement and is is neither a CEO nor an inside director. Executive team size is the total number of executives when the annual report or proxy statement is filed. In all regressions, firm and year fixed effect are used. All other definitions are given in Appendix 2. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

Dependent variable	Executive team size(t)		
	(1)	(2)	(3)
Executive departure rate (t)	-1.987***	-2.090***	-2.509***
	(-15.213)	(-14.128)	(-13.807)
Executive departure rate (t-1)		-1.155***	-1.370***
		(-9.472)	(-8.724)
Executive departure rate (t-2)			-1.024***
			(-8.344)
CEO turnover	-0.061	-0.020	-0.012
	(-1.038)	(-0.347)	(-0.212)
stock return	-0.013**	-0.007	-0.007
	(-2.246)	(-1.291)	(-1.202)
Total assets	0.624***	0.557***	0.399***
	(6.325)	(5.286)	(3.237)
Volatility	-0.016	-0.011	-0.005
	(-1.202)	(-0.967)	(-0.463)
Observations	10,594	8,754	6,954
Adjusted R-squared	0.808	0.851	0.871
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 3.11: Linear probability models of CEO and executive turnovers (ExecuComp Sample)

My sample includes all firms that are constituents of S&P 1500 index during January 1, 2005 and December 31, 2011. An executive is an executive officer in ExecuComp and is is neither a CEO nor an inside director. A CEO is an individual holding CEO position at a continuous basis. An interim CEO is not counted as a CEO. Stock return is the buy and hold return over 12 months before the fiscal year end minus CRSP value weighted market return in the same period. Volatility is the annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end. All other definitions are given in Appendix 2. The dependent variable is executive turnover in column (1) - (3); it is CEO turnover in column (4). In column (3), executive-firm and year fixed effect are used, and standard errors are clustered at executive-firm level. In all other columns, firm and year fixed effect are used. t-statistics, reported in the parentheses, are calculated with standard errors clustered at firm level. *, ** and *** denote significant at the 10%, 5% and 1% level, respectively.

	Executive Departure			CEO Dept.
	(1)	(2)	(3)	(4)
Stock return	-0.004***	-0.004***	-0.003***	-0.006***
	(-5.160)	(-4.524)	(-3.831)	(-5.105)
Total assets	0.026**	0.024**	-0.040***	0.005
	(2.424)	(2.242)	(-3.518)	(0.384)
Volatility	0.000	-0.001	-0.002	-0.003
	(0.009)	(-0.499)	(-0.945)	(-0.911)
Age	0.007***	0.007***	0.002	0.015***
	(19.226)	(19.221)	(0.820)	(11.630)
Female	-0.007	-0.005		-0.094**
	(-0.892)	(-0.658)		(-2.019)
CEO Turnover		0.047***	0.024***	
		(6.006)	(3.113)	
CEO tenure (1-5)				-0.213***
				(-13.099)
CEO tenure (6-10)				-0.088***
				(-6.753)
Observations	34,757	34,302	31,056	11,132
Adjusted R-squared	0.068	0.069	0.139	0.113
Firm FE	Yes	Yes		Yes
Individual-firm FE			Yes	
Year FE	Yes	Yes	Yes	Yes

Chapter 4

CEO Duality and Decision Time

4.1 Introduction

CEO duality is a controversial board leadership structure. The request to abolish duality is one of the most common shareholder proposals, and regulators also put extra pressure on CEO duality firms. Since 2010, the Securities and Exchange Commission (SEC) has required listed companies to disclose and justify their board leadership structure. Despite pressure from shareholders and regulators, in 2015 a majority of S&P 500 firms still had CEO duality.[1] Is it possible that CEO duality comes with benefits for shareholders, not just costs? In this study, I propose that one beneficial aspect of this unitary leadership structure is that it can expedite decision-making on boards.

A board with CEO duality has one official leader, the CEO who simultaneously serves as chair of the board. Brickley et al. (1997) point out that CEO duality establishes clear lines of authority and responsibility, reduces information costs, and alleviates power struggles. Therefore, I expect that CEO duality can facilitate effective decision-making and enhance shareholder value.

The literature generally considers only CEO duality versus non-duality, but the board leadership structure can be further refined. In recent years, appointing a lead independent director has become common in U.S. public firms. It is advocated as an

[1]Spencer Stuart Board Index 2015

alternative to an independent chair. The concept of lead independent director was introduced by Lipton and Lorsch (1992), who propose selecting leaders from the independent directors to improve board monitoring. Large institutional investors (such as BlackRock and California Public Employee Retirement System (CalPERS)) and corporate governance experts (such as Institutional Shareholder Services (ISS)) recommend appointing a lead independent director to balance the power of a CEO chair.[2][3][4] Despite the close connection between CEO duality and the presence of a lead independent director, to my knowledge the issue of CEO duality has not previously been examined in this context. I fill this gap by taking the presence or absence of a lead independent director into account. The presence of a lead independent director in a firm with a CEO chair means that there are multiple board leaders. Thus, I predict that the effect of CEO duality is more pronounced in the absence of a lead independent director.

None of the above predictions are based on agency theory. According to agent theory, combining roles of the chair and CEO increases CEO power and reduces board independence. A board led by a powerful CEO may make quicker decisions. But increasing CEO power also indicates that it is easier for the CEO to seek private benefit and build empire (Jensen, 1986); therefore, the decision may reduce shareholder wealth.

I test my hypotheses in the context of mergers and acquisitions. Acquisitions are readily observable significant corporate events with a measurable completion time. I use the number of days between the announcement date and the effective date as an approximation of time to complete a deal. The acquisition market is competitive, and delays expose the acquirer to competing bids. Offenberg and Pirinsky (2015) find that 42% of all transactions have multiple bidders in their sample of mergers and

[2]CalPERS Global Principles of Accountable Corporate Governance, accessed 23 October 2014, $\langle www.calpers-governance.org/docs-sof/principles/2014-05-calpers-global-principles-accountable-corp-gov.pdf\rangle$

[3]BlackRock Proxy Voting Guidelines for U.S. Securities April 2014, accessed 24 October 2014, $\langle www.blackrock.com/corporate/en-it/literature/fact-sheet/blk-responsible-investment-guidelines-us.pdf\rangle$

[4]ISS 2013 U.S. Proxy Voting Guidelines, accessed 23 October 2014, $\langle www.issgovernance.com/policy/2013/policy\_information\rangle$

tender offers. They argue that "Because a bidding competitor has the opportunity to outspend its rival in the window of time from the announcement to the close of the deal, speed matters most in the completion period." Therefore, mergers and acquisitions provide a good setting in which to study decision time. Furthermore, I use event study methodology to measure the quality of the deal, a method that is cleaner than using overall firm performance.

Using completed acquisition deals from 2003 to 2012, I analyze completion time and announcement returns. Compared with non-CEO executive chairs or grey chairs, CEO chairs are associated with 5 days' less completion time, and CEO chairs' deals have 0.007 higher returns. Given that the mean (median) of completion time and announcement returns is 50 (29) days and 0.012 (0.006), respectively, the differences are economically significant.

After examining the association between CEO duality and the decision time, I next analyze two factors that may strengthen or weaken this association. The first factor is the strength of monitoring. Vigilant boards may slow down decision-making in CEO duality firms. I use the presence of a lead independent director, board independence, female director representation, S&P 1500 firm status, and the percentage of directors appointed by the incumbent CEO to measure monitoring. In the subsample of firms that are under light monitoring, CEO duality is associated with shorter decision time and higher returns. In the subsample of firms that are under intense monitoring, CEO duality is not associated with decision time or returns, but it is associated with a lower likelihood of the worst deals. The results suggest that though monitoring helps CEO chairs to reduce the downside risk, the average beneficial effect of CEO duality is driven by firms that are not under intense scrutiny.

The second factor that may strengthen the effect of CEO duality is the market environment. In a competitive and fast-changing market, information becomes obsolete at a faster rate, and the cost of delayed decisions is higher. Thus, I expect that in such an environment, the benefit of timely decisions is more pronounced.

The results show supporting evidence.

My study compliments to the studies that evaluate the effects of CEO duality (Brickley et al., 1997, Goyal and Park, 2002, Bebchuk and Fried, 2004, Balsam and Puthenpurackal, 2011, Dey et al., 2011, Yang and Zhao, 2014). It is not my aim to find the average effect of CEO duality on firm value. I focus on one aspect of CEO duality- its impact on board decision-making time, and document that the unitary leadership structure may facility decision-making and it is especially valuable to firms in competitive or fast-paced environments. To my knowledge, it is also the first paper to evaluate the effect of CEO duality while considering the presence or absence of a lead independent director. The results show that the benefits of CEO duality are more pronounced with the absence of a lead independent director.

My results also suggest that monitoring by boards and institutional investors can be costly, adding to the literature that examines the value of intense board monitoring (Adams et al., 2010, Fisman et al., 2014, Faleye et al., 2011). It suggests one way in which intense monitoring may not be optimal. It also suggests that boards increase their monitoring when the CEO and chair titles are combined. However, I acknowledge that I cannot fully address the endogeneity concern in this study.

4.2 Data

I collect acquisition data from the Securities Data Corporation's (SDC) Mergers and Acquisitions database. I identify 4,118 transactions by 1,964 firms using the following criteria, which are similar to those used by Masulis et al. (2007):[5]

1. The announcement date is between January 1, 2003 and December 31, 2012. I choose year 2003 as the starting point of my sample because BoardEx's coverage is poor before 2003. Adams and Kirchmaier (2015) report that firms

[5] I clean the SDC data using the following steps before applying the filters. 1. I delete an observation if its acquirer's CUSIP is the same as the target's CUSIP. 2. If one acquirer has multiple announcements about the same target on one day, I keep the deal that is completed. 3. If one acquirer has multiple announcements about different targets on one day, I keep the deal that has the highest transaction value.

in BoardEx are 53.2% of the U.S. market capitalization in 2003, whereas the ratio is 5.2% in 2002.

2. The acquisition is completed.

3. The acquirer controls less than 50% of the target's shares prior to the announcement and owns 100% of the target's shares after the transaction.

4. The deal value is more than $1 million and is more than 1% of the acquirer's market capitalization.

5. The acquirer has annual financial data from Compustat, stock return data from CRSP, and board data from BoardEx.

6. The acquirer is neither a financial firm nor a utility firm[6].

7. If the same acquirer makes multiple acquisitions in a fiscal year, I keep the first event.

Similar to Masulis et al. (2007), I do not screen the transactions by transaction type because the distinctions among these transactions are unclear when the acquirer is the party of interest (Netter et al., 2011). Product market competition data are from the Hoberg-Phillips industry data website. Merging SDC data with the product market competition data reduces the sample size further, but it impacts only Table 4.10.[7]

I calculate abnormal returns using the method in Masulis et al. (2009). Abnormal returns are computed based on the market model in Eventus, which estimates parameters from event day -210 to event day -11 with the CRSP value-weighted return as the market return. If an event is announced on a non-trading day, I regard the following trading day as the event day. Because the announcement day in SDC may be off by no more than 2 trading days (Fuller et al., 2002), in the baseline regressions I use cumulative abnormal returns (CARs) over 5 days around the event

[6]SIC Code 6000-6999 (financial firms) and SIC Code 4900-4999 (utility firms)

[7]Using the product market fluidity score from the Hoberg-Phillips data reduces the sample to 4,059 transactions by 1,944 firms.

day to capture most of the announcement effect. I use different event windows in the robustness section.

I identify chair, CEO, and lead independent director, and I classify directors based on the descriptions in BoardEx. A lead independent director is a non-chair independent director whose job description contains the word "Lead" or "Presiding". Anecdotal evidence suggests that the titles "lead independent director" and "presiding director", are exchangeable. For example, JP Morgan stated in its 2013 proxy statement: "The Firm's Presiding Director functions as a Lead Director, but the Board prefers the term Presiding Director to emphasize that all directors share equally in their responsibilities as members of the Board."

When identifying the chair, CEO, and lead independent director, I consider only directors who hold such roles on a continuous basis and exclude any directors with interim titles. This results in 127 firm-year observations without a chair identified. When co-chairs are appointed in a company-year observation (98 observations), I classify the firm's chair type by using the most independent co-chair type. For example, if a firm has an independent co-chair and a non-CEO executive co-chair, the firm is classified as an independent chair firm.

Table 4.2 shows the transaction-level characteristics. In the full sample, the average CARs is 0.012, and the average completion time is 50 days. 51.8% of the targets are private, and in 37.3% of the deals, the acquirer and target firms are not in the same industry. Compared with the sample of Masulis et al. (2007), which covers deals between 1990 and 2003, my sample has similar average CARs, more deals involving private targets, and more diversifying deals.

Table 4.3 reports the average completion time, CARs, and deal characteristics of firms with CEO chairs and firms with non-CEO chairs. CEO chair firms have similar completion times but higher returns than non-CEO chair firms. CEO chair firms make fewer deals that are paid for entirely with stocks.

4.3 Results

4.3.1 Decision Time

This section examines the association between CEO duality and decision-making time on boards. A CEO duality board has one official board leader, the CEO chair. It may face fewer time-consuming problems in the decision-making process than a board with multiple leaders. Brickley et al. (1997) suggest that CEO duality establishes clear lines of authority and responsibility, reduces information costs, and alleviates power struggles. This leads to the hypothesis that CEO duality facilitates decision-making on boards.

The presence of a lead independent director on a board where the CEO is the chair also means multiple leaders on the board. Thus, I predict that a CEO chair makes even quicker decisions in the absence of a lead independent director.

The category of non-CEO chair can be further divided into independent chair, non-CEO executive chair, and grey chair. In 2015, 29% of S&P500 firms had an independent chair, and 19% of firms had a non-CEO executive or grey chair.[8] Compared with an independent chair, a non-CEO executive chair or a grey chair usually possesses more firm-specific information and participates more in strategy discussions (McNulty et al., 2011). The heavy involvement of both leaders may result in longer decision-making times.

According to agency theory, CEO duality is a way for managers to insulate themselves from directors' scrutiny. Agency theory also predicts that CEO duality will have a negative effect on decision time, because the board is captured and simply rubber-stamps management proposals. However, it also predicts that these decisions will be of low quality, because without the boards scrutiny, managers are likely to pick projects that enrich themselves at the cost of shareholders Jensen (1986). Agency theory also predicts that non-CEO executive chairs or grey chairs collude with CEOs due to their lack of independence and therefore make quicker

[8] Spencer Stuart Board Index 2015

decisions than independent chairs.

I use ordinary least squares models to test the hypotheses and report the results in Table 4.4. The dependent variable is the number of days from the announcement date to the effective date. After announcing the initial bid, an acquirer often continues negotiating and makes revised offers, so the gap between these dates reflects how quickly an acquirer's board processes an M&A deal. Ideally, I would take into account the negotiation period before the announcement, but the necessary data are not available in the commercial databases.[9] It is reasonable to expect, however, that the negotiation period before an announcement is positively correlated with the period afterwards. I include controls for deal characteristics and firm characteristics. Because 85% of the firms in my sample do not have more than 4 deals, I cannot use firm fixed effects. All regressions have industry fixed effects and year fixed effects that control for unobserved time-invariant industry characteristics and cross-sectional shocks occurring in a year. Standard errors are clustered at the firm level.

In the first column of Table 4.4, the coefficient on the duality dummy is negative but statistically insignificant, providing no evidence that CEO chairs make quicker decisions than a non-CEO chairs. In the second column, I include the independent chair dummy and set the omitted group as the non-CEO executive or grey chair. The coefficient on the CEO chair dummy is significantly negative, suggesting that in comparison with non-CEO executive and grey chairs, CEO chairs are associated with 5.2 days' shorter completion time. In the third column, I further divide CEO chair firms into those that lack lead independent directors and those that have lead independent directors. The results show that the negative association between CEO duality and completion time is more pronounced in firms without lead independent directors. The coefficients of the independent chair dummies are negative and marginally insignificant, providing weak evidence that in comparison with non-CEO executives and grey chairs, independent chairs are associated with

[9] Ahern and Sosyura (2014) build a proprietary dataset by collecting the data from SEC filings.

shorter decision-making time.

Other results are consistent with expectations. Acquisitions of private companies, cash deals, and diversifying deals are completed more quickly, whereas stock deals and large deals take longer to complete. Overall, the results support my hypothesis that CEO chairs are associated with shorter decision-making time. This result is not consistent with the prediction based on agency theory that independent chairs exert more monitoring than non-CEO executive and grey chairs and thus prolong the decision-making process.

4.3.2 Decision Outcome

The last section documents that CEO duality is associated with shorter decision time, but it does not necessarily indicate that the unitary leadership structure facilitates decision-making on a board. Indeed, agency theory also predicts that CEO chairs are associated with shorter decision time. To distinguish the process underlying CEO chairs' short decision time, I examine the quality of their decisions.

Short decision time can be valuable in a competitive environment such as the acquisition setting. It limits the risk of receiving a competing bid and reduces fees paid to lawyers and investment bankers. I use the cumulative abnormal returns around a deal announcement date as a proxy for the decision outcome.

Table 4.5 examines announcement returns using ordinary least squares models. In column (1), the coefficient on the CEO chair dummy is significantly positive. In column (2), I add in the independent chair dummy and set the non-CEO executive and grey director chairs as the omitted group. The coefficient on the CEO chair dummy is still significantly positive. The results imply that the deals done by CEO chairs on average have 0.007 higher returns than the deals of non-CEO chairs. Given that the average CAR is 0.012, the difference is economically meaningful. The coefficient on the independent chair dummy is neither statistically nor economically significant, suggesting that the M&A decisions made by independent chairs are not significantly better than non-CEO executive and grey director chairs.

In column (3), I divide CEO chair firms according to the status of lead independent directors. CEO chair firms without a lead independent director are associated with significantly higher announcement returns, whereas the coefficient on CEO chair firms with a lead independent director is positive but insignificant.

Overall, I find no evidence showing that CEO chairs' short decision time reflects boards' rubber-stamping, as suggested by agency theory. The results are consistent with the conjecture that CEO chairs facilitate decision-making on boards and reduce decision-making time.

4.3.3 Decision and Governance

So far, I have documented that CEO duality is associated with shorter decision time and better decision quality. My next question is how these associations change with board monitoring.

It is theoretically unclear how monitoring intensity and decision time are associated. On one hand, monitoring can mean detailed evaluation, which slows down the decision-making process. On the other hand, monitoring may improve board efficiency. Adams and Ferreira (2009) report that male directors on gender-diverse boards have fewer attendance problems and that such boards are tougher monitors. The more efficient a board is, the less time it takes to make decisions. Therefore, intense monitoring may lead to shorter decision time.

It is also unclear how monitoring and decision quality are correlated. Most industry participants believe that monitoring prevents managerial abuse of power and leads to efficiency. For example, BlackRock, CalPERS, and ISS all call for CEO duality firms to appoint lead independent directors as an extra check. However, one strand of literature points out that intense monitoring may involve costs Fisman et al. (2014), Faleye et al. (2011), Dey et al. (2011).

I measure board monitoring from five dimensions. First, I use the board's independence. Weisbach (1988) shows that board independence has a positive effect on board monitoring strength. Second, I use the number of female directors. Adams and Ferreira (2009) document that gender-diverse boards allocate more effort to monitoring. The third measure is S&P 1500 firm status. Appel et al. (2016) find that passive investors, who follow the indexes, play an important role in influencing firms' governance choices. Fourth, I use the presence of a lead independent director. The lead independent director structure is an alternative to the independent chair structure, and Lamoreaux et al. (2014) find evidence suggesting that it improves board monitoring. The last measure is the percentage of directors appointed before a CEO assumes office. Coles et al. (2014) find that board monitoring intensity declines as more directors are appointed by a CEO.

Table 4.8 examines completion time and monitoring intensity. In all regressions, the coefficients on the monitoring variables are negative. All but one are statistically significant, consistent with the conjecture that monitoring improves board efficiency. The coefficients on the interaction terms between the CEO chair dummy and the monitoring measures are all significantly positive. They imply that in firms led by CEO chairs, the effect of monitoring on the decision time disappears or event reverses.

The difference is economically meaningful. For instance, in firms that are not S&P 1500 constituents, CEO chairs accelerate the decision time by 10 days; in firms that are S&P 1500 constituents, CEO chairs take 1 more day than non-chair CEOs to complete deals. When no female directors are present, the decision time of duality firms is 14 days shorter than that of non-duality firms; when two female directors are present, the decision time of duality firms is 8 days longer.

So far, the results have shown that in non-CEO chair firms, monitoring is negatively correlated with decision time, consistent with the conjecture that monitoring improves efficiency. However, in CEO chair firms, this correlation disappears or even becomes positive. Boards may have valid reasons to be more vigilant in CEO chair firms. Next, I examine the effect of monitoring on decision quality.

Table 4.9 investigates the effect of monitoring intensity on decision quality. I use three measures to proxy for decision quality: announcement returns, the likelihood of a value-destroying deal, and the likelihood of an extremely bad deal. In general, I find no evidence that higher monitoring is associated with better deals.

Table 4.7 splits the sample into the high-monitoring subsample and the low-monitoring subsample according to each monitoring measure. The dependent variable in Panel A is completion time. The coefficients of the duality dummies are significantly negative in all low-monitoring subsamples, whereas they are insignificant in the high-monitoring subsamples, indicating that a CEO chair can make speedy decisions when board oversight is less intense. Panel B shows that in four out of five low-monitoring subsamples, the coefficients of the duality dummy are significantly positive; in all high-monitoring subsamples, none of the coefficients of the duality dummy are significant. These results suggest that a CEO chair's ability to make high-quality decisions is more pronounced when the board's scrutiny is low.

Panels C and D investigate whether intense monitoring helps to prevent a CEO chair from engaging in bad deals. In Panel C, the dependent variable is the indicator variable that equals one if the announcement returns are negative. It does not provide any evidence suggesting that CEO chairs are more likely to engage in value-destroying deals in lightly monitored firms, nor that CEO chairs are less likely to make such deals in intensely monitored firms. The dependent variable in Panel D is the indicator variable that equals one if the announcement returns are at the bottom quintile in the full sample. I still find no evidence showing that CEO chairs are more likely to engage in extremely bad deals in lightly monitored firms; however, in four out of five intensely monitored subsamples, the duality dummies are significantly negative, suggesting CEO chairs have a lower chance of making extremely bad deals than non-chair CEOs. Panels C and D show no evidence that CEO chairs misuse their power even in lightly governed firms, so my interpretation is that increasing board monitoring reduces genuine errors of approving bad projects rather than CEO chairs' abuse of power.

In general, the results suggest that boards increase monitoring when CEO and chair titles are combined; however, unlike in non-duality firms where increases in monitoring improve board efficiency, in duality firms higher monitoring delays the decision-making process. CEO chairs are able to make better decisions in lightly monitored firms, but this advantage is skimmed off by intense board monitoring. The results suggest the cost of intense monitoring in CEO chair firms.

4.3.4 Decision and Competition

In a rapidly changing and competitive environment, timeliness of a decision becomes especially important. If the good decision outcomes in the duality firms can be attributed to an effective decision-making process, I expect the advantage to be more pronounced in a fast-paced and competitive market.

I use three proxies for how quickly an environment changes and how competitive it is. Because stock prices fluctuate more in a more rapidly changing environment, the first measure is the stock return volatility calculated based on 12 monthly stock returns. The second and third measures are developed by Hoberg et al. (2014) and Hoberg and Phillips (2010).One is the Herfindahl Index, which measures the product market concentration; the other is product market fluidity, which captures the change in a firm's product space due to moves made by its competitors.

In Table 4.10, I split the sample into high-volatility/competition subsamples and low-volatility/competition subsamples.

Panel A shows that the coefficients of the CEO duality dummies are negative in all subsamples, but they are statistically significant or close to significant only in the high-volatility and high-competition subsamples. The dependent variables in Panel B are the announcement returns. Panel B shows that CEO duality is associated with better decisions in firms that operate in a fast-paced and competitive environment.

The results are consistent with those of Li et al. (2014), who find that in competitive markets, CEO power is positively associated with firm value.

4.4 Robustness

In this section, I demonstrate the robustness of the results.

4.4.1 Inconsistent results from prior studies

My finding that duality firms make higher-return acquisition deals is inconsistent with some earlier studies. Masulis et al. (2007) use a sample of acquisitions done by S&P 1500 companies in 1996 and 2003 and find a negative association between the duality and announcement returns.[10] A more recent study, Custódio and Metzger (2013), uses acquisitions done by S&P companies in the period 1990-2008; it also reports a negative correlation between the duality and announcement returns. There are two possible reasons for the different findings. The first is the difference in the sample periods. The sample period in Masulis et al. (2007) is before the effective date of the Sarbanes-Oxley Act (SOX), whereas mine is mostly in the post-SOX period. The changes in board composition brought by SOX may have reduced the agency problem in duality firms. I summarize the mean announcement returns of duality firms and non-duality firms in different time periods in Table 4.11. From 1996 to 2003, duality firms have an average CAR of 0.0044, much lower than the average CAR of non-duality firms, 0.0065. From 2004 to 2012, however, the average CAR of duality firms is 0.0128, higher than the 0.0088 average CAR of non-duality firms.

The second possible reason is that my sample includes non-S&P 1500 firms. Table 4.11 shows that in the 2004-2012 period, duality firms have a higher average CAR than non-duality firms; however, if I limit the sample to S&P 1500 firms only, non-duality firms have a higher average CAR.

[10] The main sample in Masulis et al. (2007) is from 1990 and 2003, but the duality sample is from 1996 to 2003 because the duality data are available only after 1996.

4.4.2 Other specifications

I also conduct the following robustness check using alternative specifications. I reproduce the results in Table 4.4 and Table 4.5.

1. Add two controls for CEO quality and deal quality: the number of board seats indicating how a CEO is valued in the labor market, and a competing bid dummy capturing how attractive a target is. This is to address the concern that an omitted variable, CEO competence, explains my results. CEO competence is positively correlated with the chance of being a CEO chair and the announcement returns, and negatively correlated with decision time. However, it cannot explain why the benefits of CEO duality are more pronounced in firms that face light board monitoring, as well as in firms that operate in a rapidly changing and competitive environment.

2. Winsorize the dependent variables, completion time, and CARs at the top and bottom 0.5% to exclude the possibility that the results are driven by outliers.

3. Limit the sample to the deals whose relative size is larger than 5%, because boards are more likely to be involved in large deals than in small deals.

4. Use industry year fixed effects.

Tables 4.13, 4.14 and 4.15 report the results. My main results are mostly robust to these alternative specifications.

4.5 Conclusion

This study investigates the association between CEO duality and the board decision time. I find that CEO chairs spend less time to complete acquisition deals, indicating speedy decision time on their boards. The deals have higher announcement returns, a result that is not consistent with the prediction from agency theory. The effect of CEO duality on decision time and quality is mostly observed in firms without the presence of lead independent directors and under light board monitoring, suggesting that monitoring can be costly. In addition, the effect is more pronounced in the rapidly changing and competitive environment, consistent with the conjecture that the unitary leadership structure is valuable in such environment.

CEO duality is endogenously chosen. Hermalin et al. (2003) suggest that using boards' particular tasks to measure board effectiveness is less prone to endogeneity issue. In this study, I focus on a particular task of boards, i.e. making merger and acquisition decisions. An unobserved omitted variable could explain short decision time and superior decisions by CEO chairs is CEO competence. Competent CEOs, who are more likely to become chairs, are able to pick up good acquisition projects and convince their boards easily. But it cannot explain why the benefits of CEO duality are more pronounced in firms that face light board monitoring, as well as in firms that are in rapidly changing and competitive environment. I try to address this concern by adding controls for CEO quality and deal quality. Though the results are similar in this specification, I acknowledge that I cannot completely rule out this alternative hypothesis.

4.6 Appendix 1 for Chapter 4

Table 4.1: Variable definitions

Variable	Definition	Source
	Board types	
CEO chair	Dummy variable: 1 if the CEO is the chair of the board, 0 otherwise	BoardEx
Indep. chair	Dummy variable: 1 if the chair of the board is an independent director, 0 otherwise	BoardEx
Grey chair	Dummy variable: 1 if the chair of the board is a grey director, 0 otherwise	BoardEx
Non-CEO executive chair	Dummy variable: 1 if the chair of the board is a non-CEO executive director, 0 otherwise	BoardEx
CEO chair without LID	Dummy variable: 1 if the CEO is the chair of the board and there is absence of a lead independent director, 0 otherwise	BoardEx
CEO chair with LID	Dummy variable: 1 if the CEO is the chair of the board and there is presence of a lead independent director, 0 otherwise	BoardEx
	Firm characteristics	
Total Assets(ln)	Total Assets (ln)	Compustat
Tobin's Q	(Market value of equity + book value of debt)/book value of total assets (at - ceq + mkvalt)/at)	Compustat
Leverage	The sum of the firm's short-tern amd long-term debts scaled by total assets ((dlc+dltt)/at)	Compustat
Board size	Total number of directors	BoardEx
Directorships of the CEO	The number of directorship of any public companies of the CEO	BoardEx
	Deal characteristics	
CAR(-2, 2)	Five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index.	Eventus
CAR(-2, 2)*	Five-day cumulative excess return. Excess return is calculated by deducting CRSP value-weighted return from the underlier's daily return	CRSP
100% stock deal	Dummy variable: 1 if purely cash-financed deals, 0 otherwise	SDC
100% cash deal	Dummy variable: 1 if purely stock-financed deals, 0 otherwise	SDC
Private target	Dummy variable: 1 if the target firm is private, 0 otherwise	SDC
Diversification acquisition	Dummy variable: 1 if bidder and target do no share a two digit SIC code, 0 otherwise	SDC
Relative Size	Deal value scaled by bidder's market capitalization	SDC, Compustat
	Board monitoring measures	
Board independence	Board independence quintile	BoardEx
Female director	The number of female directors	BoardEx
S&P 1500	Dummy variable: 1 if the firm is a S&P 1500 constituent, 0 otherwise	Compustat
Lead independent director	Dummy variable: 1 if a lead independent director is appointed, 0 otherwise	BoardEx
% of Not Co-opted dirs	The percentage of directors who are appointed before the CEO assumed office	BoardEx

Table 4.1: Variable definitions (Continue)

Variable	Definition	Source
	Market environment measures	
Stock volatility	Annualized standard deviation of the stock return calculated based on 12 monthly stock returns before the fiscal year end	CRSP
HHI	The Herfindahl index for the firm's market that is constructed using the Hoberge and Phillips 10-K text-based network industries (TNIC)	Hoberge and Phillips data library
Product market fluidity score	The change in a firm's product space due to moves made by competitors in a firm's product market	Hoberge and Phillips data library

Table 4.2: Summary statistics of deal and firm characteristics

The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. Variable definitions are in Appendix A.

	N	mean	St Dev	p50
CARs (-2,2)	4,118	0.012	0.089	0.006
Completion Time	4,118	50	74	29
Public Target	4,118	0.134	0.340	0
Private Target	4,118	0.518	0.500	1
100% Stock Deal	4,118	0.053	0.224	0
100% Cash Deal	4,118	0.399	0.490	0
Relative Size	4,118	0.230	0.583	0.08
Diversification	4,118	0.373	0.484	0
US Target	4,118	0.822	0.383	1
Tender Offer	4,118	0.045	0.208	0
Stock Runup	4,118	0.123	0.632	0.012
Total Assets (ln)	4,118	6.699	1.780	6.683
Boardsize (ln)	4,118	2.088	0.254	2.079
Boardsize	4,118	8.326	2.112	8
Total Assets	4,118	4,568	25,711	799
CEO Chair	4,118	0.510	0.500	1
Indep. Chair	4,118	0.259	0.438	0
Gray Chair	4,118	0.125	0.331	0
Non-CEO Exec. Chair	4,118	0.106	0.308	0
LID	4,118	0.312	0.463	0
Firm with Co-Chairs	4,118	0.024	0.152	0
Firm with Co-CEOs	4,118	0.006	0.076	0

Table 4.3: Summary statistics of deal and firm characteristics in CEO Chair firms and non-CEO Chair firms
The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. Variable definitions are in Appendix A.

	Non-CEO Chair	CEO Chair	P
CARs (-2,2)	0.010	0.014	0.1788
Completion Time	50.437	49.914	0.8198
Public Target	0.137	0.130	0.4934
Private Target	0.547	0.490	0.0003
100% Stock Deal	0.066	0.040	0.0002
100% Cash Deal	0.402	0.397	0.7327
Relative Size	0.240	0.221	0.281
Diversification	0.361	0.384	0.1261
US Target	0.826	0.818	0.4791
Tender Offer	0.043	0.048	0.4398
Stock Runup	0.091	0.153	0.0016
Total Assets (ln)	6.537	6.855	0
Boardsize (ln)	2.092	2.083	0.2348
Boardsize	8.348	8.305	0.5126
Total Assets	3300	5800	0.0023

Table 4.4: Ordinary least squares models of the number of days to complete a deal The sample consists of completed acquisition deals in the sample period from 2003 to 2012. *Completion time* is calculated as the effective date minus the announcement date. *LID* indicates firms with lead independent directors. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent Variable	Completion Time		
	(1)	(2)	(3)
CEO Chair	-2.698	-5.217*	
	(1.116)	(1.731)	
Indep. Chair		-4.911	-4.892
		(1.513)	(1.507)
CEO Chair without LID			-6.235**
			(1.964)
CEO Chair with LID			-4.029
			(1.086)
Private Target	-23.405***	-23.282***	-23.337***
	(9.051)	(8.991)	(9.093)
100% Stock Deal	59.240***	58.995***	59.036***
	(9.780)	(9.743)	(9.748)
100% Cash Deal	-9.497***	-9.348***	-9.354***
	(3.872)	(3.820)	(3.819)
Relative Size	22.072***	22.050***	22.072***
	(4.783)	(4.773)	(4.780)
Diversification	-7.847***	-7.935***	-7.919***
	(3.200)	(3.226)	(3.224)
Total Assets (ln)	8.935***	8.906***	8.831***
	(7.259)	(7.258)	(7.419)
Leverage	-3.558	-3.566	-3.551
	(1.484)	(1.487)	(1.482)
TobinQ	0.240	0.237	0.240
	(0.755)	(0.759)	(0.764)
Boardsize	0.026	-0.040	-0.062
	(0.033)	(0.052)	(0.079)
Constant	-139.066***	-136.136***	-134.666***
	(6.086)	(5.969)	(6.065)
Observations	4,118	4,118	4,118
Adjusted R-squared	0.205	0.205	0.205

Table 4.5: Ordinary least squares models of CARs

The sample consists of completed acquisition deals from 2003 to 2012. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. *LID* stands for lead independent director. Variable definitions are in Appendix A. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent Variable		CARs (-2,2)	
	(1)	(2)	(3)
CEO Chair	0.007**	0.007*	
	(2.411)	(1.927)	
CEO Chair without LID			0.008*
			(1.792)
CEO Chair with LID			0.006
			(1.628)
Indep. Chair		0.000	0.000
		(0.079)	(0.076)
Private Target	-0.003	-0.003	-0.003
	(1.079)	(1.077)	(1.066)
100% Stock Deal	0.003	0.003	0.003
	(0.291)	(0.292)	(0.290)
100% Cash Deal	-0.002	-0.002	-0.002
	(0.909)	(0.910)	(0.908)
Relative Size	0.014***	0.014***	0.014***
	(3.255)	(3.256)	(3.254)
Diversification	-0.001	-0.001	-0.001
	(0.461)	(0.458)	(0.461)
Total Assets (ln)	-0.005***	-0.005***	-0.005***
	(4.552)	(4.543)	(4.495)
Leverage	0.017***	0.017***	0.017***
	(3.829)	(3.828)	(3.829)
TobinQ	-0.001	-0.001	-0.001
	(0.746)	(0.745)	(0.748)
Boardsize	0.001	0.001	0.001
	(0.908)	(0.913)	(0.928)
Constant	0.114***	0.114***	0.113***
	(4.502)	(4.458)	(4.425)
Observations	4,118	4,118	4,118
Adjusted R-squared	0.032	0.032	0.032

Table 4.6: Summary Statistics - subsamples of low monitoring intensity firms and high monitoring intensity firms
Low monitoring intensity firms are defined as (1) Independence ratio in the bottom 2 quintile; or (2) Absence of a female director; or (3) Not a S&P 1500 constituent; or (4) Absence of a lead independent director; or (5) Percentage of Co-opted directors lower than or equal to 50%. High monitoring intensity firms are defined as (1) Independence ratio in the top 2 quintile; or (2) Presence of two or more female directors; or(3) A S&P 1500 constituent; (4) Presence of a lead independent director; or (5) Percentage of Co-opted directors higher than 50%. Asterisks indicate significance of t-test at 0.01 (***), 0.05(**), and 0.10(*) levels.

Monitoring intensity	Chair CEOs			Non-chair CEOs		
	Low	High		Low	High	
	Mean	Mean	Low-High	Mean	Mean	Low-High
Time						
Independence	47	57	-10**	56	47	9**
Female director	41	76	-35***	51	59	-8
S&P 1500	43	62	-20***	52	52	0
Lead independence director	48	55	-6*	53	50	3
Co-opted directors	48	58	-10***	58	47	11***
CARs						
Independence	0.0196	0.0154	0.0043	0.0123	0.0089	0.0072
Female director	0.0201	0.0048	0.0153***	0.0094	0.0054	0.0040
S&P 1500	0.0214	0.0065	0.0150***	0.0121	0.0057	0.0064
Lead independence director	0.0189	0.0100	0.0089**	0.0095	0.0086	0.0008
Co-opted directors	0.0145	0.0152	-0.0008	0.0093	0.0094	-0.0001
CARs < 0						
Independence	41.8%	44.2%	-2.4%	44.6%	47.5%	-3.7%
Female director	41.4%	47.0%	-5.6%*	46.1%	46.0%	0.1%
S&P 1500	43.6%	44.2%	-0.6%	46.2%	47.1%	-0.8%
Lead independence director	43.3%	44.5%	-1.2%	46.5%	46.8%	-0.3%
Co-opted directors	44.0%	43.7%	0.2%	47.1%	46.1%	1.1%
CARs in the bottom quintile						
Independence	19.1%	13.6%	5.5%***	20.3%	18.1%	0.9%
Female director	18.7%	14.4%	4.3%*	21.6%	17.7%	4.0%
S&P 1500	19.3%	14.5%	4.8%***	22.3%	17.3%	4.9%***
Lead independence director	18.3%	15.8%	2.5%	20.2%	19.9%	0.3%
Co-opted directors	17.8%	16.0%	1.9%	19.5%	20.7%	-1.2%

Table 4.7: Ordinary least squares models of subsamples split by monitoring intensity

The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. *CARs (-2.2) < 0* is an indicator variable equalling to 1 if the CARs(-2,2) is negative. *CARs (-2.2) at the bottom quintile* is an indicator variable equalling to 1 if the CARs (-2.2) is at the bottom quintile. Variable definitions are in Appendix A. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

	Board independence		# of female directors		S&P 1500 Constituents		Lead Independent Director		% of co-opted director	
	Bottom 2 quintiles	Top 2 quintiles	0	>=2	Non S&P1500	S&P1500	Non-LID	LID	>=50%	< 50%
Panel A					*Dependent Variable: Completion time*					
CEO Chair	-9.477**	2.297	-10.072**	8.291	-12.139***	1.557	-9.996***	6.524	-9.289**	0.758
	(2.388)	(0.334)	(2.407)	(0.872)	(2.868)	(0.370)	(2.665)	(1.414)	(2.253)	(0.154)
Indep. Chair	-7.662	1.923	-0.533	-18.601**	-9.481*	-0.548	-8.060**	-5.298	-1.540	-6.464
	(1.552)	(0.243)	(0.108)	(2.285)	(1.939)	(0.135)	(2.041)	(0.707)	(0.281)	(1.615)
Observations	1,715	1,586	2,003	735	2,314	1,804	2,831	1,287	2,297	1,821
Adjusted R-squared	0.221	0.194	0.177	0.201	0.201	0.221	0.210	0.210	0.211	0.204
Panel B					*Dependent Variable: CARs (-2.2)*					
CEO Chair	0.009*	0.014	0.014**	0.001	0.010*	0.003	0.009*	0.005	0.004	0.010
	(1.690)	(1.282)	(2.430)	(0.103)	(1.766)	(0.659)	(1.793)	(0.813)	(0.772)	(1.573)
Indep. Chair	-0.002	0.007	0.007	-0.003	-0.004	0.005	0.001	0.007	-0.005	0.002
	(0.239)	(0.621)	(1.106)	(0.370)	(0.601)	(1.016)	(0.132)	(0.761)	(0.845)	(0.401)
Observations	1,715	1,586	2,003	735	2,314	1,804	2,831	1,287	2,297	1,821
Adjusted R-squared	0.059	0.011	0.040	0.044	0.035	0.034	0.026	0.050	0.048	0.022

Table 4.7: Ordinary least squares models of subsamples split by monitoring intensity(Continue)

	Board independence		# of female directors		S&P 1500 Constituents		Lead Independent Director		% of co-opted director	
	Bottom 2 quintiles	Top 2 quintiles	0	>=2	Non S&P1500	S&P1500	Non-LID	LID	>=50%	< 50%
Panel C	*Dependent Variable: CARs (-2.2) < 0*									
CEO Chair	-0.025	-0.066	-0.044	-0.034	-0.001	-0.044	-0.020	-0.031	-0.016	-0.029
	(0.920)	(1.055)	(1.558)	(0.716)	(0.022)	(1.534)	(0.779)	(0.905)	(0.624)	(0.947)
Indep. Chair	0.005	-0.042	0.004	-0.072	0.052*	-0.033	0.015	-0.033	0.039	-0.005
	(0.139)	(0.651)	(0.128)	(1.230)	(1.681)	(1.016)	(0.602)	(0.464)	(1.160)	(0.158)
Observations	1,715	1,586	2,003	735	2,314	1,804	2,831	1,287	2,297	1,821
Adjusted R-squared	0.016	0.003	0.013	0.012	0.009	0.024	0.004	0.012	0.009	0.017
Panel D	*Dependent Variable: CARs (-2.2) at the bottom quintile*									
CEO Chair	-0.014	-0.112**	-0.040*	-0.052	-0.027	-0.044*	-0.023	-0.063**	-0.023	-0.053**
	(0.648)	(2.029)	(1.722)	(1.354)	(1.238)	(1.827)	(1.128)	(2.172)	(1.105)	(2.037)
Indep. Chair	0.007	-0.076	-0.027	-0.034	0.015	-0.045*	-0.008	-0.093*	-0.018	-0.014
	(0.227)	(1.320)	(1.026)	(0.742)	(0.575)	(1.732)	(0.409)	(1.867)	(0.680)	(0.559)
Observations	1,715	1,586	2,003	735	2,314	1,804	2,831	1,287	2,297	1,821
Adjusted R-squared	0.018	0.022	0.018	0.043	0.020	0.046	0.026	0.025	0.024	0.023

Table 4.8: Ordinary least squares models of the completion time with interaction terms between the monitoring measures and the CEOC dummy
The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. Variable definitions are in Appendix A. All regressions include other control variables, industry fixed effects, and year fixed effects. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent Variable		The number of days to complete a deal			
	(1)	(2)	(3)	(4)	
Independence	-4.262***				
	(3.027)				
Independence * CEOC	5.203***				
	(2.673)				
Female Directors		-4.547**			
		(2.355)			
Female Directors * CEOC		10.898***			
		(3.739)			
S&P1500			-6.020		
			(1.635)		
S&P1500*CEOC			11.775**		
			(2.570)		
LID				-12.376***	
				(3.018)	
LID*CEOC				14.064***	
				(2.669)	
Not Co-opted Dirs					-11.689*
					(1.795)
Not Co-opted Dirs * CEOC					24.726**
					(2.515)
CEO Chair	-18.337***	-13.608***	-10.285***	-9.462***	-17.282***
	(2.982)	(3.959)	(2.893)	(2.650)	(3.199)
Indep. Chair	1.589	-5.457*	-4.748	-7.841**	-4.123
	(0.424)	(1.676)	(1.472)	(2.179)	(1.249)
Observations	4,118	4,118	4,118	4,118	4,118
Adjusted R-squared	0.207	0.209	0.206	0.206	0.207

Table 4.9: Ordinary least squares models of decision outcomes with interaction terms between the monitoring measures and the CEOC dummy

The sample consists of completed acquisition deals from 2003 to 2012. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. *CARs (-2.2) < 0* is an indicator variable equalling to 1 if the CARs(-2,2) is negative. *CARs (-2.2) at the bottom quintile* is an indicator variable equalling to 1 if the CARs (-2.2) is at the bottom quintile. Variable definitions are in Appendix A. All regressions include other control variables, industry fixed effects, and year fixed effects. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent Variable			*CARs(-2.2)*					*CARs(-2,2) < 0*					*CARs(-2,2) in bottom quintile*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Independence	-0.001					0.017					0.004				
	(0.463)					(1.563)					(0.466)				
Independence * CEOC	0.002					-0.015					-0.017				
	(0.771)					(1.152)					(1.635)				
Female Directors		0.002					-0.008					0.002			
		(0.744)					(0.547)					(0.205)			
Female Directors * CEOC		-0.003					0.013					-0.006			
		(0.898)					(0.722)					(0.406)			
S&P 1500			0.004					-0.023					-0.026		
			(0.961)					(0.939)					(1.314)		
S&P 1500 * CEOC			- 0.010*					0.001					0.005		
			(1.783)					(0.044)					(0.206)		
LID				0.004					-0.003					0.010	
				(0.818)					(0.083)					(0.361)	
LID * CEOC				-0.006					-0.001					-0.026	
				(0.843)					(0.015)					(0.829)	

Table 4.9: Linear probability models of decision outcomes (Continue)

Dependent Variable	CARs(-2.2)					CAR5 negative					CAR5 in bottom quintile				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Not Co-opted Dirs					0.004					-0.057					0.011
					(0.568)					(1.318)					(0.306)
Not Co-opted Dirs * CEOC					-0.002					0.047					-0.029
					(0.199)					(0.775)					(0.584)
CEO Chair	0.002	0.009**	0.011**	0.009*	0.009	0.010	-0.034	-0.024	-0.023	-0.050	0.017	-0.031	- 0.037*	-0.025	-0.021
	(0.261)	(1.999)	(2.259)	(1.860)	(1.416)	(0.235)	(1.406)	(1.007)	(0.968)	(1.413)	(0.512)	(1.562)	(1.879)	(1.276)	(0.758)
Indep. Chair	0.002	0.000	0.000	0.001	0.000	-0.016	0.010	0.012	0.010	0.014	-0.019	-0.013	-0.012	-0.011	-0.014
	(0.328)	(0.103)	(0.066)	(0.311)	(0.009)	(0.565)	(0.433)	(0.531)	(0.400)	(0.621)	(0.855)	(0.718)	(0.633)	(0.584)	(0.764)
Observations	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118	4,118
Adjusted R-squared	0.032	0.032	0.032	0.032	0.032	0.008	0.007	0.007	0.007	0.008	0.026	0.025	0.026	0.026	0.026

Table 4.10: Ordinary least squares models of subsamples split by market conditions
The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. *CARs (-2.2) < 0* is an indicator variable equalling to 1 if the CARs(-2,2) is negative. *CARs (-2.2) at the bottom quintile* is an indicator variable equalling to 1 if the CARs (-2.2) is at the bottom quintile. *HHI* is the Herfindahl index for the firm's market that is constructed using the Hoberge and Phillips 10-K text-based network industries (TNIC). Higher the HHI, less competitive the industry is. *Product market fluidity score* is the change in a firm's product space due to moves made by competitors in a firm's product market. Higher the fluidity score, more competitive the industry is. Variable definitions are in Appendix A. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

	Stock Volatility		HHI		Product market fluidity score	
Volatility/Competition	Bottom 2 quintiles Low	Top 2 quintiles High	Top 2 quintiles Low	Bottom 2 quintiles High	Bottom 2 quintiles Low	Top 2 quintiles High
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	*Dependent Variable: The number of days to complete a deal*					
CEO Chair	-5.494	-7.266	-1.917	-9.290*	-3.395	-8.914
	(1.028)	(1.540)	(0.392)	(1.702)	(0.886)	(1.569)
Indep. Chair	-12.840**	0.644	-2.016	-11.909**	-7.806*	-6.031
	(2.517)	(0.122)	(0.408)	(2.020)	(1.852)	(0.994)
Observations	1,616	1,618	1,649	1,605	1,668	1,583
Adjusted R-squared	0.206	0.183	0.222	0.151	0.253	0.182
Panel B	*Dependent Variable: CARs (-2,2)*					
CEO Chair	0.005	0.019**	0.009	0.011*	0.004	0.012*
	(1.639)	(2.260)	(1.461)	(1.833)	(0.710)	(1.732)
Indep. Chair	-0.000	0.008	-0.005	0.007	-0.001	0.002
	(0.007)	(0.906)	(0.785)	(1.095)	(0.235)	(0.292)
Observations	1,616	1,618	1,649	1,605	1,668	1,583
Adjusted R-squared	0.055	0.038	0.036	0.031	0.052	0.030
Panel C	*Dependent Variable: CARs (-2,2) < 0*					
CEO Chair	-0.044	-0.023	-0.001	-0.062*	-0.019	-0.038
	(1.403)	(0.692)	(0.030)	(1.823)	(0.607)	(1.150)
Indep. Chair	0.028	-0.011	0.070**	-0.049	0.020	0.007
	(0.751)	(0.305)	(1.981)	(1.280)	(0.576)	(0.182)
Observations	1,616	1,618	1,649	1,605	1,668	1,583
Adjusted R-squared	0.007	0.011	0.015	0.004	0.006	0.006
Panel D	*Dependent Variable: CARs (-2,2) at the bottom quintile*					
CEO Chair	-0.062***	-0.040	-0.009	-0.070**	-0.025	-0.053*

Table 4.10: Ordinary least squares models of subsamples split by market condition (Continue)

	Stock Volatility		HHI		Product Similarity Score	
	Bottom 2 quintiles (1)	Top 2 quintiles (2)	Top 2 quintiles (3)	Bottom 2 quintiles (4)	Bottom 2 quintiles (5)	Top 2 quintiles (6)
	(2.847)	(1.367)	(0.358)	(2.542)	(1.098)	(1.886)
Indep. Chair	-0.013	-0.031	0.027	-0.070**	-0.007	-0.055*
	(0.486)	(0.935)	(0.928)	(2.248)	(0.280)	(1.725)
Observations	1,616	1,618	1,649	1,605	1,668	1,583
Adjusted R-squared	0.027	0.008	0.030	0.014	0.014	0.023

All regressions have year fixed effect, industry fixed effect and the standard set of controls.

Table 4.11: CARs of duality firms and non-duality firms by year
CARs(-2,2) is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index.

	CARs(-2,2)			
	All firms		S&P 1500 firms	
Year	Non-Dualtiy	Duality	Non-Dualtiy	Duality
1996	0.0081	-0.0070	0.0095	-0.0024
1997	0.0072	0.0094	0.0180	-0.0015
1998	0.0130	0.0077	0.0335	-0.0002
1999	0.0181	-0.0050	0.0029	-0.0026
2000	-0.0159	-0.0141	-0.0135	-0.0133
2001	-0.0145	0.0013	0.0090	-0.0033
2002	0.0010	0.0071	-0.0017	0.0031
2003	0.0192	0.0230	0.0161	0.0124
2004	-0.0047	0.0159	-0.0036	0.0046
2005	0.0093	0.0145	-0.0029	0.0078
2006	0.0168	0.0094	0.0143	0.0003
2007	0.0108	0.0063	0.0072	0.0066
2008	0.0051	0.0102	-0.0025	0.0007
2009	0.0079	0.0199	-0.0105	-0.0001
2010	0.0022	0.0127	0.0077	0.0094
2011	0.0060	0.0162	0.0111	0.0019
2012	0.0214	0.0136	0.0156	0.0078
1996-2003	0.0065	0.0044	0.0075	-0.0003
2004-2012	0.0088	0.0128	0.0051	0.0046

Table 4.12: Ordinary least squares models of the number of days to complete a deal The sample consists of completed acquisition deals from 2003 to 2012. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. *CARs(-2,2)** is calculated in the same way as *CARs(-2,2)* except that CRSP equal-weighted return is used as the market index. Variable definitions are in Appendix A. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent variable	CAR (-2,2)	CAR (-2,2)	CAR (-2,2)*
CEO/Chairman duality	0.001	0.006**	0.006**
	(0.457)	(2.157)	(2.149)
Board size	-0.000	0.000	0.001
	(-0.153)	(0.537)	(0.882)
Independent board dummy	-0.022	-0.003	-0.003
	(-1.347)	(-0.426)	(-0.484)
Competitive industry	-0.007*	-0.006*	-0.005
	(-1.755)	(-1.755)	(-1.633)
Unique industry	-0.007*	-0.007*	-0.008**
	(-1.655)	(-1.866)	(-2.036)
Log(total assets)	-0.005***	-0.005***	-0.006***
	(-3.547)	(-4.516)	(-4.755)
Tobin's Q	0.001	0.003	0.003*
	(0.438)	(1.620)	(1.753)
Free cash flow	-0.011	0.015	0.016
	(-0.469)	(1.037)	(1.117)
Leverage	0.024	0.034***	0.034***
	(1.516)	(2.806)	(2.830)
Stock price runup	-0.016**	-0.009***	-0.008**
	(-2.459)	(-2.728)	(-2.376)
Industry M&A	0.000***	0.000***	0.000***
	(6.313)	(3.359)	(3.277)
Relative deal size	0.009*	0.018***	0.018***
	(1.786)	(3.786)	(3.720)
High tech	-0.001	0.001	0.001
	(-0.238)	(0.160)	(0.162)
High tech × relative deal size	-0.039***	-0.022*	-0.022
	(-2.688)	(-1.648)	(-1.640)
Diversifying acquisition	-0.000	-0.001	-0.001
	(-0.077)	(-0.267)	(-0.243)
cPublic target × stock deal	-0.033**	-0.031**	-0.033***
	(-2.007)	(-2.525)	(-2.684)
Public target × all-cash deal	0.003	-0.002	-0.004
	(0.640)	(-0.505)	(-0.793)

Table 4.12: Linear probability models of the number of days to complete a deal(Continue)

Dependent variable	CAR (-2,2)	CAR (-2,2)	CAR (-2,2) *
Private target × all-cash deal	-0.000	-0.009***	-0.010***
	(-0.030)	(-2.980)	(-3.172)
Private target × stock deal	0.032	0.024	0.024
	(0.788)	(1.381)	(1.353)
Subsidiary target × all-cash deal	0.008**	0.002	0.002
	(2.016)	(0.722)	(0.558)
Constant	0.132***	0.110***	0.113***
	(4.343)	(4.992)	(5.136)
Observations	1,804	4,128	4,128
Adjusted R-squared	0.043	0.037	0.036

Table 4.13: Robustness - OLS of completion time

The sample consists of completed acquisition deals from 2003 to 2012. *Completion time* measures the number of days between the announcement date and the effective date. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. In column (1) and column (2), three additional variables are included. In column (3) and column (4), industry-year fixed effect used. In column (5) and column (6), the sample is limited to deals of which relative size is higher than 5%, rather than 1% in the baseline regressions. In column (7) and column (8), the dependent variable is winsorzied at the top and bottom 0.5%. In column (9) and column (10), the treatment sample and the control sample are matched on firm size and relative deal size. In column (11) and column (12), all deals are included rather than the first deal in a fiscal year. Variable definitions are in Appendix A. All regressions include industry fixed effect and year fixed effect except column (3) and column (4). The standard control variables are included but omitted from reporting for brevity. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent variable	Completion time											
Sample or model variation	CEO ability		Industry-year FE		Large deals		Winsorize dep. vars.		Match sample		All deals	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CEO Chair	-2.115	-4.405	-2.837	-5.599*	-6.013**	-9.586**	-3.041	-5.156*	-6.426**	-8.858**	-2.209	-3.337
	(0.845)	(1.420)	(1.081)	(1.678)	(2.102)	(2.506)	(1.509)	(1.952)	(2.033)	(2.087)	(0.979)	(1.205)
Indep. Chair		-4.398		-5.298		-6.690		-4.123		-4.468		-2.225
		(1.360)		(1.507)		(1.561)		(1.408)		(0.878)		(0.725)
Competing bid	42.263***	42.160***										
	(2.764)	(2.759)										
Directorship of CEO	-2.840*	-2.679*										
	(1.764)	(1.667)										
CARs (-2,2)	-7.675	-7.648										
	(0.589)	(0.589)										
Observations	4,118	4,118	4,118	4,118	2,620	2,620	4,118	4,118	1,809	1,809	5,029	5,029
Adjusted R-squared	0.208	0.208	0.191	0.192	0.237	0.237	0.250	0.250	0.220	0.220	0.200	0.200

Table 4.14: Robustness - OLS of CARs(-2,2)

The sample consists of completed acquisition deals from 2003 to 2012. *CARs(-2,2)* is the five-day cumulative abnormal return calculated using the market model. The market model parameters are estimated over the period (-210, -11) with CRSP value-weighted return as the market index. In column (1) and column (2), three additional variables are included. In column (3) and column (4), industry-year fixed effect used. In column (5) and column (6), the sample is limited to deals of which relative size is higher than 5%, rather than 1% in the baseline regressions. In column (7) and column (8), the dependent variable is winsorzied at the top and bottom 0.5%. In column (9) and column (10), the treatment sample and the control sample are matched on firm size and relative deal size. In column (11) and column (12), all deals are included rather than the first deal in a fiscal year. Variable definitions are in Appendix A. All regressions include industry fixed effect and year fixed effect except column (3) and column (4). The standard control variables are included but omitted from reporting for brevity. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent variable	CARs(-2,2)											
Sample or model variation	CEO ability		Industry-year FE		Large deals		Winsorize dep. vars.		Match sample		All deals	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CEO Chair	0.007**	0.007*	0.007**	0.007*	0.011**	0.010*	0.005**	0.005	0.009*	0.010	0.004*	0.004
	(2.401)	(1.919)	(2.288)	(1.853)	(2.568)	(1.807)	(2.006)	(1.642)	(1.771)	(1.543)	(1.752)	(1.395)
Indep. Chair		0.000		0.001		-0.002		0.001		0.002		0.000
		(0.097)		(0.162)		(0.314)		(0.153)		(0.353)		(0.013)
Competing bid	-0.001	-0.001										
	(0.030)	(0.030)										
Directorship of CEO	-0.000	-0.000										
	(0.285)	(0.292)										
Observations	4,118	4,118	4,118	4,118	2,620	2,620	4,118	4,118	1,809	1,809	5,029	5,029
Adjusted R-squared	0.032	0.032	0.015	0.014	0.032	0.031	0.034	0.034	0.034	0.033	0.025	0.025

Table 4.15: Robustness - OLS of CARs calculated in different event windows
The sample consists of completed acquisition deals from 2003 to 2012. *CARs(-1,1)*, *CARs(0,1)* and *CARs(0,2)* are calculated in the same way as CARs(-2,2) in the baseline regressions except that their event windows are (-1,1), (0,1) and (0,2) respectively. *CARs(-2,2)** is an alternative measure of CARs and the abnormal return is the market adjusted return. Variable definitions are in Appendix A. All specifications include industry fixed effect and year fixed effect. Standard errors are clustered at company level. T-statistics are shown in the parentheses. Asterisks indicate significance at 0.01 (***), 0.05(**), and 0.10(*) levels.

Dependent variable	CARs(-1,1)		CARs(0,1)		CARs(0,2)		CARs(-2,2)*	
CEO Chair	0.006**	0.006	0.004*	0.004	0.005*	0.005	0.006**	0.006
	(2.151)	(1.623)	(1.724)	(1.366)	(1.823)	(1.528)	(2.026)	(1.470)
Indep. Chair		-0.001		0.000		0.001		-0.001
		(0.157)		(0.029)		(0.172)		(-0.228)
Private Target	-0.002	-0.002	-0.001	-0.001	-0.002	-0.002	-0.004	-0.004
	(0.562)	(0.554)	(0.474)	(0.470)	(0.847)	(0.850)	(-1.184)	(-1.171)
100% Stock Deal	0.002	0.002	-0.007	-0.007	-0.007	-0.007	0.004	0.004
	(0.168)	(0.165)	(0.582)	(0.583)	(0.652)	(0.649)	(0.326)	(0.321)
100% Cash Deal	-0.001	-0.001	-0.002	-0.002	-0.003	-0.003	-0.004	-0.004
	(0.274)	(0.266)	(1.088)	(1.083)	(1.413)	(1.416)	(-1.398)	(-1.379)
Relative Size	0.014***	0.014***	0.011***	0.011***	0.011***	0.011***	0.012***	0.012***
	(3.157)	(3.156)	(2.814)	(2.814)	(2.669)	(2.670)	(2.877)	(2.874)
Diversification	-0.002	-0.002	-0.004	-0.004	-0.004	-0.004	-0.002	-0.002
	(0.803)	(0.808)	(1.420)	(1.421)	(1.458)	(1.453)	(-0.564)	(-0.569)
Total Assets (ln)	-0.005***	-0.005***	-0.004***	-0.004***	-0.005***	-0.005***	-0.005***	-0.005***
	(4.339)	(4.340)	(3.886)	(3.883)	(4.076)	(4.066)	(-4.300)	(-4.294)
Leverage	0.016***	0.016***	0.015***	0.015***	0.016***	0.016***	0.014***	0.014***
	(3.883)	(3.884)	(3.893)	(3.893)	(3.732)	(3.730)	(3.178)	(3.179)
TobinQ	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.557)	(0.558)	(0.003)	(0.002)	(0.550)	(0.548)	(-0.346)	(-0.347)
Boardsize	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(1.096)	(1.087)	(1.123)	(1.123)	(0.943)	(0.954)	(0.120)	(0.110)
Constant	0.108***	0.108***	0.086***	0.086***	0.100***	0.100***	0.046***	0.047***
	(4.656)	(4.664)	(3.984)	(3.968)	(4.239)	(4.186)	(2.644)	(2.651)
Observations	4,118	4,118	4,118	4,118	4,118	4,118	3,731	3,731
Adjusted R-squared	0.032	0.031	0.028	0.028	0.027	0.027	0.028	0.028
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Chapter 5

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