

CEOs' Personal Portfolio and Corporate Policies*

Hamid Boustanifar[†] Dan Zhang[‡]

October, 2016

Abstract

Using a unique data set of personal wealth and sociodemographic characteristics for all Norwegian CEOs, we find evidence that CEOs' personal risk taking is related to the risk-taking at their firm. We confirm the previous findings in the literature with more comprehensive data that CEO personal leverage and firm leverage are positively correlated. In addition, we find that when managers increase risky assets in their personal portfolio, corporate leverage and R&D expenditures fall and cash holding rises in the following year. The latter relations hold not only in the cross-section of firms, but also within a firm following a CEO turnover and within a firm-CEO match, and are robust to using different measures of CEOs' personal risk taking. They are stronger when the CEO has more power, i.e, when the CEO has high ownership or he is also the chairman of the board. Overall, our results add to literature by showing that not only exists CEO-firm endogenous matching but also that CEOs' personal risk preference has an impact on the corporate policies.

JEL Classifications: G30, M52

Keywords: CEO risk preferences, CEO personal portfolio, corporate finance

*We acknowledge financial support from Centre for Corporate Governance Research (CCGR) and the Research Council of Norway through a Finansmarkedfondet (grant 250251).

[†]BI Norwegian Business School, Nydalsveien 37, 0442 Oslo, Norway. Email: hamid.boustanifar@bi.no. Tel: +47 4641 0601.

[‡]BI Norwegian Business School, Nydalsveien 37, 0442 Oslo, Norway. Email: danielle.zhang@bi.no. Tel: +47 4641 0927.

1 Introduction

What are the major determinants of corporate finance decisions? Classical theories emphasize firm-, industry-, and market-related factors whereas recent studies find relatively weak support to these theories and suggest that further research is needed (Graham and Harvey, 2001). A new trend in corporate finance research emphasizes the role of managers and their individual preferences and beliefs (see Bennedsen, Perez-Gonzales, and Wolfenzon, 2013; Bertrand and Schoar, 2003; Kaplan, Klebanov, and Sorensen, 2012; Custodio and Metzger, 2013, 2014; Falato, Li, and Milbourn, 2015; Cronqvist, Makhija, and Yonker, 2012; Graham, Harvey, and Puri, 2013; Ben-David, Graham, and Harvey 2013). However, due to the lack of data, this literature often relies on indirect proxies for important inputs; for example, using CEOs who grew up in the Great Depression (Malmendier, Tate, G., Yan J. 2011) or fly small aircraft (Cain and McKeon, 2015) as a proxy for managerial risk aversion .

In this paper, we measure the CEO's personal risk taking from his non-firm wealth and portfolio holding and link it to corporate risk taking. We test whether CEO's risk preferences and firm risk are correlated positively across firms ("behavior consistency hypotheses"; cross-sectional variations) and whether changes in CEO's portfolio holdings in risky assets is negatively related to changes in firm risk policies ("hedging hypotheses"; time-series variation). We find that, in line with behavioral consistency hypothesis, CEOs who have higher personal leverage tend to take higher firm leverage. We also find that the lagged personal holdings in risky assets are negatively associated with firm leverage and R&D expenditures and positively associated with firm cash holdings. These relations hold not only across firms, but also within a firm following a CEO turnover, within a firm over time, and within a firm-CEO match. In addition, we find a stronger effect when managers have high ownership at the firm or when they are also the chairman of the board. These findings are consistent with the hedging hypothesis that the CEO who bears more risk in his personal portfolio tends to engage in less risky firm policies to hedge himself, especially when the CEO is powerful and can affect firm policies easily. In addition, we show that our measure of CEOs' holdings in risky assets explains the variation in firm leverage beyond CEO fixed effects (Bertrand

and Schoar, 2003) and CEO-firm fixed effects, and beyond the personal leverage (Cronqvist, Makhija, and Yonker, 2012). We also show that CEOs' holding in risky assets do not simply capture the persistence in firm policies. Finally, we demonstrate that the results hold when controlling for past firm performance and when using alternative measures of CEO's personal risk taking.

We contribute to the literature in the following four aspects. First, we provide more empirical evidence on the role of managers in corporate behaviors. Recent papers suggest that managers matter using managerial fixed effects (Bertrand and Schoar, 2003), overconfidence proxies (Malmendier and Tate, 2005, 2008), personal leverage (Cronqvist, Makhija, and Yonker, 2012), characteristics from CEO assessment (Kaplan, Klebanov, and Sorensen, 2012) and psychometric tests (Graham, Harvey, and Puri, 2013). To our knowledge, we are the first to link CEOs' portfolio holdings in risky assets outside the firms to the firm policies. Specifically, we measure a CEO's holding of risky assets as the value of equity, bonds and funds held outside the firm divided by the total value of his non-firm wealth. Our unique data set consists of CEO wealth (both in and outside the firm), liabilities, as well as other CEO characteristics, which are considered unobservable in most countries. In addition, we also have data on CEO characteristics even before they were appointed as a CEO, which are important for identification strategy. This rich data set provides us relatively accurate measures for managers' exposure to risk than using experiment data or proxies. We find that CEO's holdings in risky assets and firm risk strategies are correlated.

Second, we add to Cronqvist, Makhija, and Yonker (2012) by investigating time-series variations in personal leverage. Due to data limitations, Cronqvist et al. (2012) only consider CEOs' choice of leverage in buying their residential house at one point in time. We have complete information on CEOs' wealth throughout years that allows us to run panel regressions; and our measure of personal leverage also captures richer information. Similar to Cronqvist et al. (2012), we find a positive correlation between CEO personal leverage and firm leverage in a cross-sectional setting. However, we show that the changes in CEO personal leverage is not correlated with changes in firm leverage over the time and across different CEOs within

a firm. This finding may indicate that there is a CEO-firm matching so that the personal leverage stays relatively constant within a firm even when there is a CEO turnover. On the other hand, we find that CEO's holding of risky assets correlates with firm policies both cross firms and within firms. Together, these findings provide us some insights on the measures of revealed personal risk preference. To some extent, CEO leverage captures a general level of risk that a CEO would like to take while CEO's holding in risky assets captures the actual risk exposure at a given point in time.

Third, recent studies are limited to cross-sectional analyses which suffer from the potential endogenous matching of CEOs and firms (see for example, Edmans and Gabaix, 2011) and could not address CEO hedging hypothesis. In contrast, we have a panel data of about 20 years that allows us to investigate not only behavioral consistency hypothesis but also how changes in CEO's holding in risky assets shape firm policies. To deal with potential endogenous matching of CEOs and firms, we construct a CEO-firm paired panel and include firm fixed effects to capture the changes within a firm due to CEO turnovers. If indeed firms have some preferences over certain type of CEOs and tend to choose the type of CEOs that best implement their firm policies, then we would expect different CEOs in the same firm to also have similar risk preferences. Our identification strategy helps us capture the changes among CEOs within the same firm, given the CEO-firm match. In addition, we run panel data regressions using firm-year observations to study the within-firm impact of changes in the risk preferences of the same CEO on firm policies, where firm-, year-, and firm-CEO-paired-fixed effects are included. Besides, we interact CEO risk preferences with corporate governance measures to pin down the channel through which CEO risk preferences and firm policies are connected. These identification strategies reduce concerns related to endogenous matching or other issues that complicate establishing causality.

Finally, in addition to public firms, our data set also covers private firms and full ownership that are both ignored in most of the literature due to data availability. Since private firms usually face more information asymmetry problems and financial constraints, we also account for interactions between managerial personal traits, real investment, financing and

corporate governance. It is worth noting that the corporate policies of private firms in itself is of great interest to financial economists due to the limited data available to researcher. We join a recent surge of papers using data on private companies to draw new insights into public company behavior (e.g., Bargaron, Schlingemann, and Stulz, 2008; Brav, 2009; Maksimovic, Phillips, and Yang, 2015; Michaely and Roberts, 2013; and Gao, Harford, and Li, 2013).

This paper proceeds as follows. The next section briefly reviews the literature, Section 3 derives our hypotheses, Section 4 describes the data set and variables, Section 5 presents our methodology and empirical findings, and Section 6 concludes.

2 Literature

Previous literature has looked at the impact of manager's characteristics and personal preferences on firm policies. Bertrand and Schoar (2003) find that a significant extent of the heterogeneity in investment, financial, and organizational practices of firms can be explained by the presence of manager fixed effects. Malmendier and Tate (2005, 2008) find that overconfident CEOs have higher investment-cash flow sensitivities and are more likely to engage in value-destroying mergers.

Some studies focus on risk-related personal traits and find risk-loving CEOs are related to riskier firm policies. For example, Malmendier et al. (2011) find CEOs who grew up during the Great Depression are averse to debt and lean excessively on internal finance. They also find CEOs with military experience pursue more aggressive policies. Cronqvist, Makhija, and Yonker, (2012) show that corporate leverage is positively associated with CEOs' leverage in their most recent home purchase. Graham, Harvey, and Puri (2013) use survey data to find that more risk tolerant CEOs are initiating more M&As. Cain and McKeon (2015) find that CEOs who possess private pilot's licenses are associated with higher leverage and more acquisitions.

Some other studies focus on managers' exposures to firm risk. For instance, some empirical evidence suggests CEOs who are exposed to large firm risk tend to engage in less risky firm policies. Amihud and Lev (1981) show that managers might engage in mergers to reduce their

undiversifiable employment risk. May (1995) provides evidence that CEOs who have more wealth vested in their firm equity tend to diversify more at their firm. Finally, Tufano (1996) finds that in North American gold mining industry firms whose managers hold more options (more stocks) manage less (more) gold price risk, suggesting that managerial risk-aversion may affect corporate risk management policy. On the other hand, managers may adjust their outside portfolio to hedge some of their exposure to firm risk. For example, (Heaton and Lucas (2001) find households with high and variable business income hold less wealth in stocks than other similarly wealthy households. With our novel data, we could potentially test for the direction the causality run. Besides, Faccio, Marchica, and Mura (2011) find that firms controlled by diversified large shareholders undertake riskier investment than firms controlled by nondiversified large shareholders. Our paper adds to the literature by focusing on CEOs who arguably have more say in firms' operations than large shareholders.

In addition, CEOs' wealth data have been used to address other questions not directly related to firm policies. For example, Becker (2006) uses aggregate yearly data on the level of wealth of Swedish CEOs and show that CEOs' non-firm wealth has a positive effect on their incentive strength. Liu and Yermack (2007) study the relation between CEOs buying expensive real estate and firm performance. They find a negative effect, consistent with CEO entrenchment. We add to this literature by using CEOs' non-firm wealth to address a different set of questions, namely the interaction of CEO wealth with firm capital structure and investment policies. Moreover, unlike the previous studies using only the aggregated wealth, we have access to detailed components of of managers non-firm wealth, such as their holdings in equity, bonds, and funds, as well as other demographic characteristics, which enable us to better address the endogeneity issues.

3 Hypotheses

There are two hypotheses on how CEOs' personal traits affect firm policies. It should be noted, however, these two hypotheses are not mutually exclusive. Behavior consistency hypothesis focuses on cross-sectional variations while hedging hypothesis emphasizes time-series

variations.

A. Behavior consistency hypothesis Following the discovery of the concept of traits (Allport 1927 and Allport 1931), a large number of psychology studies demonstrated that traits can be captured empirically (Allport 1966; Epstein 1979; Epstein 1980) and behaviors exhibit consistency across different situations (Funder and Colvin 1991; Cronqvist, Makhija, and Yonker, 2012). The behavior consistency hypothesis predicts a positive relation between CEO's personal and corporate investment and financing decisions. There are two channels through which CEO risk preferences and firm risk policies can be positively linked. First, CEOs and firms are endogenously matched so that CEOs are chosen by firms for their specific attributes. Second, CEOs can impose their styles on the firm if boards' ability to screen or monitor managers is limited. These two channels are somewhat related, but the implications are distinct. If the first channel is true, the difference in CEO risk preference will not lead to inefficiencies in firm risk policies as long as boards optimally select the CEOs. For the interpretation of the second channel, some CEO risk preferences may cause firms to adopt suboptimal risk strategies, depending on the strength of corporate governance to screen or monitor CEOs.

B. Hedging hypothesis The hedging hypothesis predicts a negative relation between personal and corporate investment and financing decisions. There two channels that generate this negative relation. First, despite many theoretical works that implicitly assume that CEOs cannot trade, recent evidence suggests that managers do adjust their outside portfolio holdings to hedge some of their exposure to firm risk (Heaton and Lucas, 2000). This imply that if a CEO can diversify his exposure to firm risk then the incentives from his compensation contract may not lead to the optimal performance. Second, managers also engage in corporate risk reduction strategies to reduce private risk (Amihud and Lev 1981; May 1995; Tufano 1996). Under this channel, we expect the effect to be strong when corporate governance is poor and CEOs are powerful.

4 Data set

Our data set is based on the population of all limited liability firms, both public and private, in Norway and the individuals who were CEOs for at least one year.¹ We obtain accounting information for years 1994-2013 and corporate governance related variables for years 2000-2013 from the Center of Corporate Governance Research. In addition, we have sociodemographic information, compiled by Statistics Norway, for all individuals over the period of 1993-2013, including detailed information on wealth and income as well as gender, age, education, marital status, and number of kids.² We exclude financial and utility firms to avoid the impact of their regulatory capital requirements, ownership restrictions, and accounting rules. We also exclude firms with fewer than five employees. We require firms to have at least three annual observations to be included in our sample. Our final sample consists of 25,773 CEO-firm pairs and 93,363 firm-year observations.

[Insert Table 1 about here]

Table 1 reports summary statistics for all the main variables used in our analyses, including CEO characteristics, firm characteristics, and corporate governance. To deal with potential outliers, we winsorized our variables at the 1% and 99% tails. Panel A summarizes all variables for the CEO-firm paired panel with 25,774 observations, where each observation is a unique CEO-firm match. Our main variable, CEO risky assets, is measured as the value of CEO holdings of equity, bonds and funds at the year-end divided by the total value of non-

¹In Norway, the law mandates a standardized set of accounting statements certified by a public auditor for every firm regardless of its listing status, size, and industry. Failure to submit this information within 17 months from the end of the fiscal year triggers automatic liquidation by the court. Due to the wealth tax, the government's statistical agency, Statistics Norway, collects annual data on wealth and income at the individual level from a variety of sources, including the Norwegian Tax Agency, welfare agencies, and the private sector. Financial institutions supply information to the tax agency on their customers' deposits, interest paid or received, security investments, and dividends. Employers supply statements of wages paid to their employees. Earnings and wealth figures are public information in Norway. This transparency is generally believed to make tax evasion more difficult and, hence, our data more reliable.

²In Norway, wealth tax is levied at both municipal and central government level. Norwegians are required to submit a detailed annual overview of their assets to the tax authorities. The data are relatively reliable, because earnings and wealth figures are public information in Norway and this transparency makes tax evasion more difficult.

firm wealth. ³Follow the literature, we measure CEO leverage as CEO total liabilities scaled by annual income.⁴ On average, CEOs invest 21% of their total non-firm wealth in risky assets (including equity, bonds and funds). They have total liabilities of 1.7 times of their annual income, possess a gross wealth of 5 million Norwegian krone (approximately 600,000 U.S. dollars), an annual income of 0.9 million Norwegian krone (approximately 150,000 U.S. dollars), and 1.9 million Norwegian krone in financial assets (risky assets plus money market funds). About 85% of CEOs are male and 71% of them are married. The average CEO age is 56. The education, on average, is equivalent to a bachelor degree, with 11% of them having a degree in business related studies.

Our sample firms have, on average, 50.5 million Norwegian krone (approximately 6 million U.S. dollars) in total assets and 13.6 employees. On average, they take 66% leverage, measured as total liabilities over total assets. The leverage may seem to be high, but the number is reasonable given that more than 90% of our sample are private firms that are restricted to the equity issuance. In our sample, firms hold an average of 29% of their total assets in cash. On average, they invest 1% of the total assets in research and development (R&D). This number seems to be low, but it is mainly due to no investment in R&D for majority of firms. If we take the subset of firms that have positive R&D expenditure, the average R&D expenditure would be about 10% of the total assets. On average, firms have 16% of tangible assets and have about 15 years of history. Majority of firms do pay out dividends and the average dividend/earnings ratio is 0.4. Panel B reports the main variables for the firm-year long panel with 93,363 observations. The numbers are similar to those for the CEO-firm paired panel.

In addition, we use CEO ownership and the CEO-chair duality as proxies for corporate governance. CEO ownership is percentage of stock held in the firm. CEO chair is a dummy variable that equals one if the CEO also serves as the Chair of the board. Our sample CEOs own on average 36% of the firm and 42% of them also hold a position as the Chair of the

³Ideally, we would like to distinguish between equity and bonds and between corporate bonds and government bonds. However, our data does not allow us to separate these items.

⁴The main results are qualitatively the same if we measure CEO leverage by dividing CEO total liabilities with CEO non-firm wealth.

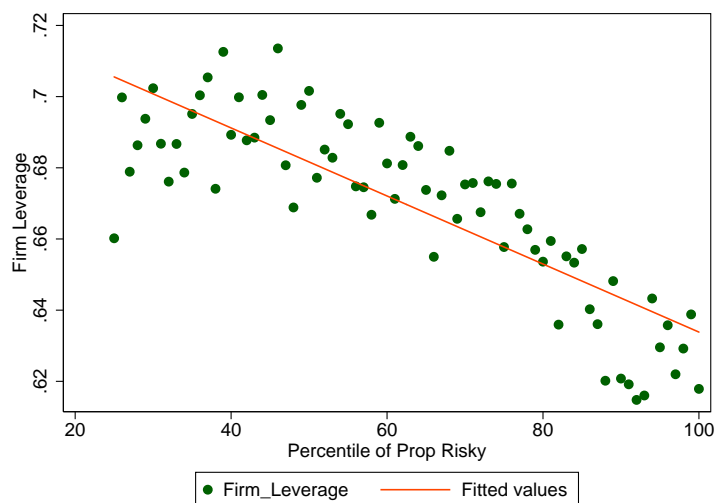


Figure 1: Leverage across percentiles of the proportion of CEO risky assets

Prop risky is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. Firm leverage is total liabilities divided by total assets. Each dot presents the average leverage for each percentile sorted according to the proportion of CEO risky assets.

board.

Prior to investigating the relation between the proportion of CEO risky assets and corporate policies in a regression framework, it is useful to look for a relation in the raw data. We sort firms according to the proportion of CEO risky assets and aggregate the leverage within each percentile. The plot is shown in Figure 1. The horizontal axis shows the proportion of CEO risky assets, ranging from 20% to 100%, and the vertical axis show the level of firm leverage. By construction, each percentile has an equal number of firms. The plot depicts a negative relation between CEO risky assets and firm leverage in raw data: the higher the proportion of CEO risky assets, the lower the firm leverage.

5 Empirical analysis

5.1 CEO-firm paired panel analysis

Our first step is to investigate the cross-section correlation between CEO risky assets (or CEO leverage) and financial policies, such as leverage, cash ratio, and R&D expenditures. To do

so, we first construct a CEO-firm paired panel, where each observation is a unique CEO-firm match. For example, if a firm had three different individuals served as a CEO during our sample years, there will be three observations in the CEO-firm paired panel; if there is no change in CEO in the firm, then we only have one observation. In total, we obtained 25,773 such CEO-firm pairs. For each variable, we take the average over the years that an individual served a CEO. We run the regressions as follows:

$$\overline{FirmPolicy}_{i,j} = \beta' \overline{CEO Risky Assets}_{i,j} + \gamma' \overline{CEO Leverage}_{i,j} + \delta' \overline{X}_{i,j} + \mu' Ind_k + \varepsilon_{i,j} \quad (1)$$

$$\overline{FirmPolicy}_{i,j} = \beta' \overline{CEO Risky Assets}_{i,j} + \gamma' \overline{CEO Leverage}_{i,j} + \delta' \overline{X}_{i,j} + \mu' Firm_i + \varepsilon_{i,j} \quad (2)$$

where i , k , and j denote firm i , industry k , and CEO j . $\overline{FirmPolicy}$ is a set of firm's average investment and financing policies measured as firm leverage, cash ratio, and R&D expenditures, in different regressions. $\overline{CEO Risk Assets}$ is the average proportion of non-firm wealth (or financial wealth, total wealth in the robustness check in section 5.6.3) invested in risky assets, lagged one year. $\overline{CEO Leverage}$ is the average ratio of CEO total liabilities to annual income. \overline{X} is a set of firm-level control variables that are used in the literature to explain firm policies such as the number of employees, total assets, tangibility, firm age, CEO wealth, CEO income, CEO gender, CEO married dummy, CEO age, CEO education level, and CEO education in business.

In regression estimation (1), we include industry fixed effects to account for the omitted variables that are associated with industry conditions. Specifically, we study the link between the variation in average CEO risky assets and firm policies for CEO-firm matched pairs within an industry.

In the regression estimation (2), we include firm fixed effects to filter out all omitted variables that are constant within a firm across different CEOs. Therefore, we focus on the association between the variation in average CEO risky assets and firm policies within a firm. In other words, we capture changes in CEO risky assets due to CEO turnovers, which better addresses the firm-CEO matching concerns relative to prior literature that only uses data

from one point in time. Suppose indeed that firms have some preferences over certain type of CEOs and tend to choose the type of CEOs that best implement their firm policies. Then we would expect different CEOs work in the same firm should also have similar risk preferences, assuming firms and CEOs are always well matched and firms' preferences do not change over our sample period. The regression estimation (2) helps us to identify the changes among CEOs within the same firm, which arguably reduces our concerns over the endogenous matching of firms and CEOs.

[Insert Table 2 about here]

The results are shown in Table 2. The odd columns report results for the regression estimation (1) where industry fixed effects are added while the even columns are results for the regression estimation (2) where firm fixed effects are included. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for investment in R&D. The table reports standard errors which are clustered at firm level.

As the results show, the lagged proportion of CEO risky assets are negatively associated with firm leverage, both across CEO-firm pairs within an industry and among CEOs within a same firm. The economic significance is also noticeable. Within a firm, a one-standard deviation increase in the proportion of CEO risky assets is associated with 0.9 ($= -0.044 \times 17\%$) percentage point decrease in firm leverage, which is about 1.4% decrease in firm leverage for a median firm in our sample. The table also shows that the lagged proportion of CEO risky assets is positively associated with firm cash holdings, both across CEO-firm pairs within an industry and among CEOs within a same firm. Within a firm, a one-standard deviation increase in the proportion of CEO risky assets is associated with 0.5 ($= 0.023 \times 21\%$) percentage point increase in firm leverage, which is about 1.7% increase in firm cash holdings for a median firm in our sample. The results for R&D expenditure are only negative and significant for the estimation with industry fixed effects but not for the estimation with firm fixed effects. One of the reasons may be that majority of our sample firms do not have investment in R&D and thus lack variations in the dependent variable to detect the effect of

CEO risky assets.

Moreover, we show how CEO's personal leverage is correlated with firm policies. We add to Cronqvist, Makhija, and Yonker (2012) by investigating time-series variations in personal leverage and by looking at corporate policies beyond firm leverage. Due to data limitations, Cronqvist et al. (2012) only consider CEOs' choice of leverage in buying their residential house at one point in time. We have complete information on CEOs' wealth through out years that allows us to run panel regressions; and our measure of personal leverage also captures richer information. Similar to Cronqvist et al. (2012), we find a positive correlation between CEO personal leverage and firm leverage in a cross-sectional setting. However, we show that the changes in CEO personal leverage is not correlated with changes in firm leverage when firm fixed-effects are included. This finding may indicate that there is a CEO-firm matching so that the personal leverage stays relatively constant within a firm even when there is a CEO turnover. In addition, we show that CEO personal leverage correlates positively with corporate cash holdings and negatively with R&D expenditure.

In sum, we find that the proportion of CEO risky assets is negatively associated with firm leverage, positively related to firm cash holdings, and negatively correlate with R&D expenditures. These findings are consistent with predictions from the hedging hypothesis that the CEO who holds risky portfolios is already bearing a lot of risk in his personal portfolio and thus engage in less risky firm policies to hedge himself. We also show that CEO leverage is negatively associated with firm leverage, positively related to firm cash holdings, and negatively correlate with R&D expenses. However, these results only hold in cross-sectional settings but not in panel setting, which is in line with behavior consistency hypothesis. This also indicates that CEO leverage captures a more general level of risk that a CEO would like to take while CEO's holding in risky assets captures the actual risk exposure at a given point in time.

5.2 Firm-year panel data analysis

The previous section show a negative association between firm policies and personal risk preferences, which supports the hedging hypothesis. To fully exploit the unique feature of our relatively long panel data set, we switch to the panel data which have more variations over the time rather than just the variations when there is a change in CEO. Essentially, the hedging hypothesis posits that within a CEO-firm match over the time there is a negative correlation between the riskiness of the CEO' personal portfolio and his firm's policies. Therefore, our test of the hedging hypothesis below use the panel data of 93,363 firm-year observations. Specifically, we run the following regressions with pooled OLS regressions and panel data regressions with firm fixed effects, respectively:

$$FirmPolicy_{i,t} = \beta' CEO_{RiskyAssets}_{i,t-1} + \gamma' CEO_{Leverage}_{i,t-1} + \delta' X_{i,t} + \lambda' Year_t + \mu' Ind_k + \varepsilon_{i,t} \quad (3)$$

$$FirmPolicy_{i,t} = \beta' CEO_{RiskyAssets}_{i,t-1} + \gamma' CEO_{Leverage}_{i,t-1} + \delta' X_{i,t} + \lambda' Year_t + \mu' Firm_i + \varepsilon_{i,t} \quad (4)$$

where i , k , and t stand for firm, industry, and time, respectively. Again, $FirmPolicy$ is a set of firms' investment and financing policies measured as firm leverage, cash ratio, and R&D expenditures, in different regressions. $CEO_{RiskyAssets}$ is the proportion of non-firm wealth invested in risky assets, lagged one year. $CEO_{Leverage}$ is the ratio of CEO total liabilities to annual income. X is a set of firm-level control variables including the number of employees, total assets, tangibility, firm age, CEO wealth, CEO income, CEO gender, CEO married dummy, CEO age, CEO education level, and CEO education in business. Industry fixed effects is included in the pooled OLS regression and firm fixed effects is added to the panel data regression. A negative (positive) β for leverage and R&D (cash ratio) would be support for the hedging hypothesis, showing that changes in the riskiness of a CEO's personal portfolio is negatively related with the riskiness of his firm policy.

[Insert Table 3 about here]

Table 3 summarizes the estimates for above regressions. The odd columns report the

results for the pooled OLS regression while the even columns are the results for the panel where firm fixed effects are included. The first two columns show the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. The standard errors are clustered at firm level. We exclude variables married, CEO age, education level, and education in business in the regressions with the firm fixed-effect, due to the lack of variations within the firm.

As shown in the table, the one-year lagged CEO risky assets is negatively related to firm leverage and R&D investment and positively related to cash holdings, all being statistically significant. The results hold both within an industry and within a firm. The effects are also economically significant. For example, a one-standard-deviation increase in the proportion of CEO risky assets is associated with 0.9 ($= -0.044 \times 17\%$) percentage point increase in firm leverage, 0.1 ($= -0.006 \times 21\%$) percentage point increase in firm leverage, and 9 ($= -0.002 \times 4\%$) percentage point increase in firm leverage, which translate to a 1.4% decrease in firm leverage, a 0.5% increase in cash holdings, and a 4.2% decrease in R&D expenditures for an average firm in the sample.

Similar to Table 2, we find that CEO's personal leverage correlates positively with firm leverage and R&D expenses and negatively with cash holdings. The results are again significant in a cross-sectional setting but less so when firm fixed effects are included. It seems that the personal leverage is relatively constant within a firm over time, which may be a sign of CEO-firm matching.

To sum up, our panel data analysis indicates that within a firm the higher the risk a CEO takes for his personal portfolio in the previous year the lower the risk he takes in the firm he manages this year, which is consistent with predictions from the hedging hypothesis. We also find that firms with higher CEO personal leverage tend to take on riskier corporate policies, which is in line with the behavior consistency hypothesis.

5.3 CEO risky assets and CEO power

So far, we have shown a negative association between the CEO risky assets and the firm risk strategies. This negative relation is consistent with two interpretations. First, CEOs may adjust their outside portfolios to hedge some of their exposure to firm risk. Second, CEOs may engage in corporate risk reduction strategies to reduce private risk. Arguably, the CEO's impact through second channel is more likely when the firm's corporate governance is poor so that he has power to change the firm policy at his wish and CEO's stake in the firm is large so that he has incentive to do so.

To distinguish through which channels the negative relation between the CEO risky assets and the firm risk strategies hold, we now include CEO power and its interaction with CEO risky assets into the regressions using the CEO-firm matched pairs. Specifically, we identify CEOs who are also the chair of the board and use this CEO-chair dual role to indicate CEO power.

We also include CEO ownership as another measure of CEO power. We are aware that CEO ownership may also capture CEO incentives: high ownership can align the interests of CEOs with the shareholders. However, recent research shows that high CEO ownership entrenches CEOs with power and thus impose agency costs on firms (see for example, Kim and Lu, 2011). For our sample, the majority are private firms where CEO ownership is high (the average is 36% and the median is 30%). We cut CEO ownership into high (above the median) and low (below the median).

Thus we focus on cross-section variations within an industry and estimate the following regression:

$$\begin{aligned}
 \overline{FirmPolicy}_{i,j} &= \beta' \overline{CEO Risky Assets}_{i,j} + \delta' \overline{CEO Leverage}_{i,j} + \theta' \overline{CEO Power}_{i,j} \\
 &+ \kappa' \overline{CEO Risky Assets}_{i,j} * \overline{CEO Power}_{i,j} \\
 &+ \lambda' \overline{CEO Leverage}_{i,j} * \overline{CEO Power}_{i,j} + \gamma' \overline{X}_{i,j} + \mu' Ind_k + \varepsilon_{i,j} \quad (5)
 \end{aligned}$$

where i , k , and j denote firm i , industry k , and CEO j . $\overline{FirmPolicy}$ is a set of firm's

average investment and financing policies measured as firm leverage, cash ratio, and R&D expenditures, in different regressions. $\overline{CEO\ Risky\ Assets}$ is the average proportion of non-firm wealth (or financial wealth, total wealth in the robustness check in section 5.6.3) invested in risky assets, lagged one year. $\overline{CEO\ Leverage}$ is the average ratio of CEO total liabilities to annual income. $\overline{CEO\ Power}$ is either CEO ownership or CEO-chair dual role, in different regressions. \overline{X} is a set of firm-level control variables that are used in the literature to explain firm policies such as the number of employees, total assets, tangibility, firm age, CEO wealth, CEO income, CEO gender, CEO married dummy, CEO age, CEO education level, and CEO education in business.

[Insert Table 4 about here]

Table 4 reports the results with the interaction terms of CEO high ownership and CEO-chair duality. CEO high ownership equals one if the percentage of stock held in the firm is higher than the median CEO ownership which is 30% in our sample. CEO-chair is a dummy variable that equals one if the CEO also serves as the Chair of the board. For the sake of space, the estimation coefficients for all the control variables are not tabulated in the table. The first two columns show that when CEOs have high ownership or high power, the effect of the CEO risky assets is even stronger on firm leverage. So holding all other things equal, an increase in CEOs' holdings of risky assets in their personal portfolio is associated with a larger decrease in firm leverage for CEOs who have high ownership or are also served as the chair of the board. Similarly, the third and fourth columns show that, ceteris paribus, an increase in CEO risky assets is correlated with a larger increase in cash holdings in the firms with high CEO ownership or CEO being the chair of the board than otherwise. In the last two columns, the coefficients for the interaction terms are both negative, but is only statistically significant for CEO high ownership and not for the CEO-chair duality.

Regarding to CEO leverage, we find that the interaction with CEO power plays a role in cash holdings but in firm leverage or R&D expenses. The third and fourth columns show that, ceteris paribus, an increase in CEO leverage is correlated with a larger decrease in cash holdings in the firms with high CEO ownership or CEO being the chair of the board than

otherwise. The dummy variable CEO high ownership itself is only marginally significant while CEO-chair duality is not significant at all.

In short, we find some evidence that changes in the risky portfolio holdings of CEOs who have high ownership and hold the position as chair tend to have stronger effects on the firm risk policies. This is consistent with the second channel of the hedging story that powerful CEOs may engage in corporate risk reduction strategies to reduce their own risk. The results on CEO leverage are mixed. On one hand, we find changes in the personal leverage of who have high ownership and hold the position as chair tend to have stronger effects on the firm cash holdings. This finding is consistent with the channel that CEOs can impose their styles on the firm if boards' ability to screen or monitor managers is limited. On the other hand, we also find the interaction with CEO power do not play a role in firm leverage and R&D expenses, which is consistent with CEO-firm endogenously matching channel.

5.4 Does CEO risky assets capture more than the CEO fixed effects?

We have shown that CEO risky assets and CEO leverage can explain some variations in firm financing and investment policies. However, one may argue that these CEO risk measures simply capture some kind of CEO characteristics that are similar to the CEO fixed effects as shown in Bertrand and Schoar (2003). To investigate if our CEO risk measures capture anything more than the CEO fixed effects, we incorporate CEO and CEO-firm fixed effects in the panel of 93,363 firm-year observations and run the following regressions:

$$\begin{aligned} FirmPolicy_{i,j,t} &= \beta' CEO Risky Assets_{i,j,t-1} + \gamma' CEO Leverage_{i,j,t-1} \\ &+ \delta' X_{i,t} + \lambda' Year_t + \mu' CEO_j + \varepsilon_{i,j,t} \end{aligned} \quad (6)$$

$$\begin{aligned} FirmPolicy_{i,j,t} &= \beta' CEO Risky Assets_{i,j,t-1} + \gamma' CEO Leverage_{i,j,t-1} \\ &+ \delta' X_{i,t} + \lambda' Year_t + \mu' CEO Firm_{i,j} + \varepsilon_{i,j,t} \end{aligned} \quad (7)$$

where i , j and t stand for firm, CEO and time, respectively. For *FirmPolicy*, we focus on firm leverage for this analysis. *CEO Risky Assets* is the proportion of non-firm wealth invested

in risky assets, lagged one year. *CEO Leverage* is the ratio of CEO total liabilities to annual income. X is a set of firm-level control variables including the number of employees, total assets, tangibility, firm age, CEO wealth, CEO income, and CEO gender. *CEO* is the dummy variable to capture the CEO fixed effects and *CEOfirm* is the CEO-firm matched dummy to capture the fixed effects of the unique CEO-firm combination. A negative β would be a support for the hedging hypothesis, showing that changes in the riskiness of a CEO's personal portfolio is negatively related with the riskiness of his firm policy.

[Insert Table 5 about here]

The results are shown in Table 5. The coefficients of CEO risky assets and the standard errors that clustered at firm level are reported in the table. The coefficients and standard errors for control variables are not tabulated. The first two columns of the table summarize the regression estimates for pool OLS and the panel data regressions using firm fixed effects as described in equations 3 and 4. The last two columns show the regression results that include CEO fixed effects and CEO-firm fixed effects, respectively. As shown in the table, the negative relation between CEO risky assets and firm leverage hold for all specifications. For example, in the fourth column where CEO-firm fixed effects are included, the negative and significant sign on CEO risky assets shows that, within a CEO-firm match, the higher the proportion of CEO risky assets last year the lower the firm leverage this year. The coefficient of CEO leverage is still significant when CEO fixed effects are included (the third column), indicating that CEO leverage still captures some more CEO characteristics beyond CEO fixed effects. The insignificant results when firm fixed effects and CEO-firm fixed effects are not surprising, given that CEO leverage is relatively constant over time.

The analysis above demonstrates that the variable CEO risky assets explains the variation in firm leverage beyond the CEO fixed effects and CEO-firm fixed effects.

5.5 Persistence in firm policies

There is evidence in the literature that corporate investment and financing policies, such as leverage, are relatively persistent (for example, Leary and Roberts (2005) and Lemmon,

Roberts, and Zender (2008)). One may argue that CEO risky assets simply captures a persistent effect in corporate policies. To test if this concern is valid, we replace the one-year lagged average CEO risky assets with the CEO risky assets measure in year 1995, way before firms' financing decisions and before some individuals were appointed as CEOs. We run the following regressions using the CEO-firm paired panel:

$$\overline{FirmPolicy}_{i,j} = \beta' CEO\ Risky\ Assets_{1995,i,j} + \gamma' CEO\ Leverage_{1995,i,j} + \delta' \overline{X}_{i,j} + \mu' Ind_k + \varepsilon_{i,j} \quad (8)$$

where i , k , and j denote firm i , industry k and CEO j . $\overline{FirmPolicy}$ is a set of firm's average investment and financing policies measured as firm leverage, cash ratio, and R&D expenditures, in different regressions. $CEO\ Risky\ Assets_{1995}$ is the proportion of non-firm wealth invested in risky assets measured in 1995. $CEO\ Leverage_{1995}$ is the ratio of CEO total liabilities to annual income measured in 1995. \overline{X} is a set of firm-level control variables that are used in the literature to explain firm policies such as the number of employees, total assets, tangibility, firm age, CEO wealth, CEO income, CEO gender, CEO married dummy, CEO age, CEO education level, and CEO education in business. A negative (positive) and significant β for leverage and R&D (cash ratio) would confirm the concern indeed CEO risky assets simply capture the persistence in the corporate policies. An insignificant β would indicate that the CEO risky assets held in 1995 can not explain the changes in firm policies later on. Thus the effect on the one-year lagged CEO risky assets does not simply capture the persistence in firm policies.

[Insert Table 6 about here]

Table 6 reports the results. We focus on the coefficients and standard errors of CEO risky assets 1995 and do not report those for the control variables. The odd columns show the specifications with industry fixed effects while the even columns are results with firm fixed effects. The first two columns show the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. The table shows that the CEO risky assets in 1995 is only associated with cash ratio when firm fixed effects is

not include and not significant for any other specifications. This finding contradicts with the concern that our variable CEO risky assets simply captures a persistent effect in corporate policies. In contrast CEO leverage seems to capture a lot of persistence in corporate policies.

The overall conclusion is that CEO risky assets explains leverage beyond a persistent corporate policy effect.

5.6 Robustness check

5.6.1 Separating professional CEOs and family CEOs

So far, we have not distinguished between professional CEOs and family CEOs. However, we are aware that the matching of the CEOs to the firms are likely to be different for these two types of CEOs. Arguably, the matching for the family CEOs is more problematic for our hypotheses because family CEOs who are the heirs of founders may have already known (before they become CEO) that they will inherit the firm and thus will choose their financial portfolios accordingly. Therefore, in this subsection, we exclude all family CEOs and repeat panel data analysis as in Table 3.

[Insert Table 7 about here]

The results are shown in Table 7. We include all the control variables as in Table 3 but only tabulate the coefficients and standard errors of CEO risky assets and CEO leverage for the sake of space. The results are qualitatively the same as those in Table 3: the share of CEOs' risky assets (which is lagged one year) is negatively related to firm leverage and R&D investment and positively related to cash holdings. All coefficients are statistically significant except for the cash ratio regression with firm fixed effects. The signs of coefficient on CEO leverage are similar to Table 3. Again, they are more significant when industry fixed-effects are presented, but less so when including firm fixed-effects.

In sum, for the sample of professional CEOs, we again find evidence that are both consistent with hedging hypothesis: a higher risk a CEO takes for his personal portfolio in the previous year is associated with a lower firm risk this year; on average, a higher leverage a

CEO takes the riskier corporate policies a firm engages.

5.6.2 Controlling for the past performance

One may also be concerned that our corporate policies are functions of current and past firm performance and profitability. For instance, after a good firm performance, firm leverage tends to be lower and cash holdings higher. At the same time, good firm performance is associated with increases in CEO wealth and job security, which might cause the CEO to invest more aggressively. Although we already lagged CEO personal portfolio risk, one may still argue that our findings are driven by expected firm performance. To address this concern, we include both past and current performance measured by return on assets (ROA) in the regression equations (3) and (4) and rerun the analysis as in Table 3.

[Insert Table 8 about here]

Table 8 reports the results. We focus on the coefficients and standard errors of CEO risky assets and the performance measures and do not report those for the control variables. We find exactly the same signs and similar magnitude as the coefficients of CEO risky assets in Table 3 and more significant signs for CEO leverage.

5.6.3 Alternative measures for CEO risky assets

Until now, we measure CEO risky assets as the proportion of non-firm wealth invested in risky assets. However, there is a concern that variations in CEO risky assets are due to changes in CEO non-firm wealth rather than in the investment in risky assets itself. To address this concern, we use different denominators such as CEOs' financial capital and total wealth. We repeat the analysis as in the specification (1) and (2) using the CEO-firm paired panel, with alternative measures of CEO risky assets.

[Insert Table 9 about here]

Table 9 summarizes the regression results for firm leverage. Only the coefficients and standard errors of the CEO risky assets variables are reported in the table. Panel A shows

the results for leverage, Panel B for cash holdings, and Panel C for the R&D expenditures. The odd columns show the specifications with industry fixed effects while the even columns are results with firm fixed effects. The first two columns summarize the regression estimates using CEO financial capital as a denominator while the last two columns show the regression results using CEO total wealth as a denominator. Again, we find that CEO risky assets is negatively related to firm leverage and R&D expenditures and positively correlated with cash holdings for the alternative measures of CEO risky assets.

Overall, the main finding of a negative association between the proportion of CEO risky assets and firm risk policies is robust to alternative measures of CEO risky assets.

5.7 Discussion on the endogeneity issues

One of the major challenges for the empirical corporate finance literature is the possibility of endogenous matching of CEOs and firms (see for example, Edmans and Gabaix (2011)). Particularly in our case, CEOs who have preferences for high leverage may be demanded by firms whose expected optimal leverage is high. Note, however, that since we control for firm characteristics, the results would not simply reflect the tendency of high risk CEOs to be matched with riskier firms. More importantly, our panel data regressions with CEO (and firm) fixed effects allows us to essentially investigate time series correlation within each match to test the hedging hypothesis. Specifically, to address this concern, we construct CEO-firm paired panel and include firm fixed effects to capture changes in CEO risky assets due to CEO turnovers. We apply this strategy for all our main analyses, exploiting the variation within each firm-CEO match, which reduces our concern on the endogenous matching problem.

Another potential concern about the previously mentioned methodology is that it does not establish causality. For example, CEOs may adjust their outside portfolios to hedge some of their exposure to firm risk; they may also engage in corporate risk reduction strategies to reduce their own private risk. We address this concern in section 5.3, where we include corporate governance variables and their interaction with CEO risky assets into the regressions with CEO-firm matched pairs. We argue that the CEO's impact through second channel is

more likely when the firm's corporate governance is poor so that he has power to change the firm policy at his wish and CEO's stake in the firm is large so that he has incentive to do so. We indeed find that the changes in the risky portfolio holdings for CEOs with high ownership and hold the position as the chair of the board have stronger effects on the firm risk policies.

6 Conclusion

This paper studies to what extent firm policies are affected by CEOs' personal assets allocation. We look at a CEO's non-firm wealth holdings to glean his risk preferences and correlate these risk preferences with firm policies. If the CEO takes more risk in his personal portfolios, it may be that (a) the CEO is risk-loving, and so will engage in risky firm policies, or (b) since the CEO is already bearing a lot of risk in his personal portfolio, he will engage in less risky firm policies to hedge himself. First, we find that CEOs' portfolio holdings in risky assets are negatively associated with firm leverage and R&D expenditures and positively associated with firm cash holdings, within a firm across different CEO and over the time. These findings are consistent with predictions from the hedging hypothesis that a CEO who holds risky portfolios is already bearing a lot of risk in his personal portfolio and thus engage in less risky firm policies to hedge himself. We also find that CEO with high personal leverage tend to take on riskier strategy at firm, indicating that the behavioral consistency hypothesis also holds. Second, we further investigate through which channels are CEOs' holdings in risky portfolio and CEO's personal leverage related to firm risk strategies. We find that the changes in the risky portfolio holdings of CEOs who have high ownership and hold the position as the chair of the board tend to have stronger effects on firm policies. This is consistent with the story that powerful CEOs and those in the poor corporate governance firms may engage in corporate risk reduction strategies to reduce their own risk. However, the interaction of CEO power and CEO leverage has weaker effects on firm policies, which is consistent with CEO-firm endogenous matching channel. Third, we show that our measure of CEOs' holdings in risky assets explains the variation in firm leverage beyond CEO fixed effects (Bertrand and Schoar, 2003) and CEO-firm fixed effects.

We contribute to the literature by providing empirical evidence on the role of managers in corporate policies. In addition, our comprehensive data set allow us to alleviate endogeneity concerns by investigating how changes in CEO's personal risk preferences shapes firm policies within CEO-firm pairs. Specifically, we construct a CEO-firm paired panel and include firm fixed effects to capture the changes within a firm due to CEO turnovers. We also run panel data regressions using firm-year observations to study the within-firm impact of the changes in CEO risk preferences on firm policies, where firm-, year-, and firm-CEO-paired-fixed effects are included. Besides, we interact CEO risk preferences with corporate governance measures to pin down the channel through which CEO risk preferences and firm policies are connected. These identification strategies diminish concerns related to endogenous matching or other issues that complicate establishing causality.

Our research improves our understanding of the determinants of firm policies. Our findings for the hedging hypothesis provide a deeper insight on managerial incentives and corporate governance design that ensures corporate resources are used to maximize stakeholder value instead of CEOs' personal risk management.

References

- Amihud, Y., and Lev. B, 1981. Risk reduction as a managerial motive for conglomerate mergers. *Bell Journal of Economics* 12, 605–617.
- Bargeron, L.L., Schlingemann, F.P., Stulz, R.M., Zutter, C.J., 2008. Why do private acquirers pay so little compared to public acquirers? *Journal of Financial Economics* 89, 375–390.
- Bennedsen, M., Perez-Gonzales, F., Wolfenzon, D., 2013. Estimating the Value of the Boss: Evidence from CEO Hospitalization Events. Working paper.
- Ben-David, I., Graham, J.R., and Harvey, C.R., 2013. Managerial Miscalibration, *The Quarterly Journal of Economics*, 1547–1584.
- Bertrand, M., Schoar, A., 2003. Managing with style: the effect of managers on corporate policy. *Quarterly Journal of Economics* 118, 1169–1208.
- Becker, B., 2006. Wealth and Executive Compensation. *Journal of Finance* 61, 379–397.
- Becker, T.A and R.Shabani, 2010. Outstanding debt and the household portfolio. *Review of Financial Studies* 23, 2900–2934.
- Burnham, T.C, J.Flynn Chapman, P.B Gray, M.H McIntyre, S.F Lipson, and P.T Ellison, 2003, Men in committed, romantic relationships have lower testosterone, *Hormones and Behavior* 44, 119 – 122.
- Brav, O., 2009. Access to capital, capital structure, and the funding of the firm. *Journal of Finance* 64, 263–308.
- Caine, M., and S. McKeon, CEO Personal Risk-Taking and Corporate Policies. *Journal of Financial and Quantitative Analysis*, forthcoming Cocco, J.F, 2005. Portfolio choice in the presence of housing. *Review of Financial Studies* 18, 535–567.
- Cronqvist, H. Makhija, A.K., Yonker, S.E., 2012. Behavioral consistency and corporate finance: CEO personal and corporate leverage. *Journal of Financial Economics* 103, 20–40.

- Custodio, C. and Metzger, D. 2013, How do CEOs matter? The effect of industry expertise on acquisition returns, *Review of Financial Studies* 26, 2008–2047.
- Custodio, C. and Metzger, D. 2014, Financial expert CEOs: CEO’s work experience and firm’s financial policies, *Journal of Financial Economics* 114, 125–154.
- Edmans, A. and X. Gabaix, 2011. The effect of risk on the CEO market. *Review of Financial Studies* 24, 2822–2863.
- Epstein, S., 1979. The stability of behavior: on predicting most of the people much of the time, *Journal of Personality and Social Psychology* 37. 1097–1126.
- Epstein, S., 1980. The stability of behavior. *American Psychologist* 35, 790–806.
- Falato, A., Li, D., Milbourn, T. 2015, Which skills matter in the market for CEOs? Evidence from pay for CEO credentials, *Management Science, Articles in Advance*, 1–25.
- Funder, D.C., Colvin, C.R., 1991. Explorations in behavioral consistency: properties of persons, situations, and behaviors. *Journal of Personality and Social Psychology* 60, 773–794.
- Gao, H., J. Harford, K. Li, 2013. Determinants of corporate cash policy: Insights from private firms. *Journal of Financial Economics* 109, 623–639.
- Granham, J.R., Harvey, C.R., Puri, M., 2013. Managerial attitudes and corporate actions. *Journal of Financial Economics* 109, 103–121.
- Grossman, J. Hart, O.D., 1983. An analysis of the principal-agent problem. *Econometrica* 51, 7–45.
- Heaton, J. and D. Lucas, 2000. Portfolio Choice and Asset Prices: The Importance of Entrepreneurial Risk, *Journal of Finance* 55, 1163–1198.
- Kaplan, S.N., Klebanov, M.M., Sorensen, M., 2012. Which CEO characteristics and abilities matter? *Journal of Finance* 67, 973–1007.

- Kim, E.H, and Y. Lu, 2011. CEO ownership, external governance, and risk-taking, *Journal of Financial Economics* 102, 272–292.
- Leary, M.T., Roberts, M.R., 2005. Do firms rebalance their capital structures? *Journal of Finance* 60, 2575–2619.
- Lemmon, M.L., Roberts, M.R., Zender, J.F., 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. *Journal of Finance* 63, 1575–1608.
- Liu, C.H., Yermack,D., 2007. Where are the shareholders' mansions? CEOs' home purchases, stock sales, and subsequent company performance. Unpublished working paper, Cornell University and New York University.
- Love, David A., 2010, The Effects of Marital Status and Children on Savings and Portfolio Choice, *Review of Financial Studies* 23, 385–432.
- Maksimovic, V., Phillips, G., Yang, L., 2013. Private and public merger waves. *Journal of Finance* 68, 2177–2217.
- Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment. *Journal of Finance* 60, 2661–2700.
- Malmendier, U., Tate, G., 2009. Superstar CEOs. *Quarterly Journal of Economics* 124, 1593–1638.
- Malmendier, U., Tate, G., Yan J. 2011. Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies. *Journal of Finance* LXVI, 1677-1833.
- May, D.O., 1995. Do managerial motives influence firm risk reduction strategies? *Journal of Finance* 50, 1275–1290.
- Michaely, R., Roberts, M.R., 2012. Corporate dividend policies: Lessons from private firms. *Review of Financial Studies* 25, 711–746.
- Miller, M.H., 1977. Debt and taxes. *Journal of Finance* 32, 261-275.

Myers, S.C., Majluf, N., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-224.

Roussanov, N., Savor P., 2012, Status, Marriage, and Managers's Attitudes to Risk, *Management Science*, forthcoming.

Sapienza, Paola, Luigi Zingales, and Dario Maestripieri, 2009, Gender differences in financial risk aversion and career choices are affected by testosterone, *Proceedings of the National Academy of Sciences*.

Tufano, P., 1996. Who manages risk? An empirical examination of risk management practices in gold mining industry. *Journal of Finance* 51, 1097–1137.

Table 1: Descriptive Statistics

This table shows the mean and median (in parentheses) of variables used in the empirical analysis. Panel A summarizes all variables for the CEO-firm paired panel. Panel B reports the main variables for the firm-year long panel. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth. CEO leverage is personal total liabilities divided by income. Annual wealth, income, and assets are as reported in million Norwegian kroner. Male, married, and business education are dummy variables that equal one if the CEO is male, is married, and has education in business, respectively. Education is a scale measure which equal one for CEOs with a university degree and zero otherwise. Leverage is total liabilities divided by total assets. Cash ratio is cash divided by total assets. R&D is the research and development expenditures scaled by total assets. Tangibility is tangible assets divided by total assets. CEO ownership is percentage of stock held in the firm. CEO chair is a dummy variable that equals one if the CEO is also the Chair of the board. The variables are winsorized at the 1% and 99% tails.

Panel A: CEO-firm paired panel (25,774 observations)

Variable	Mean	Std Dev	Median
<i>CEO Characteristics</i>			
CEO risky assets	21%	21%	15%
CEO leverage	1.7	1.5	1.4
Total wealth (in million NOK)	5.0	7.5	3.3
Salary (in million NOK)	0.6	0.5	0.5
Income (in million NOK)	0.9	0.9	0.7
Financial assets (in million NOK)	1.9	5.6	0.8
Male	85%	36%	100%
Married	71%	45%	100%
CEO age	56	10	56
Education level	1.3	0.8	1.0
Business education	11%	32%	0%
<i>Firm Characteristics</i>			
Assets (in million NOK)	50.5	636	5.6
Number of employees	13.6	2.2	11.0
Firm leverage	0.66	0.17	0.70
Cash ratio	0.29	0.21	0.25
R&D	0.01	0.04	0.00
Tangibility	0.16	0.18	0.09
Firm age	15.2	13.1	12.0
Log dividend	7.0	6.4	10.7
Dividend/earnings	0.4	7.7	0.1
<i>Corporate Governance</i>			
CEO ownership	36%	34%	30%
CEO-chair	0.42	0.49	0

Panel B: Firm-year long panel data (93,363 observations)

CEO risky assets	21%	23%	15%
Firm leverage	0.66	0.19	0.69
Cash ratio	0.29	0.23	0.25
R&D	0.01	0.04	0

Table 2: CEO risk measures and corporate policies (CEO-firm matched pairs)

This table reports the coefficient estimates for the regression estimations (1) and (2) for the CEO-firm matched pairs. The odd columns report results for the regression estimation (1) where industry fixed effect is added while the even columns are results for the regression estimation (2) where firm fixed effects are included. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash Holdings		R&D	
	(1)	(2)	(3)	(4)	(5)	(6)
	Ind FE	Firm FE	Ind FE	Firm FE	Ind FE	Firm FE
CEO risky assets	-0.074*** (0.013)	-0.044*** (0.013)	0.043*** (0.005)	0.023*** (0.007)	-0.008*** (0.001)	-0.002 (0.002)
CEO leverage	0.011*** (0.001)	0.002 (0.002)	-0.024*** (0.001)	-0.004*** (0.001)	0.001* (0.000)	0.000 (0.001)
log_Employees	0.045*** (0.007)	0.013 (0.018)	0.007 (0.010)	-0.021 (0.016)	0.040*** (0.008)	0.010 (0.019)
log_Assets	-0.031*** (0.004)	0.005 (0.016)	-0.044*** (0.005)	0.001 (0.011)	-0.029*** (0.005)	0.012 (0.019)
Tangibility	0.041** (0.019)	0.141** (0.061)	-0.319*** (0.042)	-0.423*** (0.089)	0.027 (0.018)	0.154* (0.077)
Firm_age	-0.002*** (0.000)	-0.008*** (0.001)	-0.000 (0.000)	0.001 (0.001)	-0.000*** (0.000)	-0.000 (0.000)
log_Wealth	-0.006** (0.003)	0.001 (0.002)	0.024*** (0.003)	0.002 (0.003)	0.000 (0.000)	0.000 (0.000)
log_Income	0.001 (0.002)	-0.000 (0.002)	0.002** (0.001)	0.000 (0.002)	0.000 (0.001)	0.000 (0.001)
Male	0.017* (0.008)	0.009 (0.008)	-0.035*** (0.004)	0.000 (0.008)	-0.002 (0.001)	-0.000 (0.002)
Married	0.000 (0.002)	0.003 (0.005)	-0.010*** (0.002)	-0.000 (0.008)	0.001 (0.001)	-0.002 (0.002)
CEO age	0.000 (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Education level	-0.011** (0.004)	-0.004 (0.003)	0.003 (0.003)	0.000 (0.003)	0.003** (0.001)	-0.001 (0.001)
Education busines	-0.000 (0.005)	0.008 (0.008)	-0.013*** (0.003)	-0.003 (0.005)	0.004 (0.004)	0.000 (0.002)
Indurstry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	25,773	25,773	25,773	25,773	25,773	25,773
R-squared	0.112	0.919	0.302	0.943	0.049	0.864

Table 3: CEO risk measures and corporate policies (panel data)

This table reports the coefficient estimates for the regression equations (3) and (4). The odd columns report results for the pooled OLS regression as described in regression estimation (3) added while the even columns are results for the panel where firm fixed effects are included. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash Holdings		R&D	
	(1) Ind FE	(2) Firm FE	(3) Ind FE	(4) Firm FE	(5) Ind FE	(6) Firm FE
CEO risky assets	-0.043*** (0.003)	-0.044*** (0.004)	0.015*** (0.003)	0.006** (0.003)	-0.003*** (0.001)	-0.002*** (0.001)
CEO leverage	0.003*** (0.000)	0.000 (0.000)	-0.005*** (0.000)	-0.002*** (0.000)	0.000** (0.000)	0.000 (0.000)
log_Employees	0.013*** (0.002)	0.002 (0.003)	-0.021*** (0.002)	-0.032*** (0.003)	0.004*** (0.001)	0.002* (0.001)
log_Assets	0.003 (0.002)	0.053*** (0.003)	-0.009*** (0.002)	0.043*** (0.003)	-0.027*** (0.006)	0.000*** (0.000)
Tangibility	0.072*** (0.007)	0.101*** (0.010)	-0.419*** (0.006)	-0.500*** (0.010)	0.021 (0.018)	0.000 (0.000)
Firm_age	-0.002*** (0.000)	-0.001 (0.001)	-0.001*** (0.000)	0.001** (0.001)	-0.000*** (0.000)	-0.000 (0.000)
log_Wealth	-0.004*** (0.001)	-0.007*** (0.002)	0.008*** (0.001)	0.002 (0.001)	0.000 (0.000)	-0.000 (0.000)
log_Income	-0.001 (0.001)	-0.002 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.000)	-0.001 (0.001)
Male	0.000 (0.002)	0.001 (0.004)	-0.004* (0.002)	-0.002 (0.004)	0.000 (0.001)	0.001 (0.001)
Married	0.006 (0.004)		-0.069*** (0.004)		-0.000 (0.001)	
CEO age	-0.001*** (0.000)		0.000*** (0.000)		-0.000** (0.000)	
Education level	-0.020*** (0.002)		0.005*** (0.002)		0.003*** (0.001)	
Education busines	0.004 (0.005)		-0.031*** (0.005)		0.004*** (0.001)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Indurstry FE	Yes	NO	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	93,363	93,363	93,363	93,363	93,363	93,363
R-squared	0.125	0.147	0.271	0.031	0.0441	0.0251

Table 4: CEO risk measures and CEO power

This table reports the results with the interaction terms of CEO power as described in the regression equation (5). The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. CEO high ownership equals one if the percentage of stock held in the firm is higher than the median CEO ownership which is 30% in our sample. CEO chair is a dummy variable that equals one if the CEO is also the Chair of the board. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. Control variables include CEO leverage, CEO wealth, male CEO (dummy), married CEO (dummy), CEO age, Education, Business Education, log total assets, number of employees, and tangibility. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash holdings		R&D	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO risky assets	-0.187***		0.082***		-0.009*	
* CEO high ownership	(0.016)		(0.013)		(0.005)	
CEO risky assets		-0.170***		0.077***		-0.007
* CEO-Chair		(0.028)		(0.025)		(0.004)
CEO leverage	-0.004		-0.012***		-0.000	
* CEO high ownership	(0.002)		(0.001)		(0.000)	
CEO leverage		-0.003*		-0.008***		-0.001
* CEO-Chair		(0.002)		(0.002)		(0.000)
CEO risky assets	-0.009	0.003	0.007	0.003	-0.005	-0.005**
	(0.011)	(0.013)	(0.009)	(0.016)	(0.003)	(0.002)
CEO leverage	0.009***	0.010***	-0.017***	-0.020***	0.001**	0.001*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
CEO high ownership	0.121***		-0.016*		0.005***	
	(0.011)		(0.008)		(0.001)	
CEO-Chair		0.070***		0.002		0.003
		(0.011)		(0.008)		(0.002)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,774	25,774	25,774	25,774	25,774	25,774
R-squared	0.148	0.124	0.333	0.330	0.053	0.053

Table 5: Do CEO risk measures capture more than the CEO fixed effects?

This table reports the results with various fixed effects for panel data regression equations described in regression estimate (3), (4), (6), and (7). In the first four columns, we summarize the regression estimates for the panel data using industry fixed effect, firm fixed effect, CEO fixed effect and CEO-firm fixed effect. The dependent variable is firm leverage. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. Control variables include CEO leverage, wealth, male CEO (dummy), log total assets, number of employees, and tangibility. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Dependent Variable: Leverage			
	(1) Ind FE	(2) Firm FE	(3) CEO FE	(4) CEO-Firm
CEO risky assets	-0.045*** (0.003)	-0.044*** (0.003)	-0.039*** (0.004)	-0.044*** (0.004)
CEO leverage	0.003*** (0.000)	0.000 (0.000)	0.001*** (0.000)	0.000 (0.000)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	No
Firm FE	No	Yes	No	No
CEO FE	No	No	Yes	No
CEO-Firm FE	No	No	No	Yes
Observations	93,363	93,363	93,363	93,363
R-squared	0.12	0.157	0.818	0.171

Table 6: Do CEO risk measures simply capture the persistence in firm policies

This table reports the results with the CEO risky assets measure in 1995 as described in estimations (8) and (9). The odd columns report results with industry fixed effects while the even columns are results for with firm fixed effects. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. CEO risky assets₁₉₉₅ is the value of CEO holdings of equity, bonds and funds at the year end of 1995 divided by the total value of non-firm wealth in 1995. Control variables include CEO wealth, male CEO (dummy), married CEO (dummy), CEO age, Education, Business Education, log total assets, number of employees, and tangibility. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash Ratio		R&D	
	(1) Ind FE	(2) Firm FE	(3) Ind FE	(4) Firm FE	(5) Ind FE	(6) Firm FE
CEO risky assets ₁₉₉₅	0.006 (0.007)	-0.010 (0.025)	0.047*** (0.011)	0.009 (0.026)	-0.005 (0.003)	-0.002 (0.005)
CEO leverage ₁₉₉₅	0.008*** (0.002)	0.004*** (0.001)	-0.015*** (0.003)	-0.003* (0.001)	0.000*** (0.000)	0.000 (0.000)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	22,771	22,771	22,771	22,771	22,771	22,771
R-squared	0.104	0.925	0.311	0.952	0.049	0.873

Table 7: CEO risk measures and firm leverage (excluding family CEOs)

This table reports the results with various fixed effects for panel data regression equations described in regression estimate (3), (4), (6), and (7) for the subgroup of CEOs who are not a member of the family. In the first four columns, we summarize the regression estimates for the panel data using industry fixed effect, firm fixed effect, CEO fixed effect and CEO-firm fixed effect. The dependent variable is firm leverage. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. Control variables include CEO leverage, wealth, male CEO (dummy), log total assets, number of employees, and tangibility. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash Ratio		R&D	
	(1) Ind FE	(2) Firm FE	(3) Ind FE	(4) Firm FE	(5) Ind FE	(6) Firm FE
CEO risky assets	-0.025*** (0.006)	-0.035*** (0.006)	0.012** (0.006)	0.009 (0.007)	-0.004** (0.002)	-0.004* (0.002)
CEO leverage	0.003*** (0.001)	0.001 (0.001)	-0.005*** (0.001)	-0.002*** (0.001)	0.001*** (0.000)	0.000* (0.000)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	33,962	33,962	33,962	33,962	33,962	33,962
R-squared	0.0819	0.091	0.287	0.134	0.0598	0.012

Table 8: CEO risk measures and firm policies (controlling for performance)

This table reports the results that are similar to Table 3 except for adding Return on assets and the Lagged return on assets as the control for the current and past performance. The odd columns report results with industry fixed effects while the even columns are results for with firm fixed effects. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the total value of non-firm wealth, lagged one year. Control variables include CEO wealth, male CEO (dummy), married CEO (dummy), CEO age, Education, Business Education, log total assets, number of employees, and tangibility. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively.

	Leverage		Cash Ratio		R&D	
	(1) Ind FE	(2) Firm FE	(3) Ind FE	(4) Firm FE	(5) Ind FE	(6) Firm FE
CEO risky assets	-0.045*** (0.003)	-0.045*** (0.003)	0.018*** (0.003)	0.009*** (0.003)	-0.003*** (0.001)	-0.003*** (0.001)
CEO leverage	0.003*** (0.000)	0.001** (0.000)	-0.005*** (0.000)	-0.002*** (0.000)	0.000*** (0.000)	0.000** (0.000)
Return on assets	-0.029*** (0.006)	-0.044*** (0.007)	0.142*** (0.007)	0.109*** (0.007)	-0.010*** (0.002)	-0.010*** (0.002)
Lagged return on assets	-0.024*** (0.006)	-0.033*** (0.006)	0.051*** (0.005)	0.025*** (0.006)	-0.005*** (0.001)	-0.004** (0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	93,363	93,363	93,363	93,363	93,363	93,363
R-squared	0.112	0.160	0.270	0.130	0.0550	0.0261

Table 9: Alternative measures of CEO risky assets on firm policies

This table reports the coefficient estimates for the regression estimations (1) and (2) for the CEO-firm matched pairs, using two alternative measures of CEO risky assets. In Panel A, CEO risky assets is defined as the value of CEO holdings of equity, bonds and funds at the year end divided by the CEO's financial capital, lagged one year. In Panel B, CEO risky assets is the value of CEO holdings of equity, bonds and funds at the year end divided by the CEO's total wealth, lagged one year. The odd columns report results for the regression estimation (1) where industry fixed effect is added while the even columns are results for the regression estimation (2) where firm fixed effects are included. The first two columns shows the results for leverage, the third and fourth columns for cash holdings, and the last two columns for the investment in R&D. The table reports standard errors which are clustered at firm level. Significance levels are denoted by *, **, ***, which correspond to 10%, 5%, and 1% levels, respectively

	Leverage		Cash Holdings		R&D	
	(1) Ind FE	(2) Firm FE	(3) Ind FE	(4) Firm FE	(5) Ind FE	(6) Firm FE
<i>Panel A: CEO risky assets as shares of CEO financial capital</i>						
CEO risky assets	-0.022** (0.009)	-0.022** (0.009)	0.004** (0.002)	0.003 (0.005)	-0.007*** (0.001)	-0.004*** (0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	25,773	25,773	25,773	25,773	25,773	25,773
R-squared	0.110	0.918	0.329	0.948	0.040	0.870
<i>Panel B: CEO risky assets as shares of CEO total wealth</i>						
CEO risky assets	-0.059*** (0.013)	-0.035*** (0.010)	0.036*** (0.007)	0.020* (0.010)	-0.008*** (0.001)	-0.003 (0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes
Observations	25,773	25,773	25,773	25,773	25,773	25,773
R-squared	0.282	0.947	0.282	0.947	0.044	0.876