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Essays on the impact of CEO gender on corporate policies and outcomes

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by

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DEDICATION

I would like to dedicate this dissertation to my grandmother (late Mrs. Chandravati Sah), my parents (Mr. Balaram Sah and Mrs. Nirmala Sah), my wife (Mrs. Shamili Gupta) and all my friends (especially, Mr. Amey Bhende and Mr. Ankur Rathi). Thank you very much for always encouraging and supporting me. I am sure I couldn't have done it without you!

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ABSTRACT

In the first essay I examine the cash policies of female-led firms. Recent research finds that female CEOs eschew riskier corporate policies, but it makes contradicting claims whether this is due to risk aversion. Benchmarking risk aversion by the management of firms' cash, I find that female CEOs are risk averse relative to male CEOs. Specifically, they hold significantly (18%) more cash, even for the same level of dividend payout as male CEOs. Further, they have significantly higher speed of adjustment for cash deficits, are more likely to use excess cash to increase dividends, but are equally likely to use it to increase investment. Collectively, these results indicate that greater risk aversion in the general female population continues beyond the glass ceiling and likely influences female CEOs' corporate policies. Nonetheless, cash held by female CEOs has greater marginal value, suggesting a dividend-clientele effect.

In the second essay I examine the impact of CEO gender on compensation keeping in view the corporate outcomes that they beget. Risk aversion may influence CEOs' intertemporal choices and effort regarding short-term and long-term corporate activities. Given that females are more risk averse, I examine whether there are gender-based differences in short- and long-term corporate outcomes and whether these lead to gender-based disparity in CEO compensation. I find that female CEOs have significantly (10%) superior performance on short-term firm outcomes, but inferior (24%) performance on long-term outcomes, relative to male CEOs. However, for a given level of short-term (long-term) performance female CEOs obtain relatively more (less) short-term (short-term and long-term) compensation. The end result is that there is no difference in the total

compensation between male and female CEOs. This suggests that female CEOs are well rewarded for their short-termism, enough to make up for their relative underperformance on long-term goals.

ESSAY 1 - DOES FEMALE RISK AVERSION GO BEYOND THE GLASS CEILING?

Introduction

"*Women don't take enough risks. Men are just 'foot on the gas pedal'.*"

- Sheryl Sandberg (COO of Facebook)

There is a growing presence of female executives in the top echelons of large public U.S. firms. At the end of 2012, there were 50 female CEOs in the top 1,500 public firms. Though only 3% of the total, this is nearly twice the number just a decade earlier and more than twelve times that in 1993. As female leadership of large public firms evolves there is an emerging literature that documents gender-based differences in corporate policies and divergence in corporate risk-taking (Kulich et al. (2011), Adams and Funk (2012), Adhikari (2012), Dittmar and Duchin (2013), Faccio et al. (2014), Huang and Kisgen (2013), Chen, Crossland, and Huang (2014), Francis et al., (2014)).

What drives these differences is as yet unknown. Sociology and other disciplines have long documented a significant difference in risk aversion between males and females in the general population (Croson and Gneezy (2009)). Further, females generally engage in less financial risk-taking (Barber and Odean (2001), Weber et al. (2002)). However, there is no consensus on gender-based differences in risk aversion in the broader corporate setting (Schubert et al. (1999)). It is possible that females that have shattered the proverbial glass ceiling to become CEOs are equally at ease as their male counterparts in taking risks (Faccio et al. (2014), Adams and Funk (2012)).[1] However, existing work makes contradicting claims as to whether female CEOs are more risk averse than male CEOs. For instance, Huang and Kisgen (2013) find that female CEOs have lower leverage, raise debt less frequently, and make fewer acquisitions, but conclude that this is not due to

[1] Not all female executives agree (see "Sheryl Sandberg's greatest career lesson," by P. Sellers, Fortune; 10/28/2011).

greater risk aversion.[2] On the other hand, Faccio et al. (2014) attribute lower leverage and other lower-risk policies to female risk aversion.

Although in the classical frictionless setting neither the individual manager nor her risk preference would matter much to shareholder value, in reality whether female CEOs are relatively more risk averse is important because managerial risk aversion may be value decreasing for diversified investors (Easterbrook (1984), Smith and Stulz (1985)). Moreover, a nascent literature finds that risk aversion (Graham et al. (2010)) and, more generally, managerial traits (see below) are important determinants of firm decision making and, hence, firm outcomes. Since gender is persistent, thus inducing greater behavioral consistency, it is important to determine whether or not female CEOs are more risk averse.

The objective of this study is to examine whether there are differences in the risk aversion of male and female CEOs. One challenge with pursuing this line of enquiry is that we do not directly observe managerial risk aversion and, as such, require a proxy. I am guided by the practice of benchmarking managerial risk aversion by the level of their firms' *cash holdings* (Chava and Purnanandam (2010), Dittmar and Duchin (2013)). However, I extend this practice by considering not only how much cash is held, but also the pace at which cash is accumulated and how excess cash is deployed. Jointly, these are of fundamental importance to understanding managerial risk aversion and are likely to be more informative about risk aversion relative to examining only cash holdings.

As Harford et al. (2008) note, the decision regarding the use of cash is of utmost importance to managers. One reason for this is that alternate uses of cash impose differing levels of risk on the firm. Therefore, managers' predilection for deploying cash in a particular manner is likely to reflect their risk preferences. For instance, risk averse CEOs may prefer to pay dividends with excess cash as they believe it reduces firm risk (Brav et al. (2005)), consistent with the evidence that firms that

[2] Huang and Kisgen (2013) draw inferences from a sample of CEOs and CFOs covering the time period from 1993 to 2005. However, I focus on CEOs during the period 1992 to 2013. See Table 1 for changes in the sample over time.

increase their dividends experience a reduction in systematic risk (Grullon et al. (2002)). Moreover, gender-based differences in the use of excess cash can reveal whether the observed lower leverage of female-led firms (Huang and Kisgen (2013), Faccio et al. (2014)) is a derivative of, or if the lower incidence of debt issuance is complemented by, a more aggressive debt repayment policy using excess cash.[3] Similarly, how quickly CEOs accumulate cash when there is a significant cash deficit relative to a target level is arguably a more precise signal of managerial risk aversion than their cash holdings because even less risk averse firms can occasionally have large cash holdings if they are profitable, whereas quickly reversing a cash deficit typically requires managerial proactivity. Gender differences in these aspects of firms' management of their cash are not dependent on observing gender differences in cash holdings and so examining them is insightful in their own right.[4]

I focus on the CEO since Chava and Purnanandam (2010) find evidence that CEOs, not CFOs, drive firms' cash holdings. More generally, it is CEOs' preferences that shape firm policies and set the tone for other executives, consistent with the "upper echelons" view of firm behavior (Hambrick (2005), Chaterjee and Hambrick (2007)).

I find that female-led firms have about 18% greater cash holdings than male-led firms. This result is robust to various specifications that account for the usual motives for holding cash, firm characteristics that capture the stage of firms' lifecycle, other CEO characteristics that influence risk-taking, firm governance, and industry and year fixed effects. It also holds when I use only the physical cash component of cash holdings. Given that female CEOs have easier access to external

[3] There is no simple connection between the speed of adjustment of leverage and that of cash, as could be induced by adjustment costs (Dittmar and Duchin (2011)). Hence, I cannot infer this aspect of female CEOs' cash policy from observing their debt policy.

[4] As discussed below, jointly assessing the speed of adjustment of *surplus* cash to target levels and how excess cash is deployed can assist in reconciling the higher agency cost implied by the greater cash holdings of female CEOs (Adhikari (2012)) with the presumption that female-led firms are better governed (assuming females' contribution to improved governance (Adams and Ferreira (2009), Dezsö and Ross (2012)) is transferred to operations when they become CEOs). Simply observing cash holdings could lead to incorrect inferences on this issue.

capital (Faccio et al. (2014), Francis et al. (2013)) and, as such, should have less precautionary cash demand, the results suggest that female CEOs are more risk averse than male CEOs.

My results may be driven by endogeneity. For instance, socioeconomic circumstances could favor the selection of a female CEO at the same time that the firm's cash level is high. Similarly, female executives could choose to become CEOs of cash-rich firms. I utilize identification strategies that are standard in this literature (Gao, Harford, and Li (2013), Huang and Kisgen (2013)) to address these concerns. Primarily, I use a propensity-score matched sample of female- and male-led firms and difference-in-differences tests between firms that transition from a male CEO to a female CEO and a control group of male-to-male transitions. Moreover, several controls, such as firm and CEO age and firm governance, potentially affect both cash policy and CEO selection and, as such, mitigate this concern. My results remain qualitatively the same.

I also find that female CEOs have significantly greater speed of adjustment (SOA) of cash from cash deficit to target levels, taking 1.69 years to cover half the deficit compared to 2.83 years for male-led firms. In contrast, for cash surpluses, female and male CEOs have similar SOAs.

My results also indicate that female-led firms have approximately 6.6% higher probability than male-led firms of increasing dividend payout with excess cash. In contrast, there is no gender-based difference in the probability of increasing capital investment, debt repayment, or repurchases. Further analysis indicates that, for a given dividend payout ratio as male-led firms, female-led firms hold significantly more cash. Thus, higher dividend payout appears to be a motive for female CEOs to hoard cash, but it does not fully explain this phenomenon.[5] Collectively, the above results indicate that female CEOs are more risk averse than their male counterparts.

[5] My results also suggest that despite the greater cash holdings of female CEOs it does not appear that female-led firms have greater agency problems than male-led firms because there would likely be a lower (greater) probability of increasing dividends (acquisitions) with the excess cash (and that would result in a faster SOA of cash when there is a cash surplus, Harford et al. (2008), Gao et al. (2013)). Moreover, if rebalancing is efficient, then the faster SOA when there is a cash deficit suggests that female firms may be better governed (Dittmar and Duchin (2011)).

I also examine how investors perceive the marginal value of the cash holdings of female CEOs, thus providing alternative evidence on the economic consequences of risk aversion. Female CEO risk aversion may hurt investors and, accordingly, negatively affect the marginal value of cash held by female CEOs. On the other hand, cash is positively associated with firm performance. In deciding on the relative marginal values of cash investors should consider the tradeoff between the tendency of greater cash holdings and dividend payout to lower the marginal value of cash and the positive effect of lower leverage on the marginal value of cash (Faulkender and Wang (2006)). Therefore, this is an empirical question. I find that a dollar of excess cash in female-led firms is valued at approximately 39 cents more than in a male-led firm. This result, perhaps, reflect the positive correlation between cash and firm performance (Mikkelson and Partch (2003), Fresard (2010), Garcia-Appendini and Montoriol-Garriga (2013)). Coupled with the result that there is a greater probability that female CEOs in possession of excess cash will increase dividends, this result suggests that there is a "dividend clientele" with a strong preference for female-led firms and they react positively to cash build-up, anticipating increases in dividend rather than in R&D or acquisitions which might not increase shareholder value.[6]

My paper contributes to two literatures. First, it contributes to the growing literature on the effects of managerial traits on corporate policy (Bertrand and Schoar (2003), Malmendier and Tate (2005, 2008), Malmendier et al. (2011), Cronqvist et al. (2012), Dittmar and Duchin (2013), Graham et al. (2013), Hutton et al. (2013), Cain and McKeon (2014)). Adhikari (2012), Huang and Kisgen (2013), and Faccio et al. (2014) also study CEO gender. My paper complements, but is distinct from, theirs. They examine gender-based differences in corporate policies and then infer gender-based differences in risk aversion. In contrast, I show that female CEOs are more risk averse than male CEOs, thus providing a possible reason for these policy differences. As such, I add to the extant

[6] Investors can now invest in an index of female-led firms (http://www.learnvest.com/2012/12/new-index-tracks-stocks-of-companies-run-by-female-ceos/).

discourse regarding whether even those females that have displayed the fortitude to ascend to the top rung of the corporate ladder retain the greater risk aversion that characterizes females in general. An implication of this is that investors will need to be extra vigilant that the greater risk aversion of female CEOs does not cause underinvestment in profitable, albeit riskier, projects, thus hurting investors.

Second, I contribute to the cash literature by being the first to document that male and female CEOs have different preferences for how they deploy excess cash. This is important since the way cash is deployed is likely to be more value-relevant than the cash holdings themselves. Further, I deepen our understanding of the lower leverage of female-led firms by showing that it is not accompanied by, and therefore not likely a derivative of, speedier debt repayment using excess cash. This underscores the stronger tendency of female CEOs for using excess cash to increase payout. Finally, while cash holdings are central to shareholder wealth maximization (Myers and Majluf (1984)), I show that the impact of cash on investors' wealth is a function of CEO gender.

The rest of the paper is organized as follows. Section II develops the hypotheses. Section III describes the data and Section IV presents the empirical results. Section V concludes.

Literature Review and Hypotheses Development

CEO gender, risk-taking, and firm cash holdings

To date, research relating CEO gender to corporate decisions and/or outcomes is in its nascent stage. Adhikari (2012), using U.S. data, finds that firms led by female CEOs have higher cash holdings and lower leverage, risk, and operating performance than male-led firms. Faccio et al. (2014) provide multi-country evidence that firms led by female CEOs have lower leverage, less volatile earnings, and a higher survival rate than male-led firms. Both the above papers attribute their findings to female risk-avoidance. However, although Huang and Kisgen (2013) find that female

executives make fewer acquisitions and issue debt less frequently than male executives, they do not attribute this to female risk-avoidance since they find no difference in cash holdings between firms led by male and female executives (CEOs and/or CFOs). There is, however, ample evidence that managerial risk aversion affects corporate policy. Graham et al. (2013) find that CEOs' risk-avoidance influences corporate financial policies. Dittmar and Duchin (2013) find that firms led by CEOs who previously worked at firms that experienced financial difficulties hold more cash, less short-term debt, and have lower debt ratio, due to lower risk preferences.

The literature notes that the major reasons for holding cash are transaction (Baumol (1952), Miller and Orr (1966)), precautionary (Opler et al. (1999), Almeida, Campello, and Weisbach (2004), Acharya, Almeida, and Campello (2007)), monitoring (Gao, Harford, and Li (2013)), and agency (Jensen (1986), Dittmar et al. (2003), Harford et al. (2008)) motives. If excess cash holdings mitigate risk, such as financial constraints risk (Whited (2006)), then more risk averse CEOs are expected to hold more cash. Hence, if female CEOs are more risk averse than male CEOs I expect them to hold more cash than male CEOs, after controlling for the determinants of cash holdings.

Speed of adjustment of cash

Prior studies find that firms attempt to maintain optimal levels of cash (Opler et al. (1999)). If female CEOs generally hold more cash than male CEOs and if this is motivated by greater risk aversion on the part of female CEOs, then an additional action by female CEOs that would also be consistent with greater risk aversion is that female CEOs would revert to optimal cash levels more quickly once cash levels have fallen from the optimal. Hence, the speed of adjustment (SOA) of cash can shed light on whether female CEOs are more risk averse. This is based on the argument that female-led firms have easier access to external capital and are less likely to be financially constrained

than male-led firms.[7] Assume that the transactions and opportunity costs of reverting to optimal cash levels from any given point below the optimal are the same for both male- and female-led firms.[8] The above implies that female-led firms should be less inclined to rapidly revert to the optimal level of cash. In other words, if there is a greater SOA by female-led firms, it is highly likely to be driven by higher levels of female CEOs' risk aversion.

CEO risk aversion and the use of excess cash

Cash facilitates investments in risky activities, such as research and development (R&D) and mergers and acquisitions (M&A). R&D projects are long term in nature, with a high probability of failure (Holmstrom (1989)) and M&As do not necessarily increase shareholder value (Andrade et al. (2001)). Moreover, stockholders pressure public firms to make short-term investments by underinvesting in these risky projects (Stein (1989), Bushee (1998), Bhojraj et al. (2009)). The extent to which firms engage in these activities is a function of firm characteristics and CEO risk preferences (Faccio et al. (2014), Dittmar and Duchin (2013)).

As noted by Easterbrook (1984), managerial risk-avoidance is one of the sources of agency costs. Managers, acting as agents for shareholders, have a substantial component of their personal wealth tied to the fortunes of their firms. Hence, managers may seek to reduce their risk by avoiding risky capital investment. If CEO risk-avoidance is a dominant trait and female CEOs are more risk averse than male CEOs, then there is a lower probability that female-led firms will increase capital investment even when in possession of excess cash.

However, financial market response is generally favorable to risky capital investment if the firm is suited for it, as reflected by the exhibition of certain relevant characteristics (McConnell and

[7] Faccio et al. (2014) suggest that firms led by female CEOs have easier access to external financing due to lower information asymmetry. Francis, Hasan, and Wu (2013) find that firms with female CFOs are less financially constrained and pay lower cost of bank debt.

[8] Transactions costs are related to raising external cash (but not the cost of capital per se) and opportunity costs are those arising from hoarding cash rather than deploying current cash or cash flows to alternate uses such as investment, repaying debt, and increasing productivity-based compensation which could increase firm value.

Muscarella (1985), Chan et al. (1990)). Assuming that relatively greater ability to finance risky capital investment is one such relevant characteristic, this suggests that the availability of excess cash could lead to an increase in capital investment by female-led firms. Moreover, access to cheaper capital should further facilitate capital investment. Hence, I could observe that female-led firms have a higher probability of increasing capital investment when in possession of excess cash, making this an empirical question.

Excess cash can also be used to increase payout by way of dividends or repurchases. Dividends are valuable signals and a form of wealth redistribution to shareholders (Bhattacharya (1979), Grinblatt et al. (1984), Miller and Rock (1985), Banker et al. (1993)). CEOs can also use dividend smoothing to signal future growth opportunities. Since using excess cash to make payouts is a relatively safe option for CEOs, more risk-averse CEOs should be more inclined to pursue this option. An alternative to dividend payout would be share repurchases. Therefore, I expect that the probability of an increase in payout (dividend or repurchases) is higher for female-led firms.

Cash-rich firms can change leverage towards target levels by choosing to repay debt (Faulkender et al. (2012)). They might choose to do so if the CEO wishes to develop financial slack or increase profitability, given that leverage is negatively related to profitability (Bradley, Jarrell, and Kim (1984), Harris and Raviv (1991), Rajan and Zingales (1995)). Given that reducing leverage reduces firm risk, if female CEOs are more risk averse, then I expect that female-led firms have higher probability of increasing the rate at which they pay down debt.

Marginal value of cash and CEO gender

If female-led firms hold more cash than male-led firms because of greater risk aversion, then a complementary empirical question is how investors perceive the cash held by female-led firms relative to that held by male-led firms. On the one hand, cash accumulation might be favorably perceived by the market, given that large cash balances improve operating performance (Mikkelson

and Partch (2003)), especially in periods of financial constraints (Garcia-Appendini and Montoriol-Garriga (2013)). Boyle and Guthrie (2003) suggest that financing constraints may cause firms to sacrifice a significant proportion of a project's value thereby reducing firm value. Campello, Graham, and Harvey (2010) find that financially constrained firms cut their investments more compared to firms that are less constrained. Further, cash policy is a significant strategic dimension of firm operations (Fresard (2010)). Moreover, there might be a clientele effect (DeAngelo, DeAngelo, and Skinner (2004)), whereby investors have a preference for female-led firms on the assumption that they will pay higher dividends.

On the other hand, as previously noted, managerial risk-avoidance is a source of agency costs (Easterbrook (1984)) and excess cash is usually associated with higher levels of agency conflicts (Harford, Mansi, and Maxwell (2008)). Furthermore, if excess cash is used to pay off debt, then the firm reduces the disciplinary mechanism of debt (Jensen (1986)).

Data Description and Summary Statistics

To execute my tests I require three sets of data. First, I need CEOs' gender. This is obtained from the Execucomp database. Using this data I define a dummy variable, *Female*, as one if the CEO is female in a particular year, and zero otherwise. All data in Execucomp are collected from companies' proxy statements. Because the Execucomp database starts in 1992, my sample period is from 1992 to 2013. Further, it restricts my sample to the largest 1,500 public U.S. firms. Second, I require stock return data, which are obtained from the Center for Research in Security Prices (CRSP). Third, I require firm-level financial information. I use Compustat fundamental annual database to construct my sample. As is common, financial firms (SIC 6000-6999) and utilities (SIC 4900-4999) are excluded from my sample. My primary variable from this source is the measure of *Cash Holdings*. This is the ratio of cash and marketable securities to book value of assets (CHE/AT).

This is the standard measure used in several previous studies (Opler et al. (1999), Bates et al. (2009)). Given that, for the most part, the other variables are standard in many papers I describe them in detail in the data Appendix A. I winsorized all continuous variables at the 1% and 99% levels. All dollar values are in 2002 dollars.

Table 1 reports the distribution of female-led firms in my sample over time and across industries. Panel A indicates that there has been steady growth in the number of female CEOs of large public firms in the United States, especially since the late 1990s. Nonetheless, even at their peak in 2010, they still constitute only about 3% of CEOs in the top 1,500 public firms. The evidence in Panel B indicates that females have been CEOs in about two-thirds of the 48 Fama-French industries. However, they have served a greater number of firm-years in industries such as retail (133), business services (118), and pharmaceutical products (46).

To provide a backdrop for my study, Figure 1 graphs the change in cash holdings for 20 firms that had a transition from male to female CEO during my sample period. These are the firms that had the largest change in average cash holdings from the last two years of a male CEO to the first two years of the female CEO, excluding the transition year. The evidence indicates that for many firms the change in cash holdings is quite large. On average there is a 6% increase in cash ratio, from 17% to 18%, across all male-to-female transition firms.

Table 2 provides summary statistics of the variables used in my tests. I split my sample into firms that are led by male (*Female* = 0) and female (*Female* = 1) CEOs. The unconditional evidence in the first row indicates that the cash holdings of female-led firms are substantially more than that of male-led firms. The mean (median) cash holdings is 19% (15%) for firms led by female CEOs, whereas the mean (median) cash holdings is 15% (8%) for firms led by male CEOs, a difference of about 27%. The Wilcoxon rank-sum test rejects the null hypothesis that cash holdings are the same

for both types of firms at the 1% level. I also find that the (unreported) correlation between the gender dummy, *Female*, and cash holdings is positive and significant, supporting the above finding.

I also observe notable differences in means (and/or medians) between firms with male CEOs and firms with female CEOs for almost all variables. Firms led by female CEOs tend to be smaller and to invest less in R&D, acquisitions, and capital expenditures. It is not surprising to find that firms led by female CEOs also have lower market-to-book ratio as this variable captures long-term effects of current investments.

There is no difference in the proportion of male- and female-led firms paying dividends (*Payout*). Also, firms with female CEOs have significantly lower leverage and lower financial constraints (significantly different values for the KZ Index) compared to firms led by male CEOs. This suggests that female CEOs have a preference for financial slack (by having lower leverage and greater cash holdings) even though they appear to be less financially constrained.

Empirical Results

Do female CEOs hold more cash?

I use the model in Bates, Kahle, and Stulz (2009) to study the normal levels of cash holdings by firms. The model accounts for the various motives to hold cash that have been analyzed in the literature. In order to examine the effect of female CEOs I use the gender dummy, *Female*, in the model for cash. Thus, the modified cash holdings equation with which I begin my study is:

$$\begin{aligned} Cash\ holdings_{it} = {} & \beta_0 + \beta_1 Female_{it} + \beta_2 MB_{it} + \beta_3 Size_{it} + \beta_4 CF_{it} + \beta_5 R\&D_{it} \\ & + \beta_6 Capex_{it} + \beta_7 NWC_{it} + \beta_8 Leverage_{it} + \beta_9 Payout_{it} + \beta_{10} ACQ_{it} \\ & + \beta_{11} CFvolatility_{it} + \beta_{12} Firm\ age_{it} + Industry\ FE_i + Year\ FE_t + \varepsilon_{it}. \end{aligned} \quad (1)$$

This general specification is also used by Dittmar and Mahrt-Smith (2007), Harford, Mansi, and Maxwell (2008), Gao, Harford, and Li (2013), and others. The above is a panel model with industry and year fixed effects to account for potential unobservable time-invariant industry-specific and year-specific effects that may be correlated with cash holdings. I also estimate other variants of the model using different techniques. In general throughout the paper, where appropriate, *t*-statistics are estimated with heteroskedasticity-adjusted standard errors.

The results are reported in Table 3. In Model 1, which represents equation (1), I find that *Female* is positive and statistically significant. Therefore, in support of the finding from the summary statistics, cash holdings at female-led firms are significantly larger than at male-led firms, after conditioning on the general reasons for holding cash. As CEO characteristics other than gender influence the level of firms' cash holdings (Bertrand and Schoar (2003), Malmendier, Tate, and Yan (2011), Huang and Kisgen (2013), Dittmar and Duchin (2013)), in Model 2 I control for several CEO characteristics. Specifically, I augment equation (1) with CEOs' age, tenure at the firm, and stock ownership percentage in the firm. CEOs' age is likely to capture certain life experiences, such as periods of war and economic depression, or job market experiences, that could influence disposition towards corporate liquidity. Likewise, tenure and stock ownership could affect the level of job-specific risk of the CEO or the extent of managerial overconfidence and, therefore, CEOs' desire to hoard cash. I am effectively assuming that gender reflects a disposition towards holding cash that is over and above the influences of these characteristics. The results indicate that even after controlling for CEO characteristics, *Female* remains positive and highly significant.

Although I include control variables (payout, leverage) in my model to address the agency motive for holding cash, I estimate an additional model in which I control for institutional investor ownership as a proxy for corporate governance (see Chen, Harford, and Li (2007) and references

therein). This controls for any remaining agency-related motives for holding excess cash. The results are reported in Model 3. The results continue to hold.

I also report two other models. In Model 4, I employ the Fama-MacBeth approach to correct for possible cross-sectional dependence in residuals, which biases the results in my favor if left untreated. I also account for unobserved heterogeneity among CEOs. Given my interest in assessing the effect of gender, which is a time-invariant variable that would be perfectly correlated with time-invariant (unobserved) firm fixed effects, I use a panel random effects estimator (Model 5). Using both above approaches, I continue to find that firms with female CEOs have significantly greater cash holdings.

Across the five specifications the average coefficient estimate on *Female* is 0.027. This implies that female CEOs hold cash that is 2.7% of book assets more than that of male CEOs. Stated differently, after accounting for various reasons posited in the literature for firms to hold cash, I find that female CEOs hold approximately 18% more cash than male CEOs.[9]

The signs of the control variables are consistent with my expectations and prior literature. Cash holdings increase with market-to-book, which reflects greater growth in firms' revenues. It also increases with R&D and is greater in industries with higher cash flow volatility. Also, the evidence suggests that cash holdings depend on the stage of the firm's lifecycle as younger firms tend to hold more cash than older firms. The evidence also indicates that cash holdings decline with firm size as the precautionary motive to save cash is less for large firms. Capital expenditure, net working capital, leverage, dividend payments, and acquisitions also tend to reduce cash reserves.

Identification strategy

Despite the above tests, as previously noted, the link between cash holdings and CEO gender may be spurious on account of endogeneity. To address this possibility I use different

[9] This is 0.027/0.15, the ratio of the coefficient estimate over the mean cash holdings ratio of the entire sample of firms.

approaches. First, I use a propensity score-matching approach to address potential self-selection. My aim is to obtain a control group (male-led firms) whose members have the same propensity to belong to the treatment group (female-led firms). The matching is executed using a logit regression (choice model) of the female CEO dummy variable on firm size and leverage, as well as industry and year fixed effects.[10] I then use the propensity scores obtained from the logit regression and perform a one-to-one nearest neighbor match without replacement to select firms with male CEOs. Finally, I estimate the outcome regression for female-led and matched male-led firms' cash holdings on the variables in equation (1). Hence, my inferences about relative cash holdings are on the basis of multivariate models, not univariate differences, after matching.

The results for the outcome model of the propensity score matching approach are reported in Table 4, Models 1 and 2. As before, the dependent variable is firms' cash holdings. I estimate two specifications–Model 1 is an industry and year fixed effects regression and Model 2 uses the Fama-MacBeth technique. In both specifications I find that the gender dummy is positive and statistically significant, indicating greater cash holdings by firms with female CEOs. Moreover, the coefficient estimate is within the same range as previously observed.

I also use difference-in-differences to determine whether there is a causal relation between higher cash holdings and female CEOs. In this approach, I compare firms with a male-to-female CEO transition against a sample of firms with a male-to-male CEO transition. Hence, I exclude firms with no transition or other transitions than the above. To execute the difference-in-differences I require that each firm has two years of data before and two years of data after an executive transition, excluding the year of the transition. This approach reduces the probability that the results are biased by issues such as a new CEO delaying policy changes such that the early effects reflect the policy of the pre-transition manager (Huang and Kisgen (2013)). The main model is:

[10] These characteristics are among the most common and robust distinguishing features between male- and female-led firms (Adhikari (2012), Faccio et al. (2014), and Graham et al. (2013), Huang and Kisgen (2013)).

$$Cash\ holdings_{it} = \beta_0 + \beta_1 Female_i + \beta_2 post\_transition_{it} + \beta_3 Female_i \times post\_transition_{it} + \beta_4 MB_{it}$$
$$+ \beta_5 Size_{it} + \beta_6 CF_{it} + \beta_7 R\&D_{it} + \beta_8 Capex_{it} + \beta_9 NWC_{it} + \beta_{10} Leverage_{it}$$
$$+ \beta_{11} Payout_{it} + \beta_{12} ACQ_{it} + \beta_{13} CFvolatility_{it} + \beta_{14} Firmage_{it} + \varepsilon_{it}. \quad (2)$$

The coefficient estimate of interest is that on the interaction term between *Female* (which, given my sample, now represents firms that had a transition from being male- to female-led) and the *post_transition* variable (indicating the period after executive transition), *Female*×*post_transition*. A positive and significant value for β_3 indicates that firms experience an increase in cash holdings after a male-to-female CEO transition as compared to a male-to-male CEO transition.

The results are in Table 4, Models 3 to 5. I estimate three specifications of this model. In the first specification I estimate the usual difference-in-differences model as above. In addition, following Huang and Kisgen (2013), in a second specification I exclude the standalone *Female*. In a third specification I also exclude the standalone *Female* variable, but I include firm fixed effects. In these specifications I vary the inclusion of year fixed effects. The year fixed effects address the fact that CEO transitions occur at different times in my sample. I find that the coefficient estimate on *Female*×*post_transition* is positive and significant in all specifications. This indicates that female CEOs increase firms' cash holdings more as compared to male CEOs after becoming CEO. The magnitude of the coefficient estimates on the interaction terms declines from Model 3 to Model 5, suggesting that there are some firm fixed effects that are correlated with the female dummy, but the latter is important on its own. The results also suggest that there are changes over time that have increased the cash holdings of all firms (Bates et al. (2009)) as the inclusion of the year fixed effects reduces the impact of female CEOs on cash holdings, but the female CEO effect is separate and independent of this effect.

Collectively, the evidence in this section is consistent with the view that the higher cash holdings of female CEOs is causal; that is, on average, when female CEOs take over the reign of a corporation they significantly increase the firms' cash holdings.

CEO gender and speed of adjustment of cash

To examine whether female CEOs have a greater speed of adjustment to target cash levels than male CEOs when they have a cash deficit I use the following partial adjustment model:

$$\Delta Cash\ holdings_{it} = \beta_0 + \beta_1 Female_{it} + \beta_2 \left(cash^{*}_{it} - cash_{it-1}\right) + \beta_3 Female_{it} \times \left(cash^{*}_{it} - cash_{it-1}\right) + \varepsilon_{it}. \quad (3)$$

In equation (3) the dependent variable is the change in cash holdings over the financial year. The independent variable $cash^{*}$ is the expected or target cash holdings, which is estimated as follows for each firm. Using only the propensity score-matched sample of female- and male-led firms, I re-estimate the cash holdings regression in equation (1). I then use the coefficient estimates from this model to calculate expected cash levels for male-led firms from the fitted model. I also calculate expected cash levels for female-led firms by fitting the coefficient estimates of the cash holdings regression to the data for female-led firms. This process not only helps to reduce any bias in cash holdings arising due to firm characteristics, but also gives the level of cash a female-led firm should hold in the absence of any risk-avoidance behavior by the female CEO. Thus $cash^{*}_{it}$-$cash_{it-1}$ measures the deviation of a firm's cash holdings from its target level of cash holdings, so that a positive value reflects a cash deficit. The coefficient β_2 captures the SOA of male-led firms, while β_3 captures the increment in the SOA for female-led firms relative to male-led firms.

The results are reported in Table 5. I use the full sample in Model 1, whereas I use the top and bottom quartiles of deviations in cash holdings in Model 2 and Model 3, respectively. Higher values of deviation (top quartile) would indicate a greater deficit from the expected cash levels, whereas lower values of deviation (bottom quartile) would indicate presence of excess cash as compared to the expected cash levels. For the full sample the positive, but insignificant value of β_3

indicates that female CEOs have a similar SOA as male CEOs. However, when there is a deficit in cash holdings (expected cash holdings are greater than actual; Model 2), female CEOs adjust their cash levels upward to the target at a significantly higher speed than male CEOs, as indicated by the positive and highly significant coefficient estimate, β_3. Specifically, while male CEOs close about 22% of the deficit each year, on average, female CEOs close about 34%. Stated differently, the average female CEO takes 1.69 years to close half the deficit (half-life of the deficit) , compared to 2.83 years for the average male CEO (see, e.g., Dittmar and Duchin (2011)).[11] When there is surplus cash there is no significant difference in speeds of adjustment between male- and female-led firms.

The result that female CEOs adjust cash holdings to target levels at a much faster rate than male CEOs suggests that female CEOs have a stronger preference for excess cash than male CEOs.

How do female CEOs use excess cash?

I examine if female-led firms utilize their excess cash differently from male-led firms by using a subsample of firms with excess cash in the top quartile of excess cash. Excess cash is the difference between the actual cash levels of the firm in a given year and the expected cash level for the firm in that year. To estimate the expected cash levels I use the same approach as described in the speed of adjustment estimation in the previous subsection.

For each firm-year I determine if a firm has increased its dividends (*paying*), in which case it is labeled as 1, and 0 if it has not. I then estimate a logit model to examine whether CEO gender affects the probability that a firm with excess cash in the top quartile of excess cash increases its dividend payout. I do the same for debt repayment (*repaying*), investment in R&D, capital expenditure, and acquisitions (*investing*), and repurchases *(repurchasing)* to determine if CEO gender affects the probability that firms with excess cash increase their repayment of debt, investment, or repurchases. I follow Gao et al. (2013) and use appropriate controls in the regressions.

[11] The half-life is computed as log(0.5)/log(1-SOA) for the first-order autoregressive model of cash holdings.

The results are reported in Table 6. I find that the probability that firms with excess cash increase their dividend payout is higher for firms with female CEOs than for firms with male CEOs (Model 1). In particular, there is a 6.6% higher probability that female-led firms increase dividend payout when in possession of excess cash. There is no evidence to suggest that being a female-led firm has a significant incremental effect on the probability of increasing investment, increasing debt repayment, or increasing repurchases with excess cash. These results indicate that female CEOs are more likely to pay out excess cash as dividends rather than invest, reduce debt, or repurchase shares.

Given the above evidence, it may be inferred that female CEOs hold more cash because they pay out more dividends to shareholders than male CEOs. If I fix the payout ratio for male- and female-led firms and continue to find that female-led firms still hold more cash than male-led firms, then I cannot attribute the excess cash held by female CEOs solely to higher dividends. Instead, it would lend support to the idea that female CEOs are relatively more risk averse. I examine this in two ways. I re-estimate equation (1) augmented with the interaction *Female*×*Payout*. In untabulated results, I find that the coefficient estimate on *Female*×*Payout* is positive and significant (coeff = 0.03, SE = 0.002). This indicates that, among firms that pay dividends, female-led firms hold cash that is 4.4% of book assets more than male-led firms. In my second approach, I create a propensity score-matched sample of male- and female-led firms, where I match on dividend payout ratio (dividends/book assets) and industry and year, and test for difference in mean cash holdings. In untabulated results, I find that the mean (median) cash holdings for female-led firms is 18% (14%) of book assets, which is significantly different from that for male-led firms, 13% (8%). These results imply that, for the same dividend payout ratio as male CEOs, female CEOs hold significantly more cash in proportion to total assets. Hence, female CEOs hold excess cash not solely because they are more likely to pay out higher dividends in cash. I attribute the excess cash to female CEOs' greater risk aversion, at least in part.

CEO gender and the marginal value of cash

In this subsection I examine whether investors value the excess cash held by female CEOs differently from that held by male CEOs. My result that female CEOs have a greater tendency to increase dividend payout rather than to increase investment in risky projects or accelerate debt repayment could mean that investors regard cash held by female CEOs more favorably. That is, dividend payout in the absence of profitable investment opportunities is considered as a positive signal by shareholders (Fama and French (2001)).[12] However, in a study of privately held and publicly traded European companies, Faccio et al. (2014) find that investment policies by female CEOs destroy value for shareholders as they forego profitable investment opportunities that have high risk. Thus, it is an empirical question how the market responds to the tendency of female CEOs to hold more cash than male CEOs.

To address the above, I examine how investors respond to changes in cash over a firm's fiscal year. Shareholders should react to changes in cash either positively or negatively depending upon whether they perceive the changes to be value creating or value destroying. I estimate the following Faulkender and Wang (2006) model augmented with the gender dummy, *Female*, and its interaction with changes in cash holdings:

$$R_{it}^{E}=a+\beta_1 Female+\beta_2 \frac{\Delta cash\ holdings_{it}}{MV_{it-1}}+\beta_3 Female\times \frac{\Delta cash\ holdings_{it}}{MV_{it-1}}+\boldsymbol{XB}+e_{it}. \quad (4)$$

The dependent variable R_{it}^{E} is the excess stock return for firm i in fiscal year t over stock i's benchmark return ($RB_{i,t}$) for fiscal year t (R_{it}-RB_{it}). The coefficient estimate on $Female\times\Delta cash\ holdings_{i,t}/MV_{i,t-1}$ measures the incremental marginal value of cash attributable to a female CEO. The sign and significance of the coefficient estimate indicates whether shareholders perceive changes in cash holdings by female CEOs positively or negatively. The vector $\boldsymbol{X}$ contains Δearnings, Δnet assets,

[12] Payout decisions tend to reduce agency conflicts and serve as a corporate governance mechanism (Jensen (1993)). The higher probability that female CEOs increase dividend payout may reduce potential agency problems and improve governance, such that the excess cash held by female-led firms have a greater positive effect on firm value.

ΔR&D, Δinterest expenses, Δdividends, and lagged cash holdings, all scaled by lagged market value (MV), plus leverage and new financing. ΔX indicates an unexpected change in variable X from fiscal year t–1 to year t which, following Faulkender and Wang (2006), I approximate with the actual change. Finally, I include the interactions between lagged scaled cash holdings and Δcash holdings as well as leverage and Δcash holdings as in Faulkender and Wang (2006), although my results hold without them. To calculate excess stock returns I need benchmark returns (RB_{it}). I use the value-weighted returns on the 25 Fama-French size and book-to-market portfolios to which the firms belong. The size and book-to-market classification is done at the beginning of the fiscal year.

The results are presented in Table 7. Model 1 is estimated without my variable of main interest to ensure that this specification is reasonable for my data. The results are largely consistent with Faulkender and Wang (2006). They indicate that shareholders respond positively to growth in cash holdings. Likewise, they respond positively to earnings growth and higher dividend payments. On the other hand, shareholders respond negatively to increases in interest expenses and leverage.

In Model 2 I introduce the female CEO dummy variable, *Female*, as a standalone variable. I find that the coefficient estimate on *Female* is negative and significant, indicating that firms with female CEOs, on average, have lower excess returns than firms with male CEOs. In Model 3 the variable of interest is $Female \times \Delta cash\ holdings_{i,t}/MV_{i,t-1}$. The coefficient estimate on this variable is positive and significant, implying that shareholders perceive that an increase in cash held by female CEOs has an incremental effect on their wealth relative to an increase in cash held by male CEOs. Specifically, the evidence indicates that an increase of $1 of cash held by female-led firms has $0.39 greater marginal value than an increase of $1 by male-led firms.[13] From the coefficient estimate on the standalone Δ*cash holdings* variable an extra $1 of cash held by male-led firms have a marginal value

[13] This difference appears reasonable. For instance, it is similar to the difference between financially constrained and unconstrained firms (Faulkender and Wang (2006)).

of about \$0.37, while it has a marginal value of \$0.76 if held by a female-led firm. I test the statistical significance of the marginal value of the additional dollar of cash held by female CEOs (i.e., the \$0.76) by testing the joint significance of the sum of the coefficient estimates $(\widehat{\beta_2} + \widehat{\beta_3})$. I find that they are jointly significant with a *p*-value of 0.000.

Dividend clientele theories attribute heterogeneity in firms' dividend policies to investor demand as some investors prefer to hold dividend-paying stocks due to tax or behavioral reasons (DeAngelo, DeAngelo, and Skinner (2004)). DeAngelo and DeAngelo (2006) show that a firm's payout policy is not irrelevant and investment policy is not the sole determinant of value. Thus, my results from Table 6 (female CEOs are more likely to increase dividend payout) and Table 7 (cash held by female CEOs has greater marginal value) suggest that there is a "dividend clientele" that invests in firms led by female CEOs and, hence, they react positively to cash build-up by these firms, anticipating dividend payouts rather than increased investment in R&D, capital expenditures, or acquisitions.

Conclusions

Existing evidence suggests that female CEOs eschew corporate risk relative to male CEOs, as reflected in lower leverage, relative infrequency of issuing debt, and fewer acquisitions. Motivated by the literature that uses firms' cash holdings to benchmark the level of managerial risk aversion, I comprehensively examine the relation between CEO gender and firms' broader cash policy in order to address the question of whether female CEOs are more risk averse. I find that female CEOs hold more cash and have substantially greater speed of adjustment towards target cash levels when cash has fallen below their target cash levels, relative to male CEOs. My results also indicate that while female CEOs with excess cash have similar probability of increasing investments and debt repayment as male CEOs, they have a significantly larger probability of increasing their dividend

payout. However, among firms that pay dividends and for the same dividend payout ratio as male-led firms, female-led firms still hold substantially more cash than male-led firms, suggesting that higher dividend payout is not the only reason for holding more cash. These results point strongly to risk aversion for female CEOs holding excess cash. Finally, I find that an extra dollar of cash held by female CEOs is valued more by shareholders compared to an extra dollar held by male CEOs. I conjecture that there is a "dividend clientele" that invests in firms led by female CEOs and that they react positively to cash build-up by these firms in anticipation of higher dividend payout.

Although I comprehensively examine how corporate cash policies differ on the basis of CEO gender and my results suggest the existence of a dividend clientele, I do not offer any evidence on this, which is beyond the scope of the current paper. Future research might find it fruitful to examine this further. In addition, with time and a sufficiently large number of observations future research might obtain a clearer picture of whether female CEOs extend their preference for holding excess cash to an inclination for acquiring cash-rich firms, when they do engage in acquisitions. Likewise, future research could address the question of whether female-led firms are more likely to be targeted as a result of their excess cash.

ESSAY 2 - CEO GENDER, SHORT-TERMISM AND COMPENSATION: WHO GETS PAID FOR WHAT?

Introduction

> The Equal Pay Act (1963) "*prohibits sex-based wage discrimination between men and women in the same establishment who perform jobs that require substantially equal skill, effort and responsibility under similar working conditions*."

The law, backed by social equity, demands that males and females receive equal pay for completing the same task. Yet there is much controversy as to whether this simple rule is being upheld by U.S. corporations. For a while it was widely believed that whatever gender-based wage disparity there was it affects only rank-and-file workers. However, as the media profiles new and existing female CEOs a relatively common theme is the suggestion that female CEOs are paid significantly less than their male counterparts. In fact, the media claims that the gender wage gap among CEOs is 69 percent, bigger than that among the rank and file.[14] No doubt, such a claim has been fueled, in part, by the news that the compensation of Mary Barra, the new CEO of General Motors and the first-ever female CEO of a major auto company, is less than half that of her predecessor, Dan Akerson.

Existing work relating the gender of top executives and compensation presents conflicting evidence. One set of studies suggests that female executives are paid less than male executives (Bell (2005), Jurajda and Paligorova (2009), Kulich et al. (2011), Dreher, Lee, Clerkin (2011)), while another finds that they are paid more (Gayle, Golan and Miller (2012), Hill, Upadhyay and Beekun (2014). Not surprisingly, others also find no gender disparity in compensation (Adams, Gupta, Haughton and Leeth (2007), Bugeja, Matolscy and Spiropoulos (2012)). This mixed evidence reflects

[14] That is, female CEOs make $0.69 in compensation for each $1.00 made by their male counterparts. See "Want to See Pay Discrimination Against Women? Look at the Top." by B. Covert, The Nation, February 5, 2014; "America's gender wage gap**"** by The Economist Online, April 17, 2012; and "The Gender Pay Gap Is Starkest at the Bottom and the Top. Just Ask General Motors' New CEO" by Nora Caplan-Bricker, The New Republic, February 6, 2014.

the mixed view in the media as some argue that the gender wage gap is a myth based on faulty logic and, hence, they argue, it is a mistake to assume that females are the victims of a sexist economy.[15]

In this study, I provide new insights on this issue. I argue that despite the apparent similarity across firms in terms of the "*responsibility*" of CEOs as the leader of the firm, there is CEO heterogeneity regarding "*skill* [and] *effort*". I propose that in order to determine the answer to the important issue of possible gender-based disparity in CEO compensation we have to condition on CEO "skill and effort". Because skill and effort are not easily observed and difficult to benchmark I focus on corporate outcomes, which can be decomposed into short-term and long-term outcomes. Short-termism or corporate myopia refers to the shifting of focus from long-term objectives, such as innovation or R&D , in order to meet or beat short-term performance targets (such as increasing return on assets or sales) (Porter (1992), Chen et al. (2015)). I hypothesize that female CEOs achieve greater short-term performance and less long-term performance than their male counterparts and that this is reflected in their compensation relative to male CEOs. Hence, their relative compensation is dependent on the relative value placed on long- and short-term outcomes of the firm.

CEOs make intertemporal choices regarding short-term and long-term performances (Laverty (1996)). It is generally held that short-term decisions by CEOs are less risky decisions, while long-term decisions are relatively more risky (Narayanan (1985)). I argue that managerial compensation is aligned with these short-term and long-term decisions and their outcomes. This is because extant literature suggests that some boards encourage CEOs to produce short-term outcomes in order to cater to the demands of investors (Bolton, Scheinkman, and Xiong (2006) and Thakor (1990)), whereas other boards allow CEOs to focus on long-term growth objectives (Holmstrom and Costa (1986) and (Holmstrom (1989)). In order to incentivize and motivate CEOs

[15] See "The Gender Pay Gap is a Complete Myth," Steve Tobak, CBS News, 3/8/2011; "Is the gender pay gap real?" MSN Money, 4/9/2013; and "It's Time That We End the Equal Pay Myth" by Carrie Lucas, Forbes, 4/16/2012.

to act in a manner consistent with these different goals, boards need to design compensation contracts in a way that aligns CEO characteristics and organizational goals (Hou, Priem and Goranova (2014)). Boards, therefore, reward CEOs for their expertise/performance in short- and long-term decision making with lucrative compensation contracts (Barker and Mueller (2002)).

Recent studies have shown that personality traits of CEOs affect their corporate decisions and, subsequently, corporate outcomes (Bertrand and Schoar (2003), Malmendier and Tate (2005, 2008), Malmendier, Tate and Yan (2011), Malmendier and Nagel (2011), Cain and McKeon (2012), Cronqvist, Makhija and Yonker (2012), Graham, Harvey and Puri (2013)). One's gender has an important influence on one's personality traits and induces a high level of behavioral consistency. Research in psychology and other disciplines find that females are more risk averse than males in general (Croson and Gneezy (2009)). One might argue that the gender difference in risk aversion applies to the general population only (as in most cases subjects of studies on risk preferences are randomly chosen), not to top corporate executives, because ascending to such top posts require distinct qualities that make female CEOs equally at ease in taking risk as male CEOs (Adams and Funk (2012)). However, Sah (2015) finds evidence that female CEOs are more risk averse than male CEOs and an emerging literature indicates that female CEOs tend to avoid risky corporate activities (Adhikari (2012), Faccio, Marchina and Mura (2014), Sah (2015)). Galasso and Simcoe (2011) find that overconfident CEOs are more engaged in innovation as compared to their peers. Consistent with these studies, female CEOs exhibit their reservations about risky activities by innovating less as compared to their male counterparts (Holmstrom (1989)).

If, in fact, female CEOs are more risk averse, then economic intuition would suggest that they prefer less-risky short-term goals as compared to male CEOs. Upper echelon theory argues that top executives make decisions through their very personalized thought process influenced by their personal experiences, values and cognitive biases (Hambrick and Mason (1984); Hambrick,

Geletkanycz, and Fredrickson (1993)). Consistent with this theory, greater risk aversion of female CEOs should be manifested in their preference for short-term corporate actions. If they perform well in the fulfillment of their preferred short-term objectives relative to male CEOs, then their compensation should be driven by their superior ability to execute short-term goals and obtain favorable short-term outcomes.

To examine the above, I proceed as follows. Following previous papers (Balkin, Markman, and Gomez-Mejia (2000)), I decompose CEO pay into two parts: (1) short-term compensation consisting of annual salary and bonus; and (2) long-term compensation consisting of equity-based compensation. First, I show that both short-term corporate outcomes (return on assets, ROA) and long-term corporate outcomes (success in innovation) of CEOs are significantly compensated.

Second, I examine whether there are systematic differences between male and female CEOs in terms of both short-term and long-term corporate outcomes. I find that female CEOs have superior short-term, but poor long-term performance when compared to male CEOs. Specifically, female CEOs have about 10% greater ROA than their male counterparts, but about 24% less success in innovation defined as the natural log of the citation lag-adjusted measure of citation per patent. In accordance with the existing literature, I believe that this difference is primarily driven by behavioral differences in risk-taking.

Given that long-term outcomes are generally of great importance to investors and corporate boards, if CEOs were compensated primarily for success in their firms' long-term outcomes, then one would expect female CEOs to earn relatively less compensation. I find that, on average, after controlling for the usual determinants of compensations, CEO gender does not play a significant role in determining total CEO compensation or its short- and long-term components. This result supports the findings of Adams et al. (2007) and Bugeja et al. (2012).

However, when I condition on corporate outcomes, I find that for a given level of short-term outcome female CEOs earn substantially more short-term compensation than male CEOs. This implies that boards/investors place a premium on the short-term skills that female CEOs bring to the firm. Short-term performance, however, does not provide any incremental long-term compensation for female CEOs over male CEOs. Interestingly, the evidence further indicates that for a given level of long-term outcome (innovation), female CEOs are compensated less than male CEOs in long-term, and even in short-term, compensation. This may be because boards are of the view that female CEOs are better suited to achieve short-term goals and compensate them accordingly. As before, I find no evidence of a difference in total compensation between male and female CEOs, conditional on either short- or long-term performance. Taken together, the above implies that female CEOs display relatively greater '*skill* and *effort*' in the fulfillment of their firms' short-term objectives. Correspondingly, their compensation is driven by their superior ability to execute short-term goals and obtain favorable short-term outcomes (even if they perform relatively poorly in achieving long-term goals) and, hence, I do not find any disparity in compensation. Stated differently, female CEOs are well compensated for short-termism, enough to make up for their relative underperformance on the firm's long-term goals.

To ensure the validity of my results, I address several potential issues. First, to ensure that my results are not driven by a particular choice of performance measures, I use alternative measures of long- and short-term performance and I also test those alternative measures using a larger sample of observations. Second, given the importance of conditioning on long- and short-term performance to my results, to address concerns that the effects of gender on short- and long-term corporate performance may be overstated in separate OLS estimation of this relationship I use Seemingly Unrelated Regression (SUR) models. Third, I use a propensity score-matched sample of female- and male-led firms to address any possible selection bias. The propensity score-matched sample is used

to provide robustness to the analysis of the influence of CEO gender on compensation. Finally, I address the potential issue that my results are driven by endogeneity. In particular, while I posit that CEO performance in short- and long-term corporate activities affects CEO compensation, I acknowledge the possibility that compensation can affect CEOs' effort and, hence, their performance. I address the possibility of endogeneity using a three-stage least squares (3SLS) model. My results continue to hold after addressing these concerns.

This paper makes several contributions to the nascent literature on gender-based disparity in CEO compensation. First, as far as I am aware, this is the first paper within this literature to document that female CEOs achieve relatively greater success in firms' short-term outcomes and that this affects their compensation. Second, given that this greater performance in short-term activities is likely related to their higher level of risk aversion, I tie my work on compensation differences to the well-known behavioral differences, particularly risk-taking, inherent in males and females and which an emerging literature shows continues above the glass ceiling (Adhikari (2012), Faccio et al. (2014), Sah (2015)). Third, my result that female CEOs are relatively undercompensated for a given level of long-term outcome suggests that the greater risk aversion of female CEOs is not only related to the corporate actions that female CEOs take, but also to how they are perceived by others, such as compensation committees of corporate boards.

If, in fact, CEOs make intertemporal choices regarding short-term and long-term performances within their corporations, then one size doesn't fit all and, hence, customization of compensation contracts is needed. My study could help corporate boards to design appropriate compensation contracts taking behavioral biases and preferences of executives into consideration.

The rest of the paper proceeds as follows: Section 2 reviews the literature; Section 3 discusses data and descriptive statistics; Section 4 provides empirical results and Section 5 concludes.

Relation to existing literature

Female risk aversion

In this study, I use gender-based differences in preference for long- and short-term firm performance to connect CEO gender to executive compensation. Specifically, I study the differences in and drivers of compensation for male and female CEOs. I argue that differences in corporate decisions are based on the behavioral differences, particularly attitude towards risk-taking (or risk avoidance), between male and female CEOs. Hence, male and female CEOs may have varying preferences (because of their behavioral biases) for setting corporate goals, which in turn may drive their compensation.

Risk-avoidance by females carries on even if they are in top corporate positions and that influences their corporate decision making and, hence, corporate outcomes. There are numerous studies (Bolton and Katok (1995), Blau and Kahn (1992)) which discuss risk taking behavior and gender. The common theme of these papers is that females are more risk averse than males. Croson and Gneezy (2009) provide a review of the explanations of the gender difference in risk taking. The explanations include emotions, overconfidence, and risk as a challenge or threats.

Emotions: The sense of emotion is stronger for women than for men. The experience of stronger emotion can affect the utility of a risky choice. Particularly, women become more nervous and fearful than men in anticipation of negative outcomes (Brody (1993), Fujita, Diener and Sandvik (1991)). This could be an explanation of higher risk aversion in women. Further, research has shown that in the same situation women are fearful whereas men are angry. Grossman and Wood (1993) and Lerner et al. (2003) find that an angry person evaluates a given gamble as less risky than a person who is afraid. Combined, it can be said that women show higher risk aversion than men.

Overconfidence: Though both men and women are overconfident, men are more overconfident in their success in uncertain situations than women. This overconfidence translates to

the attitude towards risk taking and could be another explanation for the gender disparity in risk avoidance. For a formal discussion of overconfidence, gender and corporate decisions see Huang and Kisgen (2013).

Risk as a challenge or threat: Another explanation of risk avoidance by females comes from different interpretations of the risky situation by males and females. Arch (1993) argues that males are more likely to see a risky situation as a challenge, which encourages participation whereas females interpret risky situations as threats that encourage avoidance.

Also, there is literature studying the effect of gender differences in corporate decisions and/or corporate outcomes. Adams and Ferreira (2009) document that when the board of directors is more gender-diverse CEO turnover is highly correlated with poor-performance. Weber and Zulehner (2010) provide evidence that start-ups which have a policy of "female first hires" possess a higher chance of survival. Faccio, Marchina and Mura (2014) provide evidence that firms led by female CEOs have lower leverage, less volatile earnings, and a higher chance of survival than firms run by male CEOs. Huang and Kisgen (2013) report that male executives make more acquisitions and issue debt more often than female executives do. Administering psychometric tests to senior executives, Graham, Harvey and Puri (2013) find that CEOs' behavioral traits, like optimism and managerial risk-aversion, are related to corporate financial policies.

CEO gender and compensation: The research relating gender of corporate executives and their compensation is in a rudimentary stage with as yet mixed results. One set of studies finds that female executives are paid less than male executives. Jurajda and Paligorova (2009) and Kulich et al. (2011) provide evidence that female managers get lower compensation as compared to male managers. Dreher, Lee, Clerkin (2011) also find that white male managers and executives have compensation and mobility advantages over their female and minority counterparts. Similarly, Bell (2005) provides evidence that female executives get 8% to 25% less pay than their male

counterparts. Other studies examining CEO compensation find no gender-based disparity. Focusing only on CEOs, Bugeja, Matolscy and Spiropoulos (2012) find that there is no significant difference in total pay, salary and bonus between male and female CEOs. Adams, Gupta, Haughton and Leeth (2007) also find no evidence of gender disparity in CEO pay, but they find about a 16% gap in pay between males and females for other executive positions below the CEO. Finally, a few recent studies dismiss the conventional claim that female executives are paid less and provide evidence that they are, in fact, paid more than their male counterparts (Gayle, Golan and Miller (2012), Hill, Upadhyay and Beekun (2014)).

Thus, there is no clear consensus on whether CEO gender affects CEO compensation as the results so far are mixed.

Data and descriptive statistics

Sample Selection

My sample consists of all public US companies recorded on the Execucomp database of Compustat from 1992 to 2005 (see below). As Execucomp does not have data for the years prior to 1992, my sample period starts in 1992. I collect data on CEO compensation, including annual salaries, bonuses, new grants of restricted stocks and options, and stocks and options from previous grants. This database has been widely used in executive compensation literature. I construct some additional firm-level variables from Compustat annual database.

I obtain patent and citation information from the National Bureau of Economics Research (NBER) Patent Citation database (see Hall, Jaffe, and Trajtenberg 2001 for details). This database provides annual information on patent assignee names, the number of patents, the number of

citations received by each patent, patent's application year, patent's grant year, and so on for all patents registered and granted by the US Patent and Trademark Office between 1976 and 2006.[16] Thus, my final sample consists of all firm year observations from the Execucomp database between 1992 and 2005 for which the patent and citation data are available. Given that this restricts my sample period to 2005 I also use an alternative measure of long-term performance over a longer period, 1992 to 2013.

Variable Construction

Measuring compensation variables: I obtain variables related to CEO compensation directly from the Execucomp database of Compustat. I provide the detail of the construction of these variables in the Appendix B.

Measuring performance variables: I use two measures of performance for my main analysis namely, ROA and Innovation. ROA is the one-year return on assets and indicates short-term performance. Innovation measures the success of a patent in terms of citations. This indicates long-term performance of the firm.

ROA: I construct the variable ROA using Compustat database. The measurement of ROA used in this study conforms to prior literature.

Innovation: I use 2006 edition of the NBER Patent Citation database to obtain information on firm innovation output. The database provides detailed information for every patent. In order to measure firm's innovation output I construct a measure of the impact and significance of a patent by counting the number of non-self-citations received by the patent.

The number of citations per patent captures the importance and novelty of innovation output. Following the existing innovation literature (e.g. Fang, Tian, and Tice (2014)), I adjust the truncation problems associated with the NBER Patent Citation database. First, there is a gradual

[16] Year 2006 is not used in my study due to the lack of observations for that year.

decrease in the number of patent applications that are eventually granted as we approach the end of sample period due to the lag in patent review and grant process. The second bias arises as a patent can keep receiving citations over a long period of time, but we can observe citations received only up to 2006. Following Hall, Jaffe, and Trajtenberg (2001 and 2005), the truncation in citation counts is corrected by estimating the shape of the citation-lag distribution. The distribution of patent grants in the pooling sample is right skewed. Therefore, I use the natural logarithm of the citation-lag adjusted citations per patent as the measure of innovation.

Measuring control variables: I construct financial variables from Compustat database. The control variables used in this study conform to prior literature. I provide the details of the construction of these variables in the Appendix B.

Descriptive Statistics

Table 8 reports the distribution of female-led firms in my sample over time and across industries. Panel A indicates that there has been steady growth in the number of female CEOs of large public firms in the United States, especially since the late 1990s. The evidence in Panel B indicates that females have been CEOs in about half of the 48 Fama-French industries for my sample. However, they have served a greater number of firm-years in industries such as retail (50), business services (47), and pharmaceutical products (19).

Table 9 provides summary statistics for my sample. I split my sample into firms that are led by male and female CEOs. The evidence in the table indicates that firms led by female CEOs pay them equally as the firms led by male CEOs. Specifically, I use the two-sample Wilcoxon rank-sum test to investigate whether there are any differences in the median values of the variables. The test fails to reject the null hypothesis that the median values of salary, total compensation and equity compensation are equal for male and female CEOs at any acceptable level of confidence. Thus, it

can be said that, male and female CEOs get similar salary, total compensation and equity compensation.

I also observe notable differences in means (and/or medians) between firms with male CEOs and firms with female CEOs for almost all the firm-level variables. For example, the mean number of patents for male-led firms is 15.11 whereas it is 8.24 for female-led firms. Similarly, I observe difference in total citations and innovation between firms with female and male CEOs, each being visibly larger for firms with male CEOs. These statistics provide preliminary indication that male CEOs are more innovative than female CEOs. Firms led by female CEOs tend to be smaller in size. It is also not surprising to find that firms led by female CEOs also have lower Tobin's Q (median) and market-to-book ratio as these variables capture long-term effects of current investments.

However, it is also interesting to note that firms with female CEOs have significantly different (lower) leverage and higher cash reserves as compared to firms led by male CEOs. This suggests that female CEOs have a preference for financial slack (by having lower leverage and greater cash holdings).[17]

Empirical Methodology and Results

Empirical Methodology

To examine whether, conditional on short-term performance, female CEOs are compensated differently from male CEOs, I proceed as follows. First, I examine whether both short- and long-term corporate outcomes are compensated. Second, I analyze whether female CEOs have any preference for short- or long-term outcomes. Finally, I examine whether the gender of the

[17] I also find that the (unreported) correlations of some of the variables used in this study are significant; but none of the correlations are high enough to present collinearity problems for my multivariate analyses.

CEO has any impact on compensation in a multivariate setting conditioning on any gender-based preferences for short- or long-term outcomes.

One bias that can occur in my coefficient estimates (impacting their validity and interpretation) may possibly be from omitted variables that can jointly influence short- and long-term CEO compensation, or short- and long-term performance. For example, more talented CEOs might have higher ROA (short-term performance) and also more patents/citations (long-term performance). Omitting variables that capture CEO talent from my regression specifications could inflate the *t*-statistics and we might observe spurious correlation. Also, the decisions related to short- or long-term goals may not be independent decisions, leading to correlated model residuals. In order to address such possibilities, I employ Seemingly Unrelated Regression (SUR) technique. Basically, I simultaneously estimate the regressions that analyze the impact of CEO gender on the long- and short-term measures of performance and obtain coefficients estimates which are free from the bias arising from omitted variables or from the correlated error terms in the OLS regression specifications. The estimates obtained from the SUR technique also enable us to compare coefficient estimates (for CEO gender) across different models (which are treated as a system) thereby helping us to decide whether female CEOs have better performance for short- or long-term corporate actions. In order to address any issues related to self-selection bias I use the propensity score-matching approach to construct a matched sample of male and female-led firms and conduct univariate as well as multivariate analysis of the compensation variables using this sample. I also execute a simultaneous equations model using the three-stage least squares (3SLS) procedure which, recognizing the potential endogeneity between compensation and performance, jointly estimate both in a simultaneous equations framework. This method is employed to address any concerns of endogeneity.

As some of these techniques haven't been widely used in the finance literature (though they are frequently used in economics and other fields), I elaborate on these techniques here.

Seemingly Unrelated Regression (SUR): Researchers use Zellner's (1962) Seemingly Unrelated Regression (SUR) to address problems arising from limited number of observations available for estimation, bias that might arise from omitted variables, and other reasons (Griffiths, Hill, and Judge (1993)). SUR consists of several regression equations, each with its own dependent variable and possibly different sets of independent variables and each such regression is a valid model in its own. The added advantage of SUR is that the error terms can be assumed to be correlated across the regression equations. If the error terms are uncorrelated, then SUR is equivalent to OLS. With SUR, if the impact of an omitted variable is consistent across a set of regressions, model estimation is improved by incorporation into the estimation of the model information captured by the covariance of the error terms across the set of regressions. The error terms are assumed to be serially independent, but they are allowed to be cross-sectionally dependent. Hence, it allows for interdependence among firms.

Propensity Score Matching: I use the propensity score-matching approach to address any issues related to self-selection bias. My aim is to obtain a control group (male-led firms) whose members have the same propensity to belong to the treatment group (female-led firms). The matching is executed using a logit regression (choice model) of the female CEO dummy variable on firm size and leverage. I then use the propensity scores obtained from the logit regression and perform a one-to-one nearest neighbor match without replacement to select firms with male CEOs. Finally, I analyze whether there is a difference in male and female CEO compensation in univariate as well as multivariate setting using the propensity score-matched sample.

Three-Stage Least Squares (3SLS): I estimate a simultaneous equations model using the 3SLS procedure to address potential endogeneity between compensation and performance variables in a simultaneous equations framework. This study utilizes 3SLS because it provides consistent estimates of the parameters; whereas ordinary least squares estimates are both biased and inefficient. In addition, because 3SLS is a full-information estimator, it produces parameter estimates that are asymptotically more efficient than 2SLS. Three models are estimated using three-stage least squares (3SLS) namely the i) model for total compensation; ii) model for ROA (measure of short-term performance); and iii) model for innovation (measure of long-term performance). This methodology helps in the joint analysis of the determinants of CEO compensation and determinants of the performance measures considering the three models as a system of simultaneous equations. As reported in Alford and Berger (1999), comparison of the OLS and 3SLS estimates suggests that the OLS and simultaneous equations results are different in some cases and estimates using 3SLS are generally better.

Results

Are Short-term and long-term measures of performance compensated? In this subsection I examine whether the short- and long-term performances of CEOs are compensated. I estimate the following equation for total compensation and its components:

$$Compensation_{i,t} = a_0 + a_1 Innovation_{i,t} + a_2 ROA_{i,t} + a_3 Return_{i,t} + a_4 Stock\ Volatility_{i,t} + a_5 Size_{i,t} + a_6 Cash_{i,t-1} + a_7 Leverage_{i,t-1} + a_8 Market\ to\ Book_{i,t-1} + a_9 CEO\ Age_{i,t} + a_{10} CEO\ Tenure_{i,t} + a_{11} CEO\ Duality_{i,t} + Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t} \quad (5)$$

The results are reported in Table 10. In the model for total compensation, Model 1, I find that the coefficient estimates on Innovation and ROA are positive and highly significant (at the 1%

level), suggesting that both short- and long-term firm outcomes are compensated. It is also interesting to note that the results indicate that short-term outcomes have a greater bearing on total compensation as compared to long-term outcomes. That is, a 1 percentage point increase in ROA, say, from the sample mean of 14% to 15%, increases the total compensation by 0.93%. Given that the sample average total compensation is $4,104,000, this leads to approximately $38,167 increase in total compensation. On the other hand, a 1% increase in the number of citations per patent (success in innovation) increases total compensation by 0.00021 units which, given the sample average, leads to an increase of $ 858.[18]

I also examine the impact of short- and long-term outcomes on short- and long-term compensation, Models 2 and 3, respectively. The results in Model 2 indicate that both short- and long-term outcomes receive short-term compensation.[19] However, in Model 3, only long-term performance earns statistically significant long-term compensation. That is, short-term activities that generate short-term outcomes are not significantly compensated with long-term compensation.

The control variables used in this study conform to previous empirical studies. Several studies have shown that firm size is an important variable in explaining variations in CEO Compensation. Generally, larger firms pay higher compensation to their CEOs (Gomez-Mejia et al. (1987), Core et al. (1999)). The existing literature in agency theory also suggests that leverage acts as a control mechanism to resolve agency problems (Jensen (1986)). Hence, higher leverage ratios would prevent CEOs from misusing firm's resources to pay themselves higher compensation. Ryan and Wiggins (2001) find CEO characteristics like age and tenure to be important determinants of CEO compensation. The control variables in all the models have expected signs. CEO

[18] Since innovation is measured as the natural log of (citation counts/patent), this is estimated as follows: for an α% increase in innovation there is an increase of approximately $\widehat{\beta_1} \times ln\left(\frac{[100+\alpha]}{100}\right)$ units of compensation, which is in dollars.

[19] Comparing standardized coefficient estimates (unreported), the evidence indicates that a one-standard deviation change in ROA has a statistically significantly greater impact on short-term compensation than a similar change in success in innovation.

compensation (total, short- and, long-term compensation) increases with firm size and stock market return whereas an increase in leverage has a negative impact on CEO compensation. Also, firms with higher cash balances and higher market-to-book ratios offer higher total compensation to their CEOs.

CEO gender and performance: In these next set of regressions, I analyze whether female CEOs exhibit any difference in achieving short- or long-term outcomes. I use the following specifications to study these relationships:

$$Innovation_{i,t}=\beta_0+\beta_1 Female_i+\beta_2 ln(Sale)_{i,t}+\beta_3 Leverage_{i,t}+\beta_4 Tobin's\ Q_{i,t}+\beta_5 PPE_{i,t}+\beta_6 R\&D_{i,t}$$
$$+\beta_7 Cash_{i,t}+\beta_8 CEO\ Age_{i,t}+\beta_9 CEO\ Tenure_{i,t}+\beta_{10} Firm\ age_{i,t}+\varepsilon_{i,t.} \quad (6)$$

$$ROA_{i,t}=\delta_0+\delta_1 Female_i+\delta_2 ln(MVE)_{i,t}+\delta_3 Cash_{i,t}+\delta_4 Stock\ Volatility_{i,t}+\delta_5 CEOAge_{i,t}$$
$$+\delta_6 CEO\ Tenure_{i,t}+\delta_7 Firm\ age_{i,t}+\varepsilon_{i,t.} \quad (7)$$

The results are reported in Table 11. The main variable of interest is the gender dummy (female) and its impact on long-term performance and short-term performance. The evidence indicates that female CEOs are better at achieving short-term goals (significant and positive in determining ROA), whereas they perform poorly in achieving long-term goals (significant and negative in determining success in innovation), relative to male CEOs. Specifically, female CEOs have about 10% greater ROA than their male counterparts, but about 24% less success in innovation.[20]

[20] Using the sample mean ROA of 0.14, the first result is obtained from 0.014/0.14. The second is derived from (*exp*(-0.276)-1) since the dependent variable, innovation, is in natural logs

The control variables in Models 1 and 2 have expected signs. From Model 1, the evidence indicates that firms with higher sales, higher R&D expenses, and higher market-to-book ratios innovate more whereas firms with higher leverage ratios and greater investment in tangible assets innovate less. From Model 2, it is evident that bigger firms (with greater market capitalization) have better ROA whereas firms with volatile returns report lower ROA.

Innovation is a time consuming and high-risk process with a significant probability of failure. It is standard practice to measure long-term performance of a firm (or a CEO) by patent and the citations associated with patents. On the other hand, improving ROA of the firm is a relatively less risky short-term outcome. The results suggest that female CEOs place more emphasis on the achievement of short-term goals and relatively less effort on the long-term goals. Thus, these results are consistent with greater risk-aversion on the part of female CEOs.

CEO gender and compensation: In this subsection I examine whether there is gender disparity in CEO compensation using the following model:

$$Compensation_{i,t} = a_0 + a_1 Female_i + a_2 Return_{i,t} + a_3 Stock\ Volatility_{i,t} + a_4 Size_{i,t} + a_5 Cash_{i,t-1}$$
$$+ a_6 Leverage_{i,t-1} + a_7 Market\ to\ Book_{i,t-1} + a_8 CEO\ Age_{i,t} + a_9 CEO\ Tenure_{i,t} + a_{10} CEO\ Duality_{i,t}$$
$$+ Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t}. \quad (8)$$

The dependent variable is the natural log of inflation-adjusted total CEO compensation and its short- and long-term components. In this regression, in addition to controlling for the usual variables that are known to affect CEO compensation, I also include the CEO gender dummy (female). Year fixed effects are included to account for potential economy-wide changes in compensation that affect all firms across all industries equally over time and industry fixed effects

are included to control for time-invariant factors that may affect firms in one industry relative to others.

The results are reported in Table 12. For the model of total compensation, Model 1, the evidence indicates that the coefficient estimate on the CEO gender dummy variable (female) is positive but insignificant. In next model, Model 2, I keep the same specification, but change the dependent variable to short-term compensation. Short-term compensation is the sum of salary and bonus obtained by the CEO during the year. Once again, I find that the coefficient estimate on CEO gender dummy (female) is positive but insignificant. Finally, in Model 3 the dependent variable is CEOs' long-term compensation. Long-term compensation is measured as the sum of option awards, stock awards, and restricted stock grants. In this model, I also find that long-term compensation is insignificantly related to gender dummy. Overall, in these specifications, the evidence indicates that CEO compensation is not affected by CEOs' gender after controlling for other factors which have previously been shown to influence CEO compensation. This result lends support to Bugeja, Matolcsy and Spiropoulos (2012) who also find similar compensation for male and female CEOs in US firms.

Given that my main goal is to examine whether, conditional on long- and short-term performance, there is gender disparity in CEO compensation I also include short- and long-term performance measures and the interaction terms between CEO gender and the short- and long-term performance measures in the above models of compensation to determine the conditional impact of performance on female CEOs' compensation. I estimate the following equation for the different compensation variables:

$$Compensation_{i,t} = a_0 + a_1 Innovation_{i,t} + a_2 ROA_{i,t} + a_3 Female_i + a_4 Female_i \times Innovation_{i,t}$$

$$+ a_5 Female_i \times ROA_{i,t} + a_6 Return_{i,t} + a_7 Stock\ Volatility_{i,t} + a_8 Size_{i,t} + a_9 Cash_{i,t-1} + a_{10} Leverage_{i,t-1}$$

$$+ a_{11}Market\ to\ Book_{i,t-1} + a_{12}CEO\ Age_{i,t} + a_{13}CEO\ Tenure_{i,t} + a_{14}CEO\ Duality_{i,t}$$

$$+ Year\ Dummies + Industry\ Dummies + \varepsilon_{i,t}. \quad (9)$$

The results are reported in Models 4-6 of Table 12. The results in Model 4 indicate that, conditioning on performance, female CEOs do not obtain significantly different total compensation relative to male CEOs. In contrast to the results for total compensation, the results in Model 5 indicate that, given a certain level of short-term performance, female CEOs receive higher short-term compensation than male CEOs. However, the results also indicate that for a given level of long-term performance female CEOs earn significantly less short-term (Model 5) and long-term (Model 6) compensation.

In these models, the control variables have the expected signs. CEO compensation increases with firm size and stock market return whereas an increase in leverage has a negative impact on CEO compensation. The evidence also indicates that age and tenure are positively and significantly related to short-term compensation, whereas they are negatively and significantly related to long-term compensation. This suggests that older CEOs and CEOs with longer tenure are paid significantly higher salary and bonuses, but lower long-term compensation. These findings are consistent with the previous findings that older CEOs are paid less in long-term compensation comprising of equity and options (Ryan and Wiggins (2001)).

Collectively, these results indicate that success in innovation has a stronger impact on the long-term compensation (stocks and options) of CEOs, whereas fulfillment of short-term goals (higher return on assets) has a stronger effect on short-term compensation (salary and bonus). Female CEOs outperform male CEOs in the short-term aspect of firm operations, but underperform them in the long-term aspect of operations. While this is consistent with greater risk

aversion of female CEOs, it does not lead to a significantly different overall compensation, relative to their male counterparts.

Robustness and endogeneity tests

Alternative measures of performance: I assess the robustness of these results to alternative dependent variables for short-term and long-term outcomes of firms. I replace ROA with OPER as the measure of short-term outcome of a firm. OPER is calculated as cash flow from operating activities scaled by assets, so it is a proxy for the short-term performance of a firm. Similarly, I replace innovation with Tobin's Q as a long-term measure of firm performance. King and Santor (2008) argue that Tobin's Q is a forward-looking measure which reflects market value of the firm's assets relative to the book value and the company's future growth opportunities.

The results of these robustness tests are in Table 13. In the first specification (Model 1), the dependent variable is TQ (Tobin's Q) and the variable of interest is the gender dummy (female). I find that the coefficient estimate on *female* is negative and statistically significant, reconfirming that female CEOs achieve lower long-term performance than male CEOs.

In the second specification (Model 2) the dependent variable is OPER. Consistent with the previous results, I find that the coefficient estimate on *female* is significant and positive suggesting that female CEOs have greater success in short-term outcomes.

Our previous results are based on a sample restricted to the period 1992 to 2005 due to the unavailability of data on innovation after 2005. To ensure that our results are not specific to the shorter sample period, in Models 3 and 4 of Table 6 I use an extended sample of annual observations from 1992 to 2013. The results are qualitatively very similar to the results reported in Models 1 and 2. Thus, the results that female CEOs place more emphasis on the achievement of

short-term goals and relatively less effort on long-term goals remain robust not only to an alternative specification, but also to an extended sample period.

Seemingly Unrelated Regressions (SUR): The result that female CEOs have significantly different short- and long-term performance relative to male CEOs is consistent with my expectation. However, because conditioning on CEOs' preference for long- or short-term firm outcome is critical for the examination of possible differences in CEO compensation it is important to ensure that the link between gender and performance is not overstated. It is expected that the dependent variables, short-run and long-run outcomes of the firm, are correlated and so should their model residuals. Therefore, estimating them separately using OLS could overstate the significance of the coefficient estimates. In order to address these concerns I re-estimate the models of short- and long-term performances on gender using a Seemingly Unrelated Regression (SUR) model.

The results are reported in Models 3 and 4 of Table 10. The results of the SUR models are qualitatively very similar to the results from the OLS specifications. Exploiting the joint estimation of long- and short-term firm outcomes using the SUR models, I continue to find that female CEOs outperform male CEOs in short-term outcomes, but perform relatively poorly for long-term outcomes (the difference in coefficient estimates for *female* is 0.28 and the z-statistic for the difference is 3.32). The results from Models 5 and 6 of Table 13 that are based on alternative measures of performance further support these findings.

These results are consistent with the view that female CEOs avoid risky activities (Holmstrom (1989), Faccio, Marchina and Mura (2014), Sah (2015)).

Propensity Score Matching: The results from the propensity score matching approach are reported in Table 14, Panel A and B. Panel A presents the univariate analysis of the compensation variables for the matched sample. The results indicate that female CEOs receive

higher short-term compensation as compared to their male counterparts. However, on average, male and female CEOs get similar total compensation and long-term compensation.

In Panel B, I present the multivariate analysis. The model used is the same as equation (8) wherein the dependent variable is the natural log of inflation-adjusted total CEO compensation and its short- and long-term components. Using the propensity score matched sample, I find no evidence suggesting that CEO gender impacts total CEO compensation or its short- and long-term components. The results from this multivariate analysis provide robustness to results reported in Table 12 for the full sample. [21]

Addressing potential endogeneity: Prior literature suggests that while performance may drive compensation, it is also plausible that higher compensation may motivate managers to perform better (Hall and Liebman (1998)). To control for the possible endogenous relationship between CEO compensation and firm performance, I use a simultaneous equations model approach. That is, the causality from firm performance to CEO compensation may be determined by estimating those variables simultaneously.

The simultaneous equations model is estimated using a three-stage least squares (3SLS) methodology. Three models are estimated using the 3SLS namely, the model for i) total compensation; ii) ROA (measure of short-term performance); and iii) innovation (measure for long-term performance). The estimated models are:

$$Compensation_{i,t} = a_0 + a_1 Innovation_{i,t} + a_2 ROA_{i,t} + a_3 Return_{i,t} + a_4 Stock\ Volatility_{i,t} + a_5 Size_{i,t} + a_6 Cash_{i,t-1} + a_7 Leverage_{i,t-1} + a_8 Market\ to\ Book_{i,t-1} + a_9 CEO\ Age_{i,t} + a_{10} CEO\ Tenure_{i,t} + a_{11} CEO\ Duality_{i,t} + \varepsilon_{i,t.} \quad (10)$$

[21] I also conduct difference-in-difference analysis (unreported) using only those firms that experienced a transition from male to female CEOs (treatment group) and male to male CEOs (control group) and I find that the results are qualitatively similar to the previous results.

$$Innovation_{i,t} = \beta_0 + \beta_1 Female_i + \beta_2 Total\ Compensation_{i,t-1} + \beta_3 ln(Sale)_{i,t} + \beta_4 Tobin's\ Q_{i,t} + \beta_5 Leverage_{i,t}$$

$$+ \beta_6 PPE_{i,t} + \beta_7 R\&D_{i,t} + \beta_8 Cash_{i,t} + \beta_9 CEO\ Age_{i,t} + \beta_{10} CEO\ Tenure_{i,t} + \beta_{11} Firm\ Age_{i,t} + \varepsilon_{i,t.} \quad (11)$$

$$ROA_{i,t} = \delta_0 + \delta_1 Female_i + \delta_2 Total\ Compensation_{i,t-1} + \delta_3\ ln(MVE)_{i,t} + \delta_4 Cash_{i,t} + \delta_5 Stock\ Volatility_{i,t}$$

$$+ \delta_6 CEO\ Age_{i,t} + \delta_7 CEO\ Tenure_{i,t} + \delta_8 Firm\ Age_{i,t} + \varepsilon_{i,t.} \quad (12)$$

The results of these models are presented in Table 15. The joint analysis of the determinants of CEO compensation and the determinants of performance reveals that success in short-term outcomes (ROA) as well as success in long-term outcomes (Innovation) can increase CEOs' total compensation. Further, the results indicate that female CEOs perform significantly better in short-term activities whereas they perform poorly in long-term activities, relative to male CEOs.

Overall, I have provided evidence that short- and long-term performances are positively and significantly related to various measures of compensation. In addition, the examination of the relationship between short-term and long-term performance of firms and the gender of CEOs reveals that female CEOs have superior abilities in accomplishing short-term goals whereas they perform poorly in accomplishing long-term goals, relative to their male counterparts. These two results in conjunction with the finding that both male and female CEOs get paid equally suggest that compensation of female CEOs is driven by their superior ability to execute short-term goals.

Conclusions

Recent appointments of female CEOs to large public U.S. firms have ignited the discussion in the financial press about gender-based differences in CEO compensation. Likewise, there is an emerging literature that has so far provided mixed empirical evidence. I argue that an assessment of a possible gender wage gap has to account for the greater risk aversion of female CEOs and its potential influence on their intertemporal choices and effort regarding short-term and long-term corporate activities. Hence, I examine whether there are gender-based differences in short- and long-term corporate outcomes and whether these lead to gender-based disparity in CEO compensation.

I find that both short- and long-term corporate outcomes are compensated. Further, I find that female CEOs exhibit superior performance in the fulfillment of short-term corporate objectives, but they perform poorly in achieving long-term goals, relative to male CEOs. The relative differences in short- and long-term measures of performance are likely attributable to differences in risk-taking behaviors between male and female CEOs. I also find that, controlling for the usual determinants of compensation, female and male CEOs are equally compensated. Conditioning on short- and long-term performance, the evidence indicates that for a given level of short-term firm performance female CEOs earn significantly more short-term compensation than male CEOs. In contrast, for given level of long-term outcome, they earn significantly less long-term, or even short-term, compensation. More important, conditioning on firm outcomes, I find no difference in total compensation between male and female CEOs. My findings provide evidence that female CEOs are better at achieving short-term outcomes of firms and that their relative expertise in successfully executing short-term goals drives their compensation.

REFERENCES

Acharya, V., Almeida, H., & Campello, M. (2007). Is Cash Negative Debt? A Hedging Perspective on Corporate Financial Policies. *Journal of Financial Intermediation* 16, 515–54.

Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics* 94, 291-309.

Adams, R. B., & Funk, P. (2012). Beyond the glass ceiling: Does gender matter? *Management Science*, 58(2), 219-235.

Adams, S. M., Gupta, A., Haughton, D. M., & Leeth, J. D. (2007). Gender differences in CEO compensation: evidence from the USA. *Women in Management Review*, *22*(3), 208-224.

Adhikari, B. (2012). Gender Differences in Corporate Financial Decisions and Performance. *Working Paper, University of Alabama.*

Alford, A. W., & Berger, P. G. (1999). A simultaneous equations analysis of forecast accuracy, analyst following, and trading volume. *Journal of Accounting, Auditing & Finance*, *14*(3), 219-240.

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *Journal of Finance* 59, 1777-1804.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2004). Board characteristics, accounting report integrity, and the cost of debt. *Journal of Accounting and Economics* 37, 315-342.

Andrade, G., Mitchell, M., & Stafford, E. (2001). New evidence and perspectives on mergers. *Journal of Economic Perspectives* 15, 103–120.

Arch, E. C. (1993). Risk-taking: A motivational basis for sex differences. *Psychological Reports*, *73*(1), 3-11.

Balkin, D. B., Markman, G. D., & Gomez-Mejia, L. R. (2000). Is CEO pay in high-technology firms related to innovation?. *Academy of Management Journal*, *43*(6), 1118-1129.

Banker, R. D., Das, S., & Datar, S. M. (1993). Complementarity of prior accounting information: The case of stock dividend announcements. *The Accounting Review* 68, 28-47.

Barker, V. L., & Mueller, G. C. (2002). CEO characteristics and firm R&D spending. *Management Science*, *48*(6), 782-801.

Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *Quarterly Journal of Economics* 116, 261-292.

Bates, T., Kahle, K., & Stulz, R.M. (2009). Why do US firms hold so much more cash than they used to? *Journal of Finance* 64, 1985-2021.

Baumol, W. J. (1952). The transactions demand for cash: An inventory theoretic approach. *Quarterly Journal of Economics* 66, 545-556.

Bell, L. A. (2005). *Women-led firms and the gender gap in top executive jobs*(No. 1689). IZA Discussion Papers.

Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics* 118, 1169-1208.

Bhattacharya, S. (1979). Imperfect information, dividend policy, and "the bird in the hand" fallacy. *The Bell Journal of Economics* 10, 259-270.

Bhojraj, S., Hribar, P., Picconi, M., & McInnis, J. (2009). Making sense of cents: An examination of firms that marginally miss or beat analyst forecasts. *Journal of Finance* 64, 2361-2388.

Blau, F. D., & Kahn, L. M. (1992). The gender earnings gap: learning from international comparisons. *American Economic Review* 82, 533-538.

Bolton, G. E., & Katok, E. (1995). An experimental test for gender differences in beneficent behavior. *Economics Letters*, *48*(3), 287-292.

Bolton, P., Scheinkman, J., & Xiong, W. (2006). Executive compensation and short-termist behaviour in speculative markets. *The Review of Economic Studies*, *73*(3), 577-610.

Boyle, G., & Guthrie, G. (2003). Investment, uncertainty, and liquidity. *Journal of Finance* 58, 2143-2166.

Bradley, M., Jarrell, G. A., & Kim, E. (1984). On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance* 39, 857-878.

Brav, A., Graham, J., Harvey, C., & Michaely, R. (2005). Payout policy in the 21st century. *Journal of Financial Economics* 77, 483-527.

Brody, L. R. (1993). On understanding gender differences in the expression of emotion. *Human feelings: Explorations in affect development and meaning*, 87-121.

Bugeja, M., Matolcsy, Z. P., & Spiropoulos, H. (2012). Is there a gender gap in CEO compensation? *Journal of Corporate Finance,* 18(4), 849-859.

Bushee, B.J. (1998). The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review* 73, 305-333.

Cain, M., & McKeon, S. (2014). CEO Personal Risk-Taking and Corporate Policies. Forthcoming, *Journal of Financial and Quantitative Analysis*.

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics* 97, 470-487.

Chan, S.H., Martin, J.D., & Kensinger, J.W. (1990). Corporate research and development expenditures and share value. *Journal of Financial Economics* 26, 255-276.

Chaterjee, A. & Hambrick, D. (2007). It's All About Me: Narcissistic Chief Executive Officers and Their Effects on Company Strategy and Performance, *Administrative Science Quarterly* 52, 351-386.

Chava, S., & Purnanandam, A. (2010). CEOs versus CFOs: incentives and corporate policies. *Journal of Financial Economics* 97, 263-278.

Chen, X., Cheng, Q., Lo, A. K., & Wang, X. (2015). CEO contractual protection and managerial short-termism. *The Accounting Review*.

Chen, G., Crossland, C., & Huang, S. (2014). Female board representation and corporate acquisition intensity. *Strategic Management Journal*.

Chen, X., Harford, J., & Li, K. (2007). Monitoring: Which institutions matter? *Journal of Financial Economics* 86, 279-305.

Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of financial economics*, *51*(3), 371-406.

Cronqvist, H., Makhija, A. K., & Yonker, S. E. (2012). Behavioral consistency in corporate finance: CEO personal and corporate leverage. *Journal of Financial Economics* 103, 20-40.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature* 47, 448-474.

DeAngelo, H., DeAngelo, L., & Skinner, D. J. (2004). Are dividends disappearing? Dividend concentration and the consolidation of earnings. *Journal of Financial Economics* 72, 425-456.

DeAngelo, H., & DeAngelo, L. (2006). The irrelevance of the MM dividend irrelevance theorem. *Journal of Financial Economics* 79, 293-315.

Denis, D. J., & Sibilkov, V. (2010). Financial constraints, investment, and the value of cash holdings. *Review of Financial Studies* 23, 247-269.

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal*, 33(9), 1072-1089.

Dittmar, A.K. & Duchin, R. (2011). The Dynamics of Cash. Working Paper, Ross Business School.

Dittmar, A.K. & Duchin, R. (2013). Looking in the Rear View Mirror: The Effect of Managers' Professional Experience on Corporate Financial Policy. Working Paper, University of Michigan.

Dittmar, A. K., & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings. *Journal of Financial Economics* 83, 599-634.

Dreher, G. F., Lee, J. Y., & Clerkin, T. A. (2011). Mobility and cash compensation: The moderating effects of gender, race, and executive search firms. *Journal of Management*, 37(3), 651-681.

Easterbrook, F. H. (1984). Two agency-cost explanations of dividends. *American Economic Review* 74, 650-659.

Faccio, M., Marchica, M. T., & Mura, R. (2014). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Working Paper, SSRN: http://ssrn.com/abstract=2021136*.

Fama, E. F., & French, K. R. (2001). Disappearing dividends: changing firm characteristics or lower propensity to pay? *Journal of Financial Economics* 60, 3-43.

Fang, V., Tian, X., & Tice, S. (2014). Does stock liquidity enhance or impede firm innovation? *Journal of Finance,* 69(5), 2085-2125.

Faulkender, M., & Wang, R. (2006). Corporate financial policy and the value of cash. *Journal of Finance* 61, 1957-1990.

Faulkender, M., Flannery, M.J., Hankins, K.W., & Smith, J. (2012). Cash flows and leverage adjustments. *Journal of Financial Economics* 103, 632–646.

Francis, B., Hasan, I., Park, J. C., & Wu, Q. (2014). Gender differences in financial reporting decision-making: Evidence from accounting conservatism. Forthcoming, *Contemporary Accounting Research*.

Francis, B., Hasan, I., & Wu, Q. (2013). The impact of CFO gender on bank loan contracting. *Journal of Accounting, Auditing and Finance* 28, 53-78.

Fresard, L. (2010). Financial strength and product market behavior: the real effects of corporate cash holdings. *Journal of Finance* 65, 1097-1122.

Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: the case for emotional intensity. *Journal of Personality and Social Psychology*, *61*(3), 427.

Galasso, A., & Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science*, *57*(8), 1469-1484.

Gao, H., Harford, J., & Li, K. (2013). Determinants of corporate cash policy: Insights from private firms. *Journal of Financial Economics* 109,623-639.

Garcia-Appendini, E., & Montoriol-Garriga, J. (2013). Firms as liquidity providers: Evidence from the 2007–2008 financial crisis. *Journal of Financial Economics* 109, 272-291.

Gayle, G. L., Golan, L., & Miller, R. A. (2012). Gender differences in executive compensation and job mobility. *Journal of Labor Economics*, 30(4), 829-872.

Gomez-Mejia, L. R., Tosi, H., & Hinkin, T. (1987). Managerial control, performance, and executive compensation. *Academy of Management Journal*,*30*(1), 51-70.

Graham, J. R., Harvey, C. R., & Puri, M. (2013). Managerial attitudes and corporate actions. *Journal of Financial Economics* 109, 103-121.

Griffiths, W. E., Hill, R. C., & Judge, G. G. (1993). *Learning and practicing econometrics*. New York: Wiley.

Grinblatt, M. S., Masulis, R. W., & Titman, S. (1984). The valuation effects of stock splits and stock dividends. *Journal of Financial Economics* 13, 461-490.

Grossman, M., & Wood, W. (1993). Sex differences in intensity of emotional experience: a social role interpretation. *Journal of Personality and Social Psychology*, *65*(5), 1010.

Grullon, G., Michaely, R., & Swaminathan, B. (2002). Are Dividend Changes a Sign of Firm Maturity?. *Journal of Business* 75, 387-424.

Hall, B. H., Jaffe, A. B., & Trajtenberg, M. (2001). *The NBER patent citation data file: Lessons, insights and methodological tools* (No. w8498). National Bureau of Economic Research.

Hall, B. H., Jaffe, A., & Trajtenberg, M. (2005). Market value and patent citations. *RAND Journal of Economics*, 16-38.

Hall, B. J., & Liebman, J. B. (1998). Are CEOs really paid like bureaucrats? *The Quarterly Journal of Economics*, *113*(3), 653-691.

Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review* 32, 334-343.

Hambrick, D. C., Geletkanycz, M. A., & Fredrickson, J. W. (1993). Top executive commitment to the status quo: Some tests of its determinants. *Strategic Management Journal*, *14*(6), 401-418.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of management review*, *9*(2), 193-206.

Harford, J., Mansi, S., & Maxwell, W. (2008). Corporate governance and firm cash holdings in the US. *Journal of Financial Economics* 87, 535-555.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *Journal of Finance* 46, 297-355.

Hill, A. D., Upadhyay, A. D., & Beekun, R. I. (2014). Do female and ethnically diverse executives endure inequity in the CEO position or do they benefit from their minority status? An empirical examination. *Strategic Management Journal.*

Holmstrom, B., (1989). Agency costs and innovation. *Journal of Economic Behavior and Organization* 12, 305-327.

Holmstrom, B., & i Costa, J. R. (1986). Managerial incentives and capital management. *The Quarterly Journal of Economics*, *101*(4), 835-860.

Hou, W., Priem, R. L., & Goranova, M. (2014). Does One Size Fit All? Investigating Pay–Future Performance Relationships Over the "Seasons" of CEO Tenure. *Journal of Management*, 0149206314544744.

Huang, J., & Kisgen, D. J. (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics* 108, 822-839.

Hutton, I., Jiang, D., & Kumar, A. (2014) Republican Managers and Corporate Policies. *Journal of Financial and Quantitative Analysis* 49(5-6), 1279-1310.

Jensen, M., (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76, 323-329.

Jensen, M., (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance* 48, 831-880.

Jurajda, Š., & Paligorova, T. (2009). Czech female managers and their wages. *Labour Economics*, 16(3), 342-351.

Kim, C. S., Mauer, D. C., & Sherman, A. E. (1998). The Determinants of Corporate Liquidity: Theory and Evidence. *Journal of Financial and Quantitative Analysis* 33, 335-359.

King, M. R., & Santor, E. (2008). Family values: Ownership structure, performance and capital structure of Canadian firms. *Journal of Banking & Finance*, *32*(11), 2423-2432.

Kulich, C., Trojanowski, G., Ryan, M. K., Alexander Haslam, S., & Renneboog, L. D. (2011). Who gets the carrot and who gets the stick? Evidence of gender disparities in executive remuneration. *Strategic Management Journal*, 32(3), 301-321.

Laverty, K. J. (1996). Economic "short-termism": The debate, the unresolved issues, and the implications for management practice and research. *Academy of Management Review*, *21*(3), 825-860.

Lerner, J. S., Gonzalez, R. M., Small, D. A., & Fischhoff, B. (2003). Effects of Fear and Anger on Perceived Risks of Terrorism A National Field Experiment. *Psychological Science*, *14*(2), 144-150.

Malmendier, U., & Nagel, S. (2011). Depression Babies: Do Macroeconomic Experiences Affect Risk Taking? *Quarterly Journal of Economics,* 126(1), 373-416.

Malmendier, U., & Tate, G., (2005). CEO overconfidence and corporate investment. *Journal of Finance* 60, 2661–2700.

Malmendier, U., & Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics* 89, 20-43.

Malmendier, U., Tate, G., & Yan, J. (2011). Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies. *Journal of Finance* 66, 1687-1733.

McConnell, J.J., & Muscarella, C.J. (1985). Corporate capital expenditure decisions and the market value of the firm. *Journal of Financial Economics* 14, 399-422.

Mikkelson, W. H., & Partch, M. M. (2003). Do Persistent Large Cash Reserves Hinder Performance? *Journal of Financial and Quantitative Analysis* 38, 275-294.

Miller, M.H., & Orr, D. (1966). A model of the demand for money by firms. *Quarterly Journal of Economics* 80, 413-435.

Miller, M. H., & Rock, K. (1985). Dividend policy under asymmetric information. *Journal of Finance* 40, 1031-1051.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-221.

Narayanan, M. P. (1985). Managerial Incentives for Short-term Results. *The Journal of Finance*, *40*(5), 1469-1484.

Opler, T., Pinkowitz, L., Stulz, R.M., & Williamson, R. (1999). The determinants and implications of corporate holdings of liquid assets. *Journal of Financial Economics* 52, 3-46.

Porter, M. (1992). Capital Choices: Changing the way America Invests in Industry. Boston, MA: *Council on Competitiveness/Harvard Business School.*

Rajan, R. G., & Zingales, L. (1995). Financial dependence and growth (No. w5758). *National Bureau of Economic Research.*

Ryan, H. E., & Wiggins, R. A. (2001). The influence of firm-and manager-specific characteristics on the structure of executive compensation. *Journal of Corporate Finance*, *7*(2), 101-123.

Sah, N. B. (2015). Does Female Risk Aversion Go Beyond the Glass Ceiling? *Unpublished working paper. University of South Florida.*

Schubert, R., Brown, M., Gysler, M., & Brachinger, H. (1999). Financial decision-making: are women really more risk averse? *American Economic Review* 89, 381-385.

Srinidhi, B., Gul, F. A., & Tsui, J. (2011). Female Directors and Earnings Quality. *Contemporary Accounting Research* 28, 1610-1644.

Stein, J.C., (1989). Efficient capital market, inefficient firms: A model of myopic corporate behavior. *Quarterly Journal of Economics* 104, 655-669.

Thakor, A. V. (1990). Investment "myopia" and the internal organization of capital allocation decisions. *Journal of Law, Economics, & Organization*, 129-154.

Weber, E., Blais, A.R., & Betz, N. (2002). A Domain-Specific Risk-Attitude Scale: Measuring Risk Perceptions and Risk Behaviors. *Journal of Behavioral Decision Making* 15, 263-290.

Weber, A., & Zulehner, C. (2010). Female hires and the success of start-up firms. *The American Economic Review*, 358-361.

Whited, T., Wu, G. (2006). Financial constraints risk. *Review of Financial Studies* 19, 531-559.

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, *57*(298), 348-368.

APPENDIX A

Variable Definitions

Variables are computed using Compustat data except for CEO Gender, Age, Tenure and Ownership which are from Execucomp

Variable	Definition and Formula
Female	CEO gender dummy (female = 1, male = 0)
Cash Holdings	Ratio of cash and marketable securities to book value of assets (CHE/AT)
Physical Cash	Ratio of only cash to book value of assets (CH/AT)
Market to Book (MB)	Market-to-book ratio (((AT-CEQ)+(CSHO*PRCC_F))/AT)
Assets	Book value of assets (in $m) (AT)
Size	Natural log of book value of assets (log(AT))
Cash Flow (CF)	Firm's profitability (cash flow/book assets) (((OIBDP-XINT-TXT-DVC)/AT))
R&D	Ratio of research and development expenses to sales (XRD/SALE)
Capex	Ratio of capital expenditures to book value of assets (CAPX/AT)
NWC	Ratio of net working capital to book value of assets ((ACT-LCT-CHE)/AT)
Leverage	Long-term debt plus debt in current liabilities to book value of assets ((DLTT+DLC)/AT)
Payout	Dummy variable defined as 1 if a firm pays a common dividend (DVC) in a given year and 0 otherwise
Payout Ratio	Ratio of common dividend to book value of assets (DVC/AT)
Acquisition (ACQ)	Ratio of acquisition activity expenses to book value of assets (ACQ/AT)
Cash Flow Volatility	Industry cash flow risk (Mean of the standard deviations of CF over 10 years for firms in same industry)
KZ Index	KZ Index is the measure of firm's financial constraints
Firm age	Number of years since a firm's incorporation
CEO Age	Age of the CEO in a given year
CEO Tenure	Tenure of the CEO in a given year
CEO Ownership	Total percentage ownership of the CEO in the firm in a given year
Institutional Ownership	Total percentage ownership by institutional investors in the firm in a given year
MV	Market value of equity ($m) (PRCC×CSHO)
Earnings	Earnings before extraordinary items ($m) (IB+XINT+TXDI+ITCI)
Interest Expenses	Interest paid by the firm in a particular year ($m) (XINT)
Change in Cash	Net change in cash and marketable securities during a particular year as compared to previous year ($m)
New Financing	Net new financing less any old financing that is repaid during the year ($m) (SSTK-PRSTKC+DLTIS-DLTR)
Net Assets	Book value of assets net of cash and marketable securities ($m) (AT-CHE)
Sales Growth	Growth in sales of the firm from year *t*-1 to *t*

APPENDIX B

Variable Definitions

Variables are computed using Compustat data, Execucomp data and NBER Patent Citation database

Variable	Explanation
Salary	CEO salary (SALARY)
Bonus	CEO bonus (BONUS)
Total Compensation	Total Compensation (TDC1)
Short-term Compensation	Short term Compensation (Sum of salary and bonus from Execucomp)
Long-term Compensation	Long term Compensation (Sum of equity and option grants from Execucomp)
Patent	Number of patents from the firm up to 2006
Total_Cite	Total number of citations of the patents for the firm
Innovation	Log of Citation lag-adjusted measure of citation per patent
Female	Gender dummy (female = 1, male = 0)
CEO Age	Age of the CEO
CEO Tenure	Tenure of the CEO
CEO Duality	Dummy variable=1 if the CEO is an executive director and 0 otherwise
TQ	Tobin's Q (((AT-CEQ)+(CSHO*PRCC))/AT)
ROA	Return on Asset (OIBDP/AT)
OPER	Cash flow from Operating Activities (OANCF/AT)
Size	Log of Total Assets (log(AT))
Sale	Net Sales (SALE)
MVE	Market Value of Equity of the firm for that year (PRCC*CSHO)
Cash	Cash scaled by Total Assets (CHE/AT)
R&D	R&D scaled by Net Sales (XRD/SALE)
Leverage	Total Liabilities divided by Assets ((DLTT+DLC)/AT)
Market-to-Book	Market to Book Ratio (((AT-CEQ)+(CSHO*PRCC_F))/AT)
Stock Return	One year return to shareholders
PPE	Tangible assets divided by Total Assets (PPENT/AT)
Stock Volatility	Volatility of the stock price of the firm for the past 60 months
Firm age	Age of the firm

APPENDIX C: TABLES AND FIGURES

Table 1
Distribution of Female CEOs over Time and Across Industries

Panel A reports the number of female CEOs for Fortune 1500 firms covered by the Execucomp Database for each year of my sample. Panel B provide distribution in firm-years across the 48 Fama-French industries over my sample period.

Panel A: Sample of Female CEOs by year

Year	No. of firms with Female CEOs	Year	No. of firms with Female CEOs
1992	1	2003	30
1993	4	2004	28
1994	7	2005	35
1995	9	2006	38
1996	11	2007	45
1997	12	2008	45
1998	18	2009	47
1999	21	2010	51
2000	24	2011	48
2001	25	2012	50
2002	28	2013	49

Panel B: Sample of Female CEO firm-years by industry

Industry	No. of female CEO firm-years	Industry	No. of female CEO firm-years
Agriculture	0	Shipbuilding, Railroad Equipment	0
Food Products	27	Defense	21
Candy & Soda	0	Precious Metals	0
Beer & Liquor	7	Non-Metallic and Industrial Metal Mining	0
Tobacco Products	6	Coal	0
Recreation	3	Petroleum and Natural Gas	4
Entertainment	8	Utilities	0
Printing and Publishing	22	Communication	27
Consumer Goods	24	Personal Services	16
Apparel	20	Business Services	118
Healthcare	7	Computers	12
Medical Equipment	10	Electronic Equipment	8
Pharmaceutical Products	46	Measuring and Control Equipment	4
Chemicals	5	Business Supplies	0
Rubber and Plastic Products	4	Shipping Containers	2
Textiles	3	Transportation	4
Construction Materials	18	Wholesale	1
Construction	0	Retail	133
Steel Works etc.	3	Restaurants, Hotels, Motels	31
Fabricated Products	3	Banking	0
Machinery	21	Insurance	0
Electrical Equipment	0	Real Estate	0
Automobiles and Trucks	1	Trading	0
Aircraft	1	Miscellaneous	6

Table 2
Summary Statistics of Male- and Female-Led Firms

The variables are: *Cash Holdings*, the ratio of cash and marketable securities to book value of assets; market-to-book ratio *(MB)*, (book value of assets minus the book value of equity plus the market value of equity)/book value of assets; *Assets*, the book value of assets in $m; firm size (*Size*), the natural log of book value of assets; firm's *profitability (CF)*, cash flow/book assets, where cash flow is measured as earnings after interest, dividends, and taxes but before depreciation; *R&D,* research and development expenses divided by sales; *Capex*, capital expenditure/assets; *NWC*, net working capital/total assets; *Leverage*, (long-term debt plus debt in current liabilities)/book assets; *payout*, a dummy variable defined as 1 if a firm pays a common dividend in a given year, and 0 otherwise; *AQC*, the intensity of acquisition activities measured as acquisitions/assets; *CFvolatility*, industry cash flow risk measured as the mean of the standard deviations of the ratio of cash flow/assets over 10 years for firms in the same industry, as defined by the two-digit SIC codes, with the additional requirement that the industry must have at least three observations; *KZ Index* is the measure of firm's financial constraints; *Firmage* is the number of years since a firm's incorporation; *CEO Age* is the age of CEO calculated using Execucomp data; *CEO Tenure* is the tenure of the CEO calculated using Execucomp data; *CEO Ownership* represents the total percentage ownership of the CEO in the firm; *Institutional Ownership* represents the total percentage ownership by institutional investors in the firm; *MV* is the market value of equity; *Earnings* is the earnings before extraordinary items; *Interest Expenses* represents the interest paid by the firm in a particular year; *Change in Cash* is the net change in cash and marketable securities during a particular year; and *New Financing* is the net new financing that the firm obtains in a given year, which takes into account any old financing that is repaid during the year. All continuous variables are winsorized at the 1% and 99% levels. All dollar values are in 2002 dollars. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

	N	Mean	Median	N	Mean	Median	N	Mean	Median	Wilcoxon rank-sum significance
Variable		All Firms			Male CEOs			Female CEOs		
Cash Holdings	27762	0.15	0.08	27136	0.15	0.08	626	0.19	0.15	***
Market to Book	27762	2.07	1.61	27136	2.08	1.63	626	2	1.5	***
Assets ($m)	27762	4655.5	1062	27136	4656.19	1064.29	626	4624.2	790.69	***
Cash Flow	27762	0.08	0.09	27136	0.08	0.09	626	0.08	0.08	***
R&D	27762	0.05	0	27136	0.05	0	626	0.05	0	***
Capex	27762	0.06	0.04	27136	0.06	0.04	626	0.05	0.03	***
Net Working Capital	27762	0.07	0.07	27136	0.07	0.07	626	0.06	0.05	
Leverage	27762	0.22	0.2	27136	0.22	0.2	626	0.19	0.15	***
Payout	27762	0.49	0	27136	0.49	0	626	0.46	0	
Acquisition	27762	0.03	0	27136	0.03	0	626	0.03	0	***
KZ index	27762	-4.94	-1.62	27136	-4.88	-1.6	626	-7.48	-2.05	***
Firm age (Years)	27762	24.3	19	27136	24.3	19	626	24.24	18	***
CEO Age (Years)	26525	55.35	55	25922	55.41	55	603	52.84	53	***
CEO Tenure (Years)	26921	7.86	6	26302	7.9	6	619	6.38	5	***
Earnings ($m)	25265	375.5	71.23	24671	374.55	71.97	594	415.02	48.49	***
Change in Cash ($m)	25265	38.48	3.36	24671	38.17	3.4	594	51.31	1.62	**
New Financing ($m)	25265	-36.15	-2.67	24671	-35.63	-2.58	594	-49.49	-4.68	*
MV ($m)	25265	6818.26	1273.98	24671	7130.4	1308.14	594	6152.4	847.2	***
Interest Expenses ($m)	25265	79.48	14.44	24671	79.16	14.52	594	92.84	8.67	***

Table 3
Effect of CEO Gender on Cash Holdings

This table reports regression results of *Cash Holdings* on *Female*, the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year *t* and 0 otherwise, plus various control variables. All variables are defined in Appendix 1. "Panel FE" are panel models with industry and year fixed effects. The models are estimated with heteroskedasticity-adjusted standard errors (in parentheses), except for the Fama-McBeth model. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

	Fixed Effects	Fixed Effects	Fixed Effects	Fama-MacBeth	Random Effects
	Model 1	Model 2	Model 3	Model 4	Model 5
Female	0.0224**	0.0263**	0.0341**	0.0404***	0.0107**
	(0.010)	(0.012)	(0.017)	(0.011)	(0.005)
Market to Book	0.0232***	0.0229***	0.0226***	0.0233***	0.0169***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Size	-0.0223***	-0.0211***	-0.0227***	-0.0195***	-0.0242***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Cash Flow	-0.0200	-0.0242	-0.0683**	-0.0082	-0.0042
	(0.024)	(0.024)	(0.028)	(0.020)	(0.009)
R&D	0.3956***	0.3913***	0.3865***	0.4573***	0.2193***
	(0.029)	(0.031)	(0.034)	(0.017)	(0.010)
Capex	-0.5312***	-0.5296***	-0.5242***	-0.5398***	-0.5109***
	(0.034)	(0.034)	(0.039)	(0.022)	(0.015)
Net Working Capital	-0.2962***	-0.2971***	-0.3094***	-0.2514***	-0.2992***
	(0.015)	(0.015)	(0.020)	(0.009)	(0.007)
Leverage	-0.2130***	-0.2070***	-0.2139***	-0.2410***	-0.1608***
	(0.011)	(0.011)	(0.014)	(0.005)	(0.005)
Payout	-0.0212***	-0.0212***	-0.0220***	-0.0294***	-0.0048**
	(0.004)	(0.004)	(0.005)	(0.002)	(0.002)
Acquisition	-0.3269***	-0.3293***	-0.3574***	-0.3167***	-0.2441***
	(0.014)	(0.014)	(0.018)	(0.020)	(0.009)
Cash Flow Volatility	0.2858***	0.2833***	0.3221**	0.4670***	0.5156***
	(0.099)	(0.106)	(0.125)	(0.088)	(0.034)
Firm age	-0.0004***	-0.0004***	-0.0004***	-0.0005***	-0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.3212***	0.3395***	0.3138***	0.3378***	0.3657***
	(0.022)	(0.028)	(0.036)	(0.009)	(0.007)
Industry FE	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	Yes	No	No
CEO Characteristics	No	Yes	Yes	No	No
Institutional Investors	No	No	Yes	No	No
R-squared	0.579	0.582	0.602	0.553	0.529
Observations	27728	25730	16329	27728	27728

Table 4
Addressing Potential Endogeneity

In this table the dependent variable is *Cash Holdings*. In Models 1 and 2, *Female* is defined as 1 if the firm's CEO is female in a given year *t* and 0 otherwise. In Models 3 to 5 it is 1 if the firm experienced a transition from a male CEO to a female CEO and 0 for a male-to-male transition. The first two models report the results from a propensity-score matched sample. The next three models report difference-in-differences regression results. The difference-in-differences test uses only those firms that experience a transition from male to female CEOs (treatment group) and from male to male CEOs (control group) during my sample period. *Post_transition* is 0 before CEO change and 1 after the change. All variables are defined in Appendix 1. The models are estimated with heteroskedasticity-adjusted standard errors (in parentheses) except for Model 2. ***, **, and * represent significant at the 0.01, 0.05, and 0.10 levels.

	Fixed Effects	Fama-MacBeth	Difference-in-Difference		
	Model 1	Model 2	Model 3	Model 4	Model 5
Female	0.0220**	0.0361***	-0.0582		
	(0.010)	(0.012)	(0.048)		
Post_transition			0.0039*	0.0025	0.0012
			(0.002)	(0.002)	(0.002)
Female × *Post_transition*			0.0833*	0.0221***	0.0090*
			(0.049)	(0.008)	(0.005)
Market to Book	0.0238***	0.0248***	0.0194***	0.0199***	0.0154***
	(0.004)	(0.006)	(0.001)	(0.001)	(0.002)
Size	-0.0258***	-0.0375***	-0.0188***	-0.0189***	-0.0238***
	(0.004)	(0.006)	(0.001)	(0.001)	(0.003)
Cash Flow	-0.0130	-0.1032	0.0072	0.0040	0.0151
	(0.073)	(0.063)	(0.021)	(0.021)	(0.019)
R&D	0.3230***	0.4299***	0.3951***	0.4054***	0.0390
	(0.074)	(0.068)	(0.022)	(0.022)	(0.038)
Capex	-0.5376***	-0.4015***	-0.5552***	-0.5302***	-0.4229***
	(0.104)	(0.107)	(0.024)	(0.025)	(0.029)
Net Working Capital	-0.4016***	-0.2759***	-0.2661***	-0.2600***	-0.2687***
	(0.049)	(0.040)	(0.009)	(0.009)	(0.015)
Leverage	-0.2609***	-0.3334***	-0.2404***	-0.2362***	-0.1220***
	(0.026)	(0.040)	(0.008)	(0.008)	(0.011)
Payout	-0.0212**	-0.0137	-0.0368***	-0.0350***	0.0031
	(0.009)	(0.012)	(0.002)	(0.002)	(0.004)
Acquisition	-0.3746***	-0.3668***	-0.2860***	-0.2810***	-0.2357***
	(0.049)	(0.071)	(0.018)	(0.018)	(0.018)
Cash Flow Volatility	0.0814	0.1709	0.7210***	0.6197***	0.4554***
	(0.377)	(0.638)	(0.058)	(0.067)	(0.082)
Firm age	-0.0002	0.0008	-0.0005***	-0.0005***	-0.0005
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Constant	0.2673***	0.4600***	0.3301***	0.3486***	0.3823***
	(0.090)	(0.049)	(0.009)	(0.015)	(0.072)
R-squared	0.624	0.664	0.544	0.547	0.840
Observations	1245	1245	10685	10685	10685
Industry	Yes	No	No	No	No
Year FE	Yes	No	No	Yes	Yes
Firm FE	No	No	No	No	Yes

Table 5
Speed of Adjustment of Cash

This table reports the regression of the *change in cash holdings* on *Female*, the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year *t* and 0 otherwise. *Cash** is the expected level of cash for each firm estimated with the coefficient estimates from the fitted model of equation (1) using the propensity score-matched sample of male- and female-led firms. "Full sample" consists of all observations, "Deficit" consists of top quartile of observations indicating a greater deficit from the expected cash levels, and "Surplus" consists of bottom quartile of observations indicating presence of excess cash (lowest deficit as compared to the expected cash levels). All variables are defined in Appendix 1. The models are estimated with heteroskedasticity-adjusted standard errors (in parentheses). ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

	Full Sample	Deficit	Surplus
	Model 1	Model 2	Model 3
Female	0.0015	-0.0102	-0.0251**
	(0.003)	(0.012)	(0.012)
(Cash* - Lagged Cash)	0.2449***	0.2172***	0.2753***
	(0.005)	(0.018)	(0.014)
Female ×(Cash*-Lagged Cash)	0.0047	0.1188*	-0.0902
	(0.029)	(0.063)	(0.063)
Constant	0.0076***	0.0053***	0.0113***
	(0.000)	(0.002)	(0.003)
R-squared	0.183	0.040	0.088
Observations	25265	6316	6316

Table 6
CEO Gender and the Use of Excess Cash

This table reports logit regressions of the probability that a dividend-paying firm increases its dividend payout ratio (*paying*), increases its repayment of debt (*repaying*), increases its investment in R&D, capital expenditure, and acquisitions (*investing*), or increasing repurchases (*repurchasing*), on *Female*, the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year *t* and 0 otherwise, plus various control variables. All variables are defined in Appendix 1. The models are estimated with heteroskedasticity-adjusted standard errors (in parentheses). ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

	Paying	Repaying	Investing	Repurchasing
	Model 1	Model 2	Model 3	Model 4
Female	0.3781**	0.1470	-0.1409	0.1540
	(0.169)	(0.168)	(0.162)	(0.174)
Size	0.4693***	0.0354*	0.0003	0.1508***
	(0.024)	(0.020)	(0.021)	(0.021)
Cash Flow	1.4465***	0.4475	2.6680***	3.0855***
	(0.407)	(0.341)	(0.371)	(0.372)
Cash Flow Volatility	-5.2074*	0.0528	-3.8094	-0.3148
	(3.086)	(2.423)	(2.619)	(2.980)
Sales Growth	-0.0052***	-0.0038*	0.0125***	-0.0003
	(0.001)	(0.002)	(0.002)	(0.001)
Leverage	-2.1835***	0.2394	-0.4280**	-0.9617***
	(0.238)	(0.173)	(0.180)	(0.199)
Constant	-1.2127	1.6595*	0.0382	-3.2699***
	(0.798)	(0.917)	(0.815)	(1.191)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.1716	0.0307	0.0798	0.0853
Observations	6,316	6,316	6,316	6,316

Table 7
CEO Gender and the Marginal Value of Cash Holdings

This table reports the regression of excess stock returns on the interaction between *change in cash holdings* and *Female*, the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year *t* and 0 otherwise, plus various control variables. All variables (except *Female* and *leverage*) are scaled by lagged market value (MV_{t-1}). All variables are defined in Appendix 1. The models are estimated with heteroskedasticity-adjusted standard errors (in parentheses). ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

	Model 1	Model 2	Model 3
Female		-0.0345**	-0.0368**
		(0.017)	(0.017)
ΔCash Holdings	0.3705***	0.3701***	0.3667***
	(0.086)	(0.086)	(0.086)
Female × ΔCash Holdings			0.3938*
			(0.209)
ΔEarnings	0.0429***	0.0428***	0.0429***
	(0.011)	(0.011)	(0.011)
ΔNet Assets	0.0461***	0.0460***	0.0458***
	(0.011)	(0.011)	(0.011)
ΔR&D Expenses	-0.0380	-0.0359	-0.0103
	(0.237)	(0.237)	(0.238)
ΔInterest Expenses	-0.0943	-0.0942	-0.0952
	(0.155)	(0.155)	(0.154)
ΔDividends	0.4851**	0.4839**	0.4872**
	(0.206)	(0.206)	(0.206)
Lagged(Cash Holdings)	-0.0177**	-0.0176**	-0.0172**
	(0.008)	(0.008)	(0.008)
Leverage	-0.0078*	-0.0078*	-0.0078*
	(0.004)	(0.004)	(0.004)
New Financing	-0.0563***	-0.0563***	-0.0564***
	(0.014)	(0.014)	(0.014)
Lagged(Cash Holdings) × ΔCash Holdings	-0.0171***	-0.0171***	-0.0170***
	(0.003)	(0.003)	(0.003)
Leverage ×ΔCash Holdings	-0.2391*	-0.2388*	-0.2363*
	(0.124)	(0.124)	(0.123)
Constant	0.1539***	0.1532***	0.1530***
	(0.047)	(0.047)	(0.047)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.044	0.044	0.044
Observations	25,260	25,260	25,260

Table 8
Distribution of Female CEOs over Time and Across Industries

Panel A reports the number of female CEOs for Fortune 1500 firms covered by the Execucomp Database for each sample year. Panel B provide distribution in firm-years across the 48 Fama-French industries over the sample period. The sample period is 1992 to 2005, due to the availability of NBER's data on innovation required for the empirical tests below.

Panel A: Sample of Female CEOs by year

Year	No. of firms with Female CEOs	Year	No. of firms with Female CEOs
1992	1	1999	20
1993	4	2000	24
1994	7	2001	23
1995	9	2002	26
1996	11	2003	27
1997	12	2004	25
1998	17	2005	24

Panel B: Sample of Female CEO firm-years by industry

Industry	No. of female CEO firm-years	Industry	No. of female CEO firm-years
Agriculture	0	Shipbuilding, Railroad Equipment	0
Food Products	0	Defense	12
Candy & Soda	0	Precious Metals	0
Beer & Liquor	0	Non-Metallic and Industrial Metal Mining	0
Tobacco Products	1	Coal	0
Recreation	3	Petroleum and Natural Gas	0
Entertainment	0	Utilities	0
Printing and Publishing	6	Communication	4
Consumer Goods	14	Personal Services	8
Apparel	15	Business Services	47
Healthcare	4	Computers	10
Medical Equipment	4	Electronic Equipment	0
Pharmaceutical Products	19	Measuring and Control Equipment	0
Chemicals	0	Business Supplies	0
Rubber and Plastic Products	0	Shipping Containers	0
Textiles	3	Transportation	0
Construction Materials	8	Wholesale	1
Construction	0	Retail	50
Steel Works etc.	0	Restaurants, Hotels, Motels	4
Fabricated Products	2	Banking	0
Machinery	4	Insurance	0
Electrical Equipment	0	Real Estate	0
Automobiles and Trucks	1	Trading	0
Aircraft	0	Miscellaneous	10

Table 9
Summary Statistics

This table presents the summary statistics. All variables are defined in the Appendix. The full sample consists of annual observations between 1992 and 2005. All continuous variables are winsorized at the 1% and 99% levels. All dollar values are in 2002 dollars. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Variable	N	Mean	Median	N	Mean	Median	N	Mean	Median	Wilcoxon rank-sum significance
	All CEOs			Male CEOs			Female CEOs			
Salary ($ thousands)	17187	635.44	574.53	16957	635.23	574.53	230	650.7	561.21	
Bonus ($ thousands)	17187	620.01	350	16957	621.55	352.79	230	506.23	239.98	***
Equity Compensation($ thousands)	17187	2409.93	785.78	16957	2405.25	785.33	230	2755.2	807.89	
Total Compensation ($ thousands)	17021	4104.1	2148.81	16792	4103.4	2153.96	229	4155.5	1849.64	
Patent (Number)	17187	15.02	0	16957	15.11	0	230	8.24	0	***
Total Cites (Number)	17187	108.6	0	16957	109.93	0	230	10.53	0	***
Innovation	17187	0.81	0	16957	0.82	0	230	0.48	0	***
Size	17187	7.08	6.91	16957	7.09	6.92	230	6.41	6.16	***
Cash	17181	0.14	0.06	16951	0.14	0.06	230	0.22	0.18	***
R&D	17165	0.05	0	16937	0.05	0	228	0.06	0	**
Leverage	17149	0.15	0.12	16920	0.15	0.12	229	0.11	0.06	***
Market-to-Book	17148	3.29	2.4	16919	3.3	2.41	229	2.96	2.02	***
Tobin's Q	17149	2.17	1.65	16920	2.17	1.65	229	2.22	1.54	**
ROA	17187	0.14	0.14	16957	0.14	0.14	230	0.13	0.13	

Table 10
Evidence on Whether Short- and Long-Term Outcomes are Compensated

This table presents the impact of long-term (Innovation) and short-term (ROA) performance measures on CEO compensation using panel regressions. The variable female is the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year t and 0 otherwise. The compensation values are obtained by taking the natural logarithm of the respective variables. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The full sample consists of annual observations between 1992 and 2005. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Dependent Variable: CEO Compensation			
	Total Compensation	Short-term Compensation	Long-term Compensation
	Model 1	Model 2	Model 3
Short-term performance (ROA)	0.933***	1.220***	0.452
	(0.105)	(0.075)	(0.347)
Long-term performance (Innovation)	0.021***	0.012**	0.052**
	(0.008)	(0.005)	(0.022)
Stock Return	0.001***	0.001***	0.002***
	(0.000)	(0.000)	(0.001)
Stock Volatility	1.814***	-0.488***	2.838***
	(0.200)	(0.145)	(0.681)
Size	0.487***	0.307***	0.739***
	(0.007)	(0.005)	(0.022)
Lagged Cash	0.204***	0.031	-0.046
	(0.072)	(0.051)	(0.239)
Lagged Leverage	-0.469***	-0.138**	-1.535***
	(0.068)	(0.057)	(0.253)
Lagged Market-to-Book	0.053***	-0.028***	0.088***
	(0.009)	(0.005)	(0.025)
CEO Age	-0.003**	0.004***	-0.032***
	(0.001)	(0.001)	(0.004)
CEO Tenure	-0.004***	0.002***	-0.041***
	(0.001)	(0.001)	(0.004)
CEO Duality	0.035	0.159*	0.458
	(0.143)	(0.088)	(0.535)
Constant	3.393***	3.971***	1.114
	(0.199)	(0.146)	(0.704)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Adj-R-sqr	0.453	0.450	0.163
Observations	12823	12886	12886

Table 11
Effect of CEO Gender on Measures of Performance

This table presents the impact of CEO gender on measures of long-term and short-term performance using OLS regressions and seemingly unrelated regressions (SUR). Innovation is the measure of long-term performance and ROA is the measure of short-term performance. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The full sample consists of annual observations between 1992 and 2005. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Dependent Variable: Measure of Performance				
	OLS Regression		Seemingly Unrelated Regression	
	Model 1	Model 2	Model 3	Model 4
	Long-term (Innovation)	Short-term (ROA)	Long-term (Innovation)	Short-term (ROA)
Female	-0.276***	0.014*	-0.264***	0.014**
	(0.065)	(0.008)	(0.086)	(0.007)
Log(Sale)	0.109***		0.112***	
	(0.008)		(0.008)	
Leverage	-0.643***		-0.612***	
	(0.071)		(0.084)	
Tobin's Q	0.071***		0.063***	
	(0.009)		(0.007)	
PPE	-0.313***		-0.312***	
	(0.042)		(0.051)	
R&D	1.897***		2.056***	
	(0.115)		(0.092)	
Cash	0.139	-0.039***	0.129	-0.039***
	(0.088)	(0.007)	(0.082)	(0.005)
CEO Age	0.004***	-0.000***	0.004***	-0.000***
	(0.001)	(0.000)	(0.001)	(0.000)
CEO Tenure	-0.006***	0.001***	-0.005***	0.001***
	(0.001)	(0.000)	(0.001)	(0.000)
Firm age	0.005***	-0.001***	0.005***	-0.001***
	(0.001)	(0.000)	(0.001)	(0.000)
Log(MVE)		0.015***		0.015***
		(0.001)		(0.001)
Stock Volatility		-0.539***		-0.537***
		(0.020)		(0.015)
Constant	-0.329***	0.156***	-0.334***	0.156***
	(0.096)	(0.008)	(0.097)	(0.008)
Adj-R-sqr	0.085	0.191		
Observations	15207	14759	14706	14706

Table 12
Effect of CEO Gender on Compensation

This table presents the impact of CEO Gender on their compensation using panel regressions. The variable female is the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year t and 0 otherwise. The compensation values are obtained by taking the natural logarithm of the respective variables. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The full sample consists of annual observations between 1992 and 2005. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Dependent Variable: CEO Compensation						
	Total Compensation	Short-term Compensation	Long-term Compensation	Total Compensation	Short-term Compensation	Long-term Compensation
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Short-term performance (ROA)				0.922***	1.216***	0.440
				(0.105)	(0.075)	(0.348)
Long-term performance (Innovation)				0.022***	0.013**	0.058**
				(0.008)	(0.005)	(0.027)
ROA*Female				0.710	0.345**	2.207
				(0.690)	(0.170)	(2.200)
Innovation*Female				-0.121	-0.082**	-0.843***
				(0.086)	(0.039)	(0.295)
Female	0.094	0.067	-0.026	0.044	0.044	0.065
	(0.062)	(0.042)	(0.237)	(0.109)	(0.080)	(0.391)
Stock Return	0.002***	0.002***	0.003***	0.001***	0.001***	0.002***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Stock Volatility	1.202***	-1.306***	2.560***	1.817***	-0.485***	2.825***
	(0.198)	(0.140)	(0.647)	(0.200)	(0.145)	(0.680)
Size	0.488***	0.306***	0.747***	0.487***	0.307***	0.740***
	(0.007)	(0.005)	(0.022)	(0.007)	(0.005)	(0.022)
Lagged Cash	0.093	-0.121**	-0.068	0.202***	0.030	-0.016
	(0.071)	(0.050)	(0.234)	(0.072)	(0.051)	(0.239)
Lagged Leverage	-0.568***	-0.257***	-1.610***	-0.470***	-0.138**	-1.535***
	(0.066)	(0.056)	(0.249)	(0.068)	(0.057)	(0.253)
Lagged Market-to-Book	0.078***	0.004	0.101***	0.053***	-0.028***	0.086***
	(0.008)	(0.005)	(0.023)	(0.009)	(0.005)	(0.025)
CEO Age	-0.003**	0.004***	-0.032***	-0.003**	0.004***	-0.032***
	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.004)
CEO Tenure	-0.004***	0.003***	-0.041***	-0.004***	0.002***	-0.042***
	(0.001)	(0.001)	(0.004)	(0.001)	(0.001)	(0.004)
CEO Duality	0.080	0.216**	0.473	0.034	0.159*	0.460
	(0.140)	(0.090)	(0.534)	(0.143)	(0.088)	(0.536)
Constant	3.531***	4.154***	1.195*	3.390***	3.968***	1.112
	(0.196)	(0.149)	(0.700)	(0.199)	(0.146)	(0.704)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R-sqr	0.448	0.434	0.162	0.453	0.450	0.163
Observations	12823	12886	12886	12823	12886	12886

Table 13
Effect of CEO Gender on Alternate Measures of Performance

This table presents the impact of CEO gender on alternative measures (and extended sample period) of long-term and short-term performance using OLS regressions and seemingly unrelated regressions (SUR). Tobin's Q is the measure of long-term performance and Cash flow from operating activities (OPER) is the measure of short-term performance. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The sample for models 1, 2, 5 and 6 consists of annual observations between 1992 and 2005. The sample for models 3 and 4 consists of annual observations between 1992 and 2013. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Dependent Variable: Measure of Performance						
	OLS Regression		OLS Regression		Seemingly Unrelated Regression	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Long-term (Tobin's Q)	Short-term (OPER)	Long-term (Tobin's Q)	Short-term (OPER)	Long-term (Tobin's Q)	Short-term (OPER)
Female	-0.174*	0.015**	-0.129***	0.013***	-0.134*	0.015**
	(0.098)	(0.007)	(0.048)	(0.004)	(0.078)	(0.006)
Log(MVE)	0.336***	0.017***	0.262***	0.018***	0.345***	0.014***
	(0.009)	(0.001)	(0.006)	(0.002)	(0.007)	(0.001)
Leverage	-2.738***		-2.292***		-2.330***	
	(0.071)		(0.056)		(0.079)	
R&D	1.188***		1.136***		1.896***	
	(0.184)		(0.148)		(0.089)	
Cash	2.149***		1.661***		2.036***	
	(0.118)		(0.078)		(0.076)	
CEO Age	-0.010***	0.000	-0.011***	-0.000**	-0.010***	0.000
	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
CEO Tenure	0.005***	0.000***	0.005***	0.001***	0.005***	0.000***
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Firm age	-0.018***	-0.000***	-0.016***	-0.001***	-0.018***	-0.000***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Log(Sale)		-0.000		0.009***		0.004***
		(0.001)		(0.002)		(0.001)
Constant	0.747***	-0.021***	1.148***	-0.051***	0.583***	-0.025***
	(0.097)	(0.007)	(0.069)	(0.012)	(0.092)	(0.006)
Adj-R-sqr	0.387	0.076	0.334	0.047		
Observations	15249	15254	25730	25746	15237	15237

Table 14
Effect of CEO Gender on Compensation using Propensity Score-Matched Sample

This table presents the impact of CEO Gender on their compensation using propensity score-matched sample. Panel A presents the univariate analysis whereas Panel B presents the multivariate analysis using panel regressions. The variable female is the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year t and 0 otherwise. The compensation values used in the multivariate regressions are obtained by taking the natural logarithm of the respective variables. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The sample consists of annual observations between 1992 and 2005. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Panel A: Univariate Analysis

Variable	Female CEOs	Male CEOs	Difference
Total compensation	4170.16	3662.75	507.42
			(489.74)
Short-term compensation	1181.38	1020.28	161.10**
			(80.35)
Long-term compensation	2778.59	2322.45	456.14
			(421.31)

Panel B: Multivariate Analysis

	Dependent Variable: CEO Compensation		
	Total Compensation	Short-term Compensation	Long-term Compensation
	Model 1	Model 2	Model 3
Female	0.041	0.081	-0.194
	(0.111)	(0.074)	(0.405)
Stock Return	0.002**	0.001**	0.008**
	(0.001)	(0.001)	(0.003)
Stock Volatility	2.246*	-0.331	0.568
	(1.172)	(0.894)	(4.145)
Size	0.586***	0.349***	0.995***
	(0.036)	(0.026)	(0.129)
Lagged Cash	0.480	0.212	0.936
	(0.404)	(0.276)	(1.362)
Lagged Leverage	-1.270***	-0.218	-1.339
	(0.442)	(0.302)	(1.772)
Lagged Market-to-Book	-0.003	-0.014	-0.020
	(0.036)	(0.027)	(0.135)
CEO Age	-0.016*	-0.002	-0.101***
	(0.009)	(0.006)	(0.035)
CEO Tenure	0.006	-0.001	-0.002
	(0.007)	(0.004)	(0.027)
CEO Duality	-1.650***	-0.058	-2.379*
	(0.338)	(0.285)	(1.312)
Constant	4.805***	3.944***	5.341*
	(0.941)	(0.652)	(3.172)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Adj-R-sqr	0.615	0.574	0.335
Observations	346	346	346

Table 15
Joint Analysis of Compensation and Performance

This table presents the joint analysis of the determinants of CEO compensation and performance measures using 3-Stage Least Square methodology (3SLS) and considering the three models as a system of simultaneous equations. The variable female is the CEO gender dummy variable, defined as 1 if the firm's CEO is female in a given year t and 0 otherwise. Total Compensation is the measure of CEO Compensation. The compensation values are obtained by taking the natural logarithm of the respective variables. Innovation is the measure of long-term performance and ROA is the measure of short-term performance. All other variables are defined in the Appendix. All continuous variables are winsorized at the 1% and 99% levels. The full sample consists of annual observations between 1992 and 2005. The terms in parentheses are heteroskedasticity robust standard errors. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 levels.

Simultaneous Regressions using 3-Stage Least Square Methodology					
Total Compensation		Long-term performance (Innovation)		Short-term performance (ROA)	
Model 1		Model 2		Model 3	
Short-term performance (ROA)	4.701***	Female	-0.154**	Female	0.012*
	(0.210)		(0.069)		(0.007)
Long-term performance (Innovation)	0.630***	Lagged(Log(Total Compensation))	0.292***	Lagged(Log(Total Compensation))	0.000
	(0.050)		(0.009)		(0.001)
Stock Return	0.000	Log(Sale)	-0.025***	Log(MVE)	0.016***
	(0.000)		(0.009)		(0.001)
Stock Volatility	3.849***	Leverage	-0.432***	Cash	-0.037***
	(0.229)		(0.081)		(0.006)
Size	0.383***	TQ	0.044***	Stock Volatility	-0.557***
	(0.008)		(0.007)		(0.017)
Lagged Cash	0.119	PPE	-0.477***	CEO Age	-0.001***
	(0.074)		(0.042)		(0.000)
Lagged Leverage	0.087	R&D	1.614***	CEO Tenure	0.001***
	(0.093)		(0.091)		(0.000)
Lagged Market-to-Book	-0.030***	Cash	-0.040	Firm age	-0.001***
	(0.009)		(0.076)		(0.000)
CEO Age	-0.005***	CEO Age	0.005***	Constant	0.153***
	(0.001)		(0.002)		(0.009)
CEO Tenure	-0.004**	CEO Tenure	-0.004***		
	(0.001)		(0.001)		
CEO Duality	-0.053	Firm age	0.006***		
	(0.155)		(0.001)		
Constant	3.750***	Constant	-1.622***		
	(0.180)		(0.109)		
R-sqr	0.151	R-sqr	0.0278	R-sqr	0.2158
Observations	12657	Observations	12657	Observations	12657

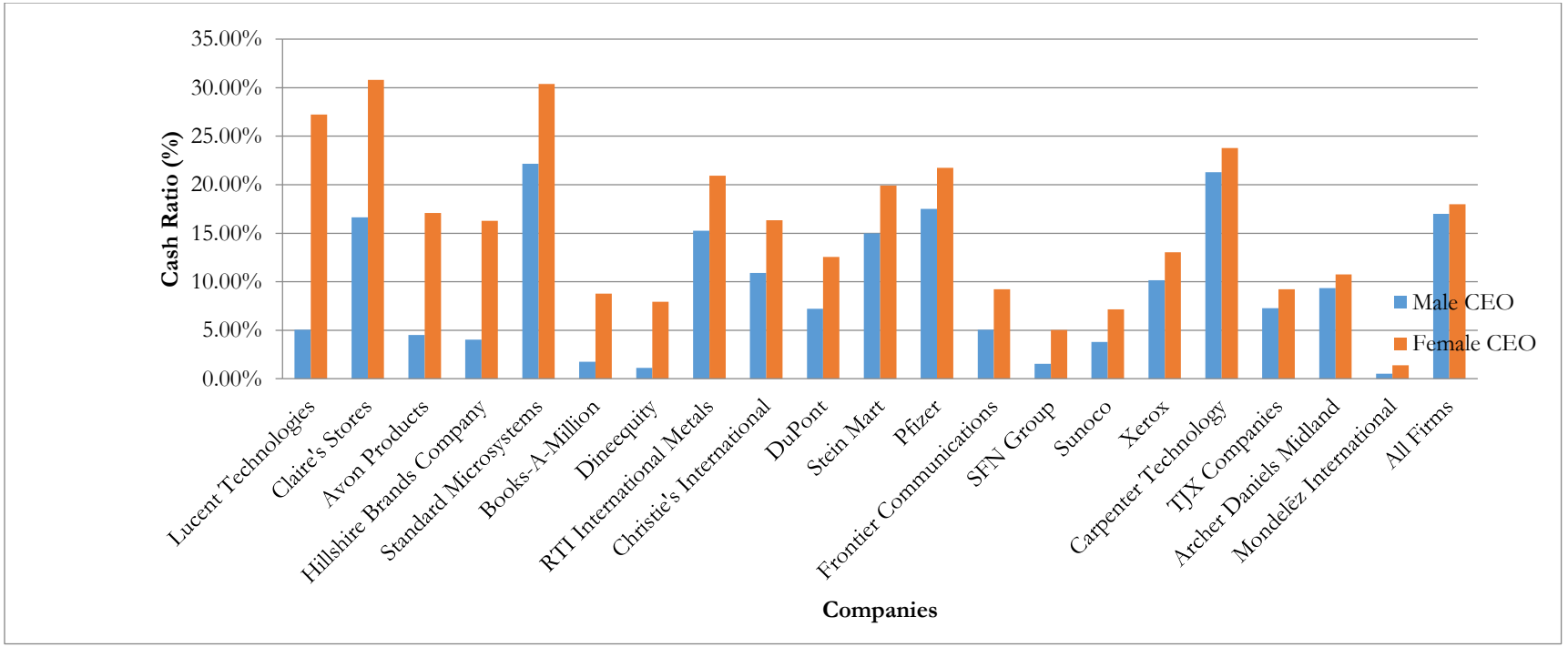

Fig. 1 Change in Cash Holdings around Male-to-Female CEO Transitions

This figure graphs the cash holdings of the 20 companies that had the largest change in cash holdings from the last two years of a male CEO to the first two years of a female CEO, excluding the transition year. The last column represents the average change in cash holdings for all male-to-female transition firms.