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Female Executives and Corporate Cash Holdings

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Abstract

I find that firms led by female top executives hold more cash, partly due to precautionary motives. To overcome endogeneity concerns, I employ several econometric techniques, including an instrumental variable analysis based on a historical event that resulted in a plausibly exogenous variation in the female workforce participation. Overall, my results are consistent with the view that greater risk-aversion leads female executives to hold more cash.

JEL Classifications: J16, G30

Keywords: Gender, Corporate cash holding, risk-aversion

1. Introduction

Since Opler *et al.* (1999), the study of corporate cash holdings has gained significant attention. One of the most important reasons for holding cash is a precautionary motive (Keynes (1936), Opler *et al.* (1999)). Cash provides a cushion against bankruptcy risks and fends off adverse cash flow shocks because cash enables firms to finance their activities if other sources of financing are not available. Consistent with this view, Bates *et al.* (2009) find that the increase in firms' cash holdings over time are positively correlated with the increase in firm-specific risks. However, from an investment point of view, cash (and cash equivalents) are negative net present value (NPV) projects because interests earned on cash and marketable securities are generally much lower than investors' required rates of return. Because holding cash entails such risk-return tradeoffs, it is plausible that managers' risk-aversion influences how much cash a firm holds.

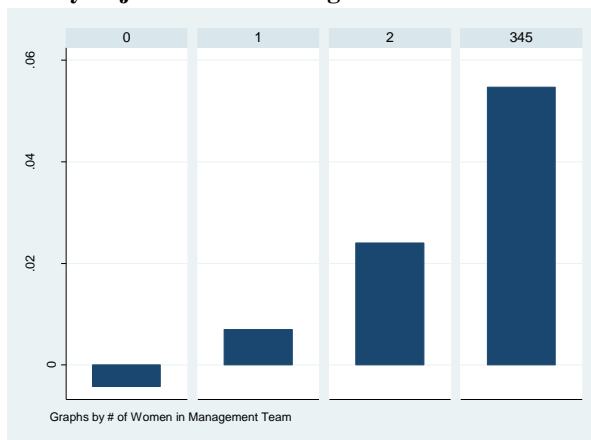
I examine if risk-tolerances of top executives of public companies influence corporate cash holdings. I build on a growing literature which shows that managers' traits and personal preferences lead to heterogeneous policies among otherwise similar firms (see, e.g., Malmendier and Tate (2005, 2008), Malmendier, Tate and Yan (2011), Hutton, Jiang and Kumar (2014), Adhikari and Agrawal (2016a, 2016b)). Most studies on corporate cash holdings assume that it is a function of firm-specific characteristics only. However, anecdotal evidence suggests that managers' idiosyncrasies may significantly explain why some companies hold more cash than others. An interesting example is Steve Jobs. Jobs, who is better-known for his self-confidence and innovativeness, did not pay dividends and hoarded huge amounts of cash, presumably because he was gun-shy from the hardship Apple had endured in the late 1990s.¹ So,

¹ *Fortune* reports "When he returned to Apple in 1997 the company was, according to his recollection, three months away from bankruptcy. Since then he has treated Apple's growing cash hoard like a starvation survivor treats food in

examining the potential role of managerial preferences can significantly add to our knowledge of corporate cash holdings.

I hypothesize that firms led by more risk-averse managers hold more cash due to precautionary motives. Executives' risk-tolerances are largely unobservable, but numerous studies have shown that gender is an important predictor of an individual's risk-tolerance, with women being less risk-tolerant than men.² Even in public companies, female executives pursue less risky corporate policies than their male counterparts (see, e.g., Huang and Kisgen (2013), Faccio, Marchica, and Mura (2016), Adhikari, Agrawal and Malm (2016), Zeng and Wang (2016)).³ Accordingly, I use the number of women in a firm's top executive team as a proxy for managers' aggregate risk-aversion.⁴ I find that firms with more women in their top executive teams hold more cash as a proportion of total assets. Figure 1 presents a snapshot of my main findings: the industry-adjusted ratios of cash and cash equivalents to total assets increase with the number of female top executives in a firm (0 or 1 or 2, or more than 2).

Figure 1: Average industry-adjusted cash holding across the number of female top executives



I acknowledge the endogeneity of female representation in the top executive teams and deal with this issue in various ways. This includes an instrumental variables technique that uses a novel instrument based on an historical event that led to a plausibly exogenous variation in the supply of qualified female

the larder -- something that could disappear at any time. [...] Jobs said [when asked] why Apple didn't pay dividends, "The cash in the bank gives us tremendous security and flexibility. - *Fortune* (Aug 13, 2010) <http://fortune.com/2010/08/13/why-steve-jobs-doesnt-pay-dividends/>

² See, e.g., Cohn *et al.* (1975), Riley and Chow (1992), Hinz, McCarthy and Turner (1997), Vanderhei and Bajtelsmit (1997), Sunden and Surette (1998), Adhikari and O'Leary (2011).

³ In general, an individual's personal behaviors are found to be consistent with their behavior at work. For instance, Cronqvist, Makhija and Yonker (2011) find that CEOs who use bigger mortgages for their own house also use more leverage in their firms.

⁴ Using % of women also obtains very similar results.

executives. Further analyses suggest that the effect of female executives on cash is more pronounced among firms that are likely to need more cash for precautionary motives.

2. Data and variables

My sample comprises the intersection of the Compustat, CRSP and Execucomp datasets. The sample starts in 1995 and ends in 2010. Following previous studies, I exclude financial firms (SIC codes 6000–6999) and utilities (SIC 4900–4949) because these industries are highly regulated.

My main dependent variable of interest is a firm’s cash holdings, defined as the natural log of the ratio of cash and marketable securities (Compustat: *che*) to total assets (Compustat: *at*). My main explanatory variable of interest is the number of female executives among the top executives of a firm listed in the Execucomp database. Other control variables are similar to those used in prior studies on cash holding. Table 1 provides definitions and basic summary statistics for the main variables used in this study.

Table 1: Definitions and basic summary statistics

Variable	Definition	Mean	Median	Std. Dev.
Cash Holding	Natural logarithm of the ratio of cash and short-term investments to total assets (Compustat items: <i>che/at</i>)	-2.72	-2.49	1.58
# Female Execs.	Number of female executives among the top executives in a year listed in Execucomp database	0.33	0.00	0.63
Firm Size	Natural logarithm of annual sales (<i>sale</i>)	7.10	7.02	1.59
Net WorkCap	Non cash current assets minus current liabilities divided by total assets (<i>wcap- che/at</i>)	0.08	0.07	0.15
Cash Flow	Income before extraordinary items plus depreciation scaled by total assets (<i>(ib +dp)/at</i>)	0.08	0.09	0.12
Cash Flow Risk	Standard deviation of time-series of Cash Flow for a firm	0.07	0.05	0.07
Tobin's Q	Ratio of market value of the firm to book value of assets ($(prcc_f * csho + at - che)/at$)	2.07	1.60	1.49
R&D	R&D expenditure divided by sales (<i>xrd/sale</i>)	0.06	0.00	0.15
Acquisitions	Acquisitions scaled by total assets (<i>aqc/at</i>)	0.03	0.00	0.06
CapEx	Capital expenditures divided by assets (<i>capx/at</i>)	0.06	0.04	0.06
Leverage	Long-term debt scaled by assets (<i>dltt/at</i>)	0.19	0.16	0.18
Dividend Payer	An indicator variable for non-zero cash dividends (<i>dv</i>)	0.51	1.00	0.50

3. Female executives and cash holding: baseline results

Table 2 shows the results from the regressions for cash holding decisions. T statistics, robust to heteroskedasticity and firm clustering, are in parentheses. To reduce the influence of outliers, most continuous variables are winsorized at the top and bottom 0.5%. Statistical significance at 10%, 5% and 1% for two-tailed tests are indicated by *, **, and *** respectively. Model 1 is a parsimonious model, which only controls for industry (Fama-French 48) and year fixed effects and finds that firms with more

women in the top executive team hold more cash after accounting for time and industry effects. To minimize the omitted variable bias, Model 2 includes a large number of control variables that are also important predictors of cash holdings as found by previous literature. Model 2 also obtains a positive and statistically highly significant coefficient on *# Female Execs.* Specifically, the coefficient of 0.075 indicates that compared to a firm with no female executives, a firm with one female executive has a 7.5% higher cash/asset ratio.

Table 2: Top female executives and cash holdings

	(1) Cash Holding	(2) Cash Holding	(3) Cash Holding
# Female Execs.	0.134*** (4.37)	0.075*** (3.03)	0.090*** (3.35)
Firm Size		-0.121*** (-8.02)	-0.125*** (-8.46)
Net WorkCap		-1.717*** (-11.26)	-1.926*** (-10.85)
Cash Flow Risk		2.011*** (6.31)	1.971*** (6.03)
Tobin's Q		0.168*** (16.27)	0.154*** (14.98)
R&D		0.882*** (7.15)	0.774*** (6.47)
Acquisitions		-2.634*** (-15.68)	-2.838*** (-14.92)
Cash Flow		0.995*** (8.53)	1.003*** (8.25)
CapEx		-3.509*** (-10.02)	-3.383*** (-8.95)
Leverage		-1.799*** (-14.85)	-1.633*** (-12.58)
Dividend Payer		-0.217*** (-5.06)	-0.190*** (-3.97)
Industry/Year fixed effects	Yes	Yes	Yes
N	21539	19518	14288
Adj. R ²	0.444	0.284	0.462

There are more female executives in some industries than others. So, one concern is that these differences in cash holdings may be an artifact of vast differences in industry practices. I estimate my regressions with a sample that excludes three industries, broadly defined, with the greatest representation of female executives (Huang and Kisgen (2012)): consumer durables, consumer non-durables, and

manufacturing. The results in column 3 reveal that the effect of female executives on cash holdings continues to remain strong even when I exclude the firms with the highest presence of female top executives. Therefore, my results are unlikely to be driven by large differences in industry practices.

4. Identification issues and instrumental variables

Female representation in top management positions is likely to be endogenous, which makes it difficult to interpret my results thus far as a causal relation. First, women, being more risk-averse than men, might self-select into firms that have a culture of holding more cash for precautionary purposes. Second, observable and unobservable omitted variables might be simultaneously affecting the presence of women in the top executive teams and firms' cash policies. I attempt to overcome such identification issues in the following ways.

4.1 Difference-in-differences

In this section, I examine a possibility that the positive relation between the presence of female executives and cash holdings may be due to a risk-averse firm culture. Such a culture may instill a practice of holding more cash and, at the same time, attract more risk-averse employees. If my results are driven by a time-invariant firm culture, I should not observe any change in cash holding behaviors within a firm due to the changes in top executives. However, if executives' risk-aversion matters for cash holding, then I likely observe changes in cash holding behaviors *within a firm*, albeit gradually, when there are changes from a male to a female executive, or vice-versa. I test these contrasting predictions by using a difference-in-differences setting around CEO turnovers. However, I realize that the change in cash policy is unlikely to be immediate or drastic, but is likely to be gradual. Therefore, I compare the difference in the average cash holdings before the CEO turnover with the average of three years after the turnover.

Table 3: Difference-in-differences around CEO changes

	(1)	(2)
	Cash Holding	Cash Holding
Post _(t+1, t+3)	0.046*	0.038
	(1.74)	(1.43)
MaleToFemale*Post _(t+1, t+3)		0.301***
		(2.97)
FemaleToMale*Post _(t+1, t+3)		-0.087
		(-0.60)

(Rest similar to Table 1)

Table 3 presents the results. $Post_{(t+1, t+3)}$ is an indicator variable for the window from 1 to 3 years after the change in CEO. $MaleToFemale$ indicates that the incoming (outgoing) CEO is a female (male). $FemaleToMale$ indicates that the incoming (outgoing) CEO is a male (female). The omitted baseline observations are the cases where there is no change in CEO. First, $Post_{(t+1, t+3)}$ obtains a positive coefficient which is significant at the 10% level. This suggests that firms increase cash holdings after any CEO turnover, possibly because turnover results in a significant uncertainty in the firm, and the new CEO might be reluctant to spend cash anywhere yet. More importantly, the regressions obtain a positive and significant coefficient on $MaleToFemale*Post_{(t+1, t+3)}$, which suggests that the increase in cash holding after the CEO turnover is much higher if the firm replaces a male CEO with a female CEO. This relationship appears asymmetric: if a male CEO replaces a female CEO, firms do not decrease cash holdings significantly.

The difference-in-differences analysis obtains results generally consistent with my baseline results, and makes some case for a causal effect.

4.2 Matched sample

Another source of endogeneity is the possibility that firms and executives might self-select each other according to firms' business models and executives' risk preferences. To account for such self-selection, I employ a propensity score matched (PSM) treatment effect model. I partition my sample into two groups: firm-years with and without a woman in the top executive team. Then, using a probit model with the full set of control variables used in the regressions in Table 2, I predict the probability of a firm having a female top executive. Next, using the nearest neighborhood of the predicted probabilities, for each firm that actually has a female top executive (i.e., the treatment sample), I find another firm that does not have a female top executive but has almost equal probability of having one (i.e., the matched control sample). To ensure the quality of the matches, I impose a caliper of 0.0001 and match with replacement.

Table 4: Difference in Cash Holding (unmatched and propensity matched samples)

Variable	Sample	Treated	Controls	Difference	T-stat
Cash Holding	Unmatched	-2.54	-2.76	0.22***	8.39
	ATET	-2.55	-2.62	0.07**	2.06

Table 4 shows the differences in unmatched samples and the average treatment effect of the treated (ATET) and finds an ATET of 0.07, which is statistically significant at the 5% level. This result suggests that firms with a female top executive have 7% higher cash ratios than otherwise similar firms without a female executive, even after controlling for the possibility of self-selection based on observable firm characteristics.

4.3 Instrumental variables approach

To obtain an instrumental variable for the presence of women in a firm's top executive team, I exploit a historical event that led to a plausibly exogenous variation in female labor supplies across different states in the US. My instrument is inspired by Acemoglu, Autor, and Lyle (2004), who find that the Second World War (WWII) drew many women to the workforce permanently due to a decline in the domestic supply of male labor induced by the war. Around 16 million men in the US were mobilized to serve in the armed forces. My identification strategy exploits the following two notions:

- 1) The mobilization rates varied substantially across US states, partly due to idiosyncratic differences in the behavior of local draft boards. Because the negative supply shock of male workers had to be compensated with female workers, this variation in the mobilization of men also led to a variation in female labor supply across states (Acemoglu, Autor and Lyle (2004)).
- 2) The war also changed many men's perception of working women over subsequent generations because, for example, WWII created more men with mothers who worked. Fernandez, Fogli, and Olivetti (2004) conclude that "although the effect of World War II faded for the older cohorts, its influence on the labor supply for the later cohort persisted" (p. 1278). The war thus created a "ripple" effect that influenced not only the generation that was directly affected by the war but also next generations.

Also, a geographic variation in the supply of capable women for managerial positions is important because top executives of public firms are likely to come from local areas (see, e.g. Yonker (2014)). Therefore, I expect that the state-level mobilization rate of men in WWII positively predicts female representation top management teams of firms in the state. In contrast, perhaps more importantly, there is no obvious reason for the state-level mobilization rate to directly affect cash holdings of firms located in the state several decades later. So this instrument plausibly satisfies the exclusion criterion.

Accordingly, I employ the fraction of registered men between the ages of 18 and 44 who were drafted or enlisted for WWII in a state (*WWII Mobilization*) as an instrument for the percentage of female executives in the top management team of a firm headquartered in the state, and estimate a two-stage least squares (2SLS) regression.⁵ Column 1 of Table 5 shows the coefficient on *WWII Mobilization* in a state is positive and statistically significant at the 1% level in predicting the number of female top executives in a firm headquartered in the state. The range of the mobilization rates across the states is about 10%. Thus, a coefficient of 1.601 translates into the difference in the number of female top executives of about 0.16

⁵ I obtain the list of state mobilization rates from Professor David Autor's website: <http://economics.mit.edu/faculty/dautor/data/autacemly06>.

(1.601 *10% =0.16)). Thus the economic impact of *WWII Mobilization* on the number of female executives seems substantial considering that the average # *Female Execs.* is about 0.33. Column 2 of Table 4 reports the results of the second-stage of 2SLS regression, in which *Cash Holding* is the dependent variable. Consistent with my earlier baseline results, the instrumented # *Female Execs.* positively and significantly predicts cash holdings.

Table 5: Instrumental variables approach

	(1) # Female Execs. (2SLS – 1 st Stage)	(2) Cash Holding (2SLS – 2 nd Stage)
WWII Mobilization	1.599*** (4.34)	
# Female Execs. (<i>Instrumented</i>)		2.343*** (3.30)
<i>(Rest similar to Table 1)</i>		
N	19087	19087
Adj. R ²	0.094	-0.517

To ensure that the results are not sensitive to the choice of an instrument, in unreported tests I also employ another instrument previously used by Huang and Kisgen (2013) based on a state-level gender equality index developed by Sugarman and Straus (1988). I obtain similar results as above.⁶

5. Precautionary motive of cash holding

Han and Qiu (2007) show that financially constrained firms are more likely to hold extra cash due to precautionary motives because they cannot easily raise capital when needed. If such constraints make more risk-averse managers hold more cash, the precautionary motive predicts that the effect of female managers on cash holdings should be more pronounced among financially more constrained firms. On the other hand, if financial constraint does not moderate the relation between female executives and cash holdings, the motive for such cash holding would be ambiguous. To test these predictions, I follow Han and Qiu (2007) and use three different metrics for identifying more financially constrained firms: 1) Non-dividend payers 2) Firms without investment-grade credit ratings, and 3) smaller firms (i.e., firm size less than the median firm size). I then estimate my baseline regressions separately among the constrained and unconstrained firms.

⁶ These results are available from the authors on request.

Table 6 presents the results. With each measure of financial constraint, I find that the positive relation between female executives and cash holdings is more pronounced among more financially constrained firms. The predictive power of female executives on cash holding is smaller and mostly statistically insignificant among financially unconstrained firms. This result is consistent with the notion that uncertainty about the ability to raise cash when needed makes more risk-averse female managers hold more cash and supports the precautionary motive of cash holding.

Table 6: Cash Holdings among constrained and unconstrained firms

	Cash Holding		Cash Holding		Cash Holding	
	(1) Non-div. Payers	(2) Div. Payers	(3) Junk or unrated	(4) Investment grade	(5) Small firms	(6) Large firms
# Female Execs.	0.096*** (3.26)	0.059 (1.55)	0.090*** (3.28)	0.042 (0.93)	0.080*** (3.28)	0.059 (0.92)
	<i>(Rest similar to Table 1)</i>					
N	9,826	9,692	14,408	5,110	10,147	9,371
Adj. R ²	0.457	0.363	0.447	0.36	0.367	0.464

6. Conclusion

This paper contributes to a growing literature on the determinants of corporate cash holdings by proposing a behavioral explanation of cash holdings. Using gender as a proxy for risk-aversion, this study finds that firms with higher representations of women, who tend to be more risk-averse than men, hold more cash. Further analyses, including an instrumental variable approach, suggest that this relation is plausibly causal. Higher cash holdings by female executives seems to be motivated by precautionary motives.

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