



Gender and corporate finance: Are male executives overconfident relative to female executives? ☆



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ABSTRACT

We examine corporate financial and investment decisions made by female executives compared with male executives. Male executives undertake more acquisitions and issue debt more often than female executives. Further, acquisitions made by firms with male executives have announcement returns approximately 2% lower than those made by female executive firms, and debt issues also have lower announcement returns for firms with male executives. Female executives place wider bounds on earnings estimates and are more likely to exercise stock options early. This evidence suggests men exhibit relative overconfidence in significant corporate decision making compared with women.

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1. Introduction

Traditional corporate finance largely ignores the influence a specific manager has on decision making, focusing on firm characteristics instead of managerial characteristics. Nevertheless, few would argue that Apple would be the same company if someone other than Steve Jobs had been Chief Executive Officer (CEO), or that General Electric would be the same if not led by Jack Welch.

We examine executive heterogeneity by focusing on one potentially important characteristic of executives: their gender. Behavioral differences in gender have been studied extensively in psychology and other fields, but not in corporate finance. In this paper, we examine whether the gender of an executive has a material impact on corporate decision making. We then examine whether the differences in behavior we identify have an impact on shareholder value.

The number of female top executives in the U.S. has increased significantly. Among major U.S. corporations in 2005, 7.5% of Chief Financial Officers (CFOs) and 1.5% of CEOs were women, versus 3.0% and 0.5% in 1994, respectively. Despite this increase in female representation, previous research has not examined whether gender plays a role in corporate decisions. Examining this is important not only because it provides more insights into corporate behavior generally, but also because the representation of women in higher ranking executive positions continues to

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be relatively small. We test whether firms with female executives (CEOs and CFOs) make different financing or acquisition decisions compared with firms with male executives¹. We then examine whether any differences in decisions identified for women are better or worse for shareholder value. The primary hypothesis we test, based on previous literature in other contexts, is that male executives are overconfident in corporate finance decisions compared with women.

Using a difference-in-differences empirical framework on a hand collected data set of executive transitions, we identify several key differences for female executives relative to male executives. We find that firms with female executives grow more slowly and are less likely to make acquisitions. We also find that acquisitions made by female executives have higher announcement returns compared with those made by firms with male executives. We find analogous results for capital structure decisions. Female executives are less likely to issue debt, and announcement returns for debt offerings are higher when the firm has a female executive. Female executives do not, however, make significantly different changes to leverage overall.

These main results are consistent with relative overconfidence for male executives compared with female executives, yet other explanations could also be consistent with this evidence². We conduct a number of additional tests to distinguish the overconfidence interpretation from other explanations consistent with these key results. First, we test whether male executives are overconfident directly by examining their earnings forecasts. We find that earnings forecasts made by firms with male executives have significantly narrower bands than those with female executives. Second, we examine the likelihood that male executives are replaced relative to female executives. Overconfident executives should be more likely to be replaced, because overconfident decisions lead to non shareholder value-enhancing decisions. We find that male executives, especially CFOs, are more likely to be replaced (i.e., serving less than four years in tenure), consistent with men being overconfident. Third, we replicate measures of overconfidence based on stock option exercise decisions used in [Malmendier and Tate \(2005\)](#) for male and female executives. Male executives are less likely to exercise deep-in-the-money options early, which is consistent with male overconfidence. Finally, we examine the likelihood of an acquisition being acquirer shareholder value destroying. If male executives are overconfident, they should sometimes inadvertently undertake value-destroying acquisitions. Consistent with

male overconfidence, we find that acquisitions undertaken by men are significantly more likely to have negative announcement returns than those undertaken by firms with female executives. The evidence from these four tests supports the interpretation that male executives are overconfident relative to female executives in major corporate decisions.

While our main identification strategy of difference-in-differences around executive transitions largely excludes alternate explanations for our main results, we conduct one additional set of tests to rule out any lingering concerns. These tests rely on an instrumental variable approach, in which the instrument we use for a firm having a female executive is based on a previous study that calibrates a state's level of gender status equality ([Sugarman and Straus, 1988](#)). We conjecture that the more friendly a state is to women's equality generally, the more likely a firm located in that state is to have a female executive. We use as an instrument the state's gender status equality value for each firm based on the firm's headquarters location (this continuous measure ranges from 0 to 100). So, for example, a firm headquartered in Mississippi (the lowest scoring state) gets a significantly lower score than a firm headquartered in Oregon (the highest scoring state). We find that this measure is significantly related to the decision to hire a female executive in the first stage. Second-stage results from a two-stage least squares (2SLS) instrumental variable (IV) design confirm the results from the primary difference-in-differences approach.

To our knowledge, ours is one of the first papers to study gender differences in the corporate setting. Gender has been examined in other business settings, including stock trading behavior ([Barber and Odean, 2001](#)), the mutual fund industry ([Atkinson, Baird, and Frye, 2003](#)), start-up firms ([Verheul and Thurik, 2001](#)), and competitive environments in laboratory settings ([Niederle and Versterlund, 2007](#)). [Graham, Harvey, and Puri \(forthcoming\)](#) use a survey-based approach to identify differences in CEO risk aversion and optimism and then relate those differences to corporate financial decisions. [Sapienza, Zingales, and Maestripietri \(2009\)](#) examine the impact of testosterone levels in men and women and the impact of that testosterone on career choices. [Bharath, Narayanan, and Seyhun \(2009\)](#) examine insider trading by female versus male executives, and [Adams and Ferreira \(2009\)](#) examine the impact of female board members on firm governance and stock performance. Our paper differs from previous literature as we examine different aspects of executive behavior including mergers and financing decisions, we use a difference-in-differences empirical approach, we hand collect data to obtain a larger sample of female executives, and we examine not only executive decision making but also the market's reaction to that decision making.

The rest of the paper is organized as follows. In [Section 2](#), we state our hypotheses; in [Section 3](#), we provide our main empirical tests; in [Section 4](#), we conduct additional tests to evaluate why gender differences exist; and in [Section 5](#), we conclude.

¹ We include female CEOs and CFOs in our sample, but the sample is heavily weighted toward female CFOs given their greater representation in firms. Both CEOs and CFOs are integral players in the decisions we examine in this paper. For example, [Bertrand and Schoar \(2003\)](#) find that the CFO of a firm significantly affects both capital structure and acquisition policy. [Frank and Goyal \(2010\)](#) find that CFOs are at least as important, if not more important, for capital structure decisions as CEOs.

² We use the term "overconfidence" to encompass both overconfidence and optimism as in previous literature (see, e.g., [Malmendier and Tate, 2005](#); [Camerer and Lovo, 1999](#)).

2. Gender differences and executive decisions

In this section, we discuss the hypothesis that male executives exhibit relative overconfidence in corporate decision making compared with female executives.

2.1. Gender behavioral differences

Previous finance and psychology literature finds that men are overconfident relative to women. To understand the impact of overconfidence in the context of corporate financial decisions, consider a one-period project that costs \$1 today, with an expected payout of α in one year ($\alpha > 1$) with discount rate σ . An overconfident manager is one who overestimates his own ability to affect α [the better-than-average effect as documented, for example, by Svenson (1981) for driving ability or in exam answer confidence in Lundeberg, Fox and Punccohar (1994)]. An overconfident manager could also believe his estimate of α is more accurate, implying an underestimation of the discount rate σ [narrow confidence intervals as found, for example, in Larwood and Whittaker (1977)]. For a manager who believes his estimate of α is certain, the appropriate discount rate is the risk-free rate. Some previous literature defines an optimistic agent as one with positive expectations for future events (but not directly due to his own skill), which would also lead to overestimation of α as in the better-than-average effect. Puri and Robinson (2007) propose a novel approach to measuring this bias specifically. Some papers define overconfidence to include both the better-than-average effect and narrow confidence intervals (e.g., Malmendier and Tate, 2005), while others distinguish overconfidence from optimism by defining overconfidence only as bias on σ (e.g., Ben-David, Graham, and Harvey, 2010). For ease of exposition, we use overconfidence to include both overconfidence and optimism, except where we think we can make a distinction. In our setting generally we are unable to distinguish between these two similar constructs.

Overconfidence implies women undertake fewer projects, or more generally make fewer significant decisions, than men, holding other factors constant. Because overconfident men overestimate net present values (NPVs), they undertake more transactions because they expand the acceptable transaction pool to include some deals that are negative NPV. We test this implication by examining the frequency of acquisitions, debt issuance, and equity issuance decisions for male versus female executives. Overconfidence also implies that decisions ultimately made by women have more positive market reactions. If men are more overconfident in their decision making, the market should respond more negatively on average because a portion of the deals undertaken by men are value-destroying. We test this by examining announcement returns surrounding acquisitions, equity issuance, and debt issuance decisions for male versus female executives.

Overconfidence is not the only potential behavioral bias for female executives relative to male executives. For example, previous literature also finds that women are relatively more risk averse than men. Previous research indicates that women invest in less risky assets

in their investment portfolios (see, e.g., Sunden and Surette, 1998; Bernasek and Shwiff, 2001; Agnew, Balduzzi, and Sunden, 2003), and similar behavior is shown in simulated gambles (Levin, Snyder, and Chapman, 1989) and is reported in surveys on risk preferences (Barsky, Juster, Kimball, and Shapiro, 1997; Prince, 1993)³. Although female risk aversion and male overconfidence can lead to similar predictions, one distinction is that overconfident men make worse decisions for a firm and women, if relatively risk averse, make worse decisions for a firm. One distinct implication distinguishing these two concepts therefore relates to career outcomes. If women are systematically risk averse to the detriment of shareholders, eventually the board will identify this, and they should get fired more often, or generally be less likely to maintain their job. If men are systematically overconfident to the detriment of shareholders, they should be the ones more likely to get fired or leave their position. We test whether women are more or less likely to retain their position as CEO or CFO relative to male executives. A second way we test for overconfidence directly is to examine earnings forecasts for male executive versus female executive firms. If men are overconfident, narrow confidence intervals imply that they provide narrower ranges for earnings forecasts than women.

Third, we examine stock option exercising and stock purchase behavior of executives to measure overconfidence as in Malmendier and Tate (2005). Malmendier and Tate (2005) classify executives as overconfident if they persistently fail to reduce their exposure to the idiosyncratic risk of their firms. Executives hold some discretion in their exposure to the equity value of the firm, and executives who are overconfident overestimate returns leading them to believe the stock is undervalued, all else equal. We replicate their measures for our sample, including whether female versus male executives are more likely to hold company stock options that are deep in the money (Holder 67) or hold options all the way until expiration (Long Holder). We also examine whether they are more likely to buy shares in company stock despite already high exposure to company risk (Net Buyer). Malmendier and Tate (2005) argue that overconfident executives will have higher values or likelihoods for all three of these measures.

Finally, we examine the probability that a firm undertakes an acquisition that is value destroying for shareholders. Overconfidence implies men undertake some projects that have a negative NPV. We directly test this by examining the likelihood for shareholder value destroying acquisitions. Because some of the market reaction to an acquisition might be related to the funding

³ Some studies have also questioned the findings that indicate differences in gender risk aversion (see, e.g., Schubert, Brown, Gysler, and Brachinger, 1999; Atkinson, Baird, and Frye, 2003). Some studies find, in particular, that in higher level positions (e.g., fund managers) gender risk-aversion differences are no longer evident (see, e.g., Atkinson, Baird, and Frye, 2003; Master and Meier, 1988; Birley, 1989). Female CFOs have made it through a rigorous selection process, so we might similarly expect to find no differences in risk aversion for this subset of women.

of the acquisition (cash versus stock), we conduct this test for the full sample of acquisitions as well for acquisitions that are financed with cash only⁴.

2.2. The significance of CEOs and CFOs

Our paper builds on previous literature that examines the effects of nongender executive characteristics on corporate decision making. Bertrand and Schoar (2003) find that manager fixed effects are significant for corporate decisions. They find that both CEOs and CFOs are significant for both investment policy and financial policy. CFO fixed effects are significant predictors of a firm's level of investment and number of acquisitions, leverage, interest coverage, and cash holdings. CEO fixed effects are significant predictors of a firm's investment policy, but less so for a firm's financial policy⁵. Frank and Goyal (2010) examine the effect of CEOs and CFOs on corporate leverage. They find that leverage is affected by the particular manager and that CFOs explain more of the variation in leverage than CEOs. Kaplan, Klebanov, and Sorensen (2012) examine which types of CEO characteristics increase the likelihood for being hired and their ultimate performance in leveraged buyout (LBO) and venture capital deals. Graham, Harvey, and Puri (forthcoming) find that managerial attitudes, such as risk aversion and optimism, are related to corporate financial policies. Our study contributes to this literature by examining the influence of a primary executive characteristic, gender, on significant firm decisions. We also specifically examine the impact on shareholder value of any differences in decision making by gender.

3. Main empirical tests

This section presents the main empirical tests of gender differences in corporate financial and investment decisions.

3.1. Empirical methodology

Female executives are not randomly assigned to firms, so our empirical framework must consider potential endogeneity issues. The gender of an executive could be considered as random as the color of the executive's hair or whether an executive's first name begins with the letter J or M. However, boards could discriminate based

on gender, or women may self-select into certain types of firms. If firms discriminate based on gender, the same characteristics that are associated with discriminatory behavior could be associated with the outcomes found in this paper. Female representation is also not uniform across all kinds of firms. Exclusion of women from "male" jobs can result in an excess supply of labor in "female" occupations, as in the Bergmann (1974) overcrowding hypothesis. For example, female executives are more highly represented at consumer products firms. If consumer products firms also grow more slowly, for example, a spurious inference could be made. Female executives could also seek out firms that are different. Perhaps, for example, women choose to work at firms that make better acquisitions.

To mitigate these issues, we use a difference-in-differences framework for our empirical tests, comparing activity before and after transitions from a male to a female executive with a control sample of male-to-male transition firms. Using panel data with fixed effects achieves similar objectives, but the difference-in-differences approach has several advantages. The difference-in-differences approach requires the executive to be in power for a significant time period, negates any unique effects of an executive transition, and reduces noise from dated observations⁶. We require that an executive be in power for at least three years (the year he or she is hired and two years following) to ensure that he or she has had significant time to make an impact on corporate policy. We use male-to-male transition firms as our control group, thereby conditioning all tests on the occurrence of an executive transition of any kind, and because we compare behavior and outcomes after a transition to a female executive with those before the transition, we remove any time-invariant unobservable firm effects. Therefore, any other characteristics of a firm must have changed at the same time of the transition, and be independent of a transition, for alternate explanations to be supported.

For robustness, we also conduct more traditional panel data regressions with firm fixed effects with a female executive dummy variable. One advantage of this specification is that firms that have a female-to-male executive transition, male-to-female-to-male transition, or male-to-female-to-female transition are included. We discuss the specifics of these tests in Section 3.3.

Despite these efforts, this empirical approach does not completely rule out the argument that some unobserved change in discriminatory orientation of the firm that

⁴ In unreported tests, we also examine whether firms with female executives are more likely to hold greater cash positions, have lower debt maturities, or have more accrual activity, all three of which have been argued to be measures of risk aversion in management decision making (Chava and Purnanandam, 2010). In all three cases, we do not find significant differences between firms with male versus female executives, which provides more evidence against a risk-aversion interpretation.

⁵ In a recent paper, Fee, Hadlock, and Pierce (2011) raise some doubts regarding the overall conclusions of Bertrand and Schoar (2003). Using exogenous CEO changes caused by death and health reasons, they find little variability in firm behavior before and after a new CEO is put in place.

⁶ Consider a panel data regression that includes 20 years of data for a particular firm, with 19 years of a male CFO and only the last year with a female CFO. In this case, the beginning years are unlikely to provide an effective control for the last year that the female was in power. Furthermore, if the female executive was in power for only one year, she might not have a significant impact on policy that quickly. Finally, because the female was in power for a year, decisions that are unique to an executive transition would compromise the results (e.g., perhaps all executives make fewer acquisitions in their first year in office). The difference-in-difference approach eliminates these issues. Our approach, however, differs from typical difference-in-differences tests in that our observations are not concentrated entirely around a particular date. We control for year effects in all the tests to address this difference.

coincides with the decision to hire a woman could explain our findings. Firms could also seek out women if they know that men and women differ in corporate financial policy. For example, if a firm knows that it would like to reduce its acquisitions, perhaps it deliberately hires a female. This particular story is consistent with our overall interpretation, although it suggests a recursiveness that could intensify the results we find. We also control for particular characteristics of the executive, such as whether the executive has a Master of Business Administration (MBA), the executive's age, and if hired internally versus externally, to distinguish the gender explanation from other potentially correlated executive characteristics.

To rule out the alternate explanation of an unobserved change in discriminatory orientation of the firm, we conduct one additional set of tests using an instrumental variable approach. The instrument we use for a firm having a female executive is based on a previous study that calibrates a state's level of gender status equality. Sugarman and Straus (1988) evaluate the 50 U.S. states and assign each of them a score for its gender status equality. We conjecture that the more friendly a state is to women's equality generally, the more likely a firm headquartered in that state is to have a female executive. The measures used to determine this score are economic, political, and legal. For example, the economic measures include measures such as income equality for women versus men, the political measures include measures such as female representation in the state senate and judge positions, and the legal measures include measures such as fair employment laws and discrimination laws. We use as an instrument the state's gender status equality value for each firm based on the firm's headquarters location. The score is out of 100, with scores ranging from 19.2 (for firms headquartered in Mississippi) to 59.9 (for firms headquartered in Oregon), and a median score of 42.3 (Florida). While this variable is plausibly correlated with the decision to hire a female executive, it is unlikely that this variable would affect our outcome variables other than through its direct effect on the gender of the executive. For example, the gender equality friendliness of a state should not affect the acquisition performance of firms in that state. So, this instrument reasonably meets the exclusion restriction.

3.2. Data and summary statistics

We focus on CEOs and CFOs because the sample of CEOs alone is too small for meaningful analysis. Focusing on both provides a larger sample (116 female executive firms for the majority of tests) while still examining executives who have meaningful impacts on firm financing and acquisition activity. CEOs have an important part in major decisions of the firm, but several studies indicate that CFOs also play a significant role in both acquisition and capital structure decisions. Anecdotal evidence also supports the supposition that CFOs are integral in acquisition decisions. For example, Indra Nooyi, then CFO of PepsiCo, was the "lead negotiator on a \$13.8 billion acquisition of Quaker Oats" (Wall Street Journal, 2006). Responsibilities for Carol Tome, CFO of Home Depot, include

"oversight of acquisitions, strategy" (CFO Magazine, 2007), and more generally, an article in *Business Trend Quarterly* (2007) states that "during a merger or acquisition, the CFO and the finance department are routinely called upon to evaluate and execute transactions."

We compile our data set for female executives using executive information on the ExecuComp database (which contains only the largest firms) and we supplement this with hand collected data for all firms with book assets greater than \$500 million. We also require that the firm be a NYSE-, Amex- or Nasdaq-listed firm in Compustat, from which we obtain firm financial data. The ExecuComp database is available from 1992 and electronic filings through the Securities and Exchange Commission (SEC) Electronic Data Gathering, Analysis and Retrieval (EDGAR) system became effective in 1993, so our sample covers from 1993 to 2005. We collect the name, gender, and rank of the executive for all firms. If ExecuComp reports two executives with the same title (CEO or CFO) for a firm in the same year, we choose the one with a higher rank. This matching identifies executives for 12,348 firm years. For the remaining firm-year observations, we manually collect the name and gender of the incumbent executive of a firm-year by searching the 10K filing of the firm through the SEC EDGAR system⁷. If the company filing does not report the gender of the executive or refer to the executive using third person pronouns, we search through Factiva, the company's website, and business websites, such as Forbes.com and ZoomInfo.com, to identify the gender of the executive. This search yields 26,668 firm-year observations for which the name and gender of the executive are available.

We construct our executive transition sample from the firm-year list using the following filters. We require that a new executive appears on the company's 10K reports for at least 3 consecutive years as an executive. The transition year is between 1994 and 2003, and the book assets of the firm in the transition year is greater than \$500 million. The predecessor is a male executive, which means that the transition should be either a male-to-male or a male-to-female transition and, we exclude financial firms (Standard Industrial Classification code between 6000 and 6999) and foreign firms (American Deposit Receipts, Global Deposit Receipts, and Canadian firms). Our final sample contains 1,750 cases of male-to-male transitions and 116 cases of male-to-female transitions. The transition year (year t) is defined as the first year that a new executive appears in a firm's 10K file. Appendix A (Table A1) provides a list of the female executives for our sample. We collect executives' biographical information, such as age, education, and whether hired from inside the firm, from BoardEx and from company filings. Our data sources for acquisitions and equity-debt offerings are from Securities Data Company (SDC) Platinum M&A Database and SDC Platinum New Issues Database, respectively.

⁷ We also double-check the accuracy of executive information reported by ExecuComp. In about 5% of the firm years that ExecuComp provides a CFO record, the executive information is inconsistent with that by the company filing. We correct the discrepancy using the information in the firm's 10K reports.

Table 1

Summary statistics.

This table presents the distribution of our sample executives by gender and other characteristics, including tenure, transition year, and industry affiliation. Tenure is the number of years that the executive shows up on a firm's 10K reports as a Chief Executive Officer or Chief Financial Officer. We require that the executive has to be in office consecutively for at least three years. The year of transition is the first year that the executive shows up on the annual report. The industry definition follows Fama and French classification, which is available on Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Panel A: Distribution of executives by gender and tenure

Gender	Tenure (years)										Total
	3	4	5	6	7	8	9	10	11	12	
Male	401 22.9%	347 19.8%	321 18.3%	246 14.1%	158 9.0%	124 7.1%	62 3.5%	49 2.8%	32 1.8%	10 0.6%	1,750
Female	21 18.1%	36 31.0%	21 18.1%	14 12.1%	12 10.3%	6 5.2%	3 2.6%	1 0.9%	2 1.7%	0 0.0%	116

Panel B: Distribution of executives by gender and transition year

Gender	Transition Year										Total
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Male	41 2.3%	120 6.9%	135 7.7%	138 7.9%	183 10.5%	201 11.5%	274 15.7%	241 13.8%	217 12.4%	200 11.4%	1,750
Female	4 3.5%	9 7.8%	3 2.6%	8 6.9%	10 8.6%	17 14.7%	15 12.9%	20 17.2%	21 18.1%	9 7.8%	116

Panel C: Distribution of executives by gender and industry affiliation

Gender	Industry					Total
	Consumer	Manufacture	Health	High-Tech	Other	
Male	447 25.5%	635 36.3%	329 18.8%	97 5.5%	242 13.8%	1,750
Female	38 32.8%	33 28.5%	20 17.2%	5 4.3%	20 17.2%	116

Summary statistics for the sample of executive transitions are shown in Tables 1 and 2. Table 1 indicates that more women have been hired as executives recently, with 43.1% of women in our transition sample hired in the last three years (i.e., from 2001 to 2003) versus 37.6% of male executives. This increase over time could represent an increase in the supply of qualified women over this period or reductions in discriminatory attitudes. Women are also more highly represented in consumer industries, whereas men are more represented in manufacturing and other industries. Panel A of Table 2 shows that the average size of a firm that hires a female is approximately 50% greater than that of male firms the year before the transition. Because larger firms are more visible, the board and CEOs of those firms could have to be more careful not to discriminate in hiring and promotion decisions. Table 2 also shows that the percentage increase in asset growth is much smaller for firms with female executives and that female executives reduce market leverage after a transition, although the difference is small. Panel B of Table 2 indicates that female executives are on average younger (by an average of about three years). Female executives are also significantly more likely to be hired from within, whereas male executives are more likely to be hired externally. To the extent discrimination exists in the hiring of female executives, internal executives could be able to more effectively demonstrate their quality. The board of

directors is more likely to have a woman when a female executive is hired. For some of these demographic variables (for example, internal versus external hiring), we are unable to identify the particular characteristic for all firms in our sample. We, therefore, report many of main results using the full sample to maximize our sample, but our results are qualitatively similar on smaller samples using these variables as controls.

Table 3 shows results of multivariate tests predicting which types of firms are more likely to hire a female executive. Women are more likely to be hired at firms with high market-to-book ratios. Governance measures as well as other firm characteristics are not consistently significant predictors of hiring a woman in this multivariate setting. Consistent with the univariate results, we find that female executives are more likely to be hired from within and tend to be younger in age. In unreported results, we find that the lagged outcome variables such as asset growth and acquisitions are insignificant when included as additional controls in the multivariate regressions.

3.3. Managerial decision making

We begin our primary empirical investigation by conducting difference-in-differences tests to evaluate whether women make significantly different corporate financial decisions from men. The sample for these tests is firm years three

Table 2

Firm leverage, profitability, and size around executive transitions.

Panel A presents the mean statistics of leverage, profitability, and size of the sample firms around the year of transition (Year t). See Appendix B for the definition of the variables. Panel B reports board characteristics of male and female executive firms and executive characteristics. *Board Size* is the number of directors on the board. *Board Independence* is the fraction of independent outside directors on the board. *CEO/Chairman Duality* is an indicator variable that equals one if the titles of Chief Executive Officer (CEO) and chairman are vested in the same individual and zero otherwise. *Female Representation on Board* is the fraction of female directors on the board. *MBA* is an indicator variable that equals one if the executive has an MBA degree and zero otherwise. *Executive Age* is the age of the executive when hired as a CEO or Chief Financial Officer (CFO). *Hired from Inside* is an indicator variable that equals one if the executive is hired from inside the firm and zero otherwise. *Total Compensation* is the total amount of annual compensation the executive receives. *Cash Compensation* and *Stock and Option Compensation* are cash compensation (including salary and bonus) and stock and option compensation as a fraction of total compensation, respectively. The last two columns in Panel B report t -statistics and z -statistics for differences in means and medians, respectively, of each variable across male and female executive firms. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A: Firm leverage, profitability, and size around executive transitions.

Year	Book Leverage		Market Leverage		Return on Assets		Operating ROA		Size	
	Male-to-male	Male-to-female	Male-to-male	Male-to-female	Male-to-male	Male-to-female	Male-to-male	Male-to-female	Male-to-male	Male-to-female
$t-1$	42.13%	41.58%	30.23%	26.81%	14.28%	15.22%	14.27%	15.91%	6,229	9,177
t	43.35%	42.87%	31.21%	27.70%	13.63%	14.77%	14.30%	15.93%	6,810	9,674
$t+1$	42.97%	43.56%	30.38%	26.58%	13.64%	14.24%	13.98%	14.89%	7,145	10,135
$t+2$	43.30%	42.29%	30.06%	25.35%	13.27%	14.23%	13.64%	15.24%	7,828	10,743

Panel B: Board and executive characteristics, and executive compensation.

Variables	Male executive		Female executive		Test of difference	
	Mean	Median	Mean	Median	t -statistic	z -statistic
<i>Board Size</i>	9.02	9.00	8.33	9.00	1.46	1.13
<i>Board Independence</i> (percent)	54.50	63.64	55.27	66.67	0.27	0.55
<i>CEO/Chairman Duality</i> (percent)	82.29	100.00	81.03	100.00	0.34	0.34
<i>Female Representation on Board</i> (percent)	10.22	10.00	14.08	12.50	3.30***	3.16***
<i>MBA</i> (percent)	48.57	0.00	56.00	100.00	1.01	1.01
<i>Executive Age</i> (years)	47.21	47.00	44.12	44.00	4.69***	3.83***
<i>Hired from Inside</i> (percent)	43.19	0.00	64.29	100.00	3.51***	7.37***
<i>Total Compensation</i> (thousands of dollars)	3,490.23	1,855.22	2,237.24	1,319.15	2.74***	3.56***
<i>Cash Compensation</i> (percent)	46.60	44.01	49.71	49.32	1.17	1.19
<i>Stock and Option Compensation</i> (percent)	36.46	34.52	36.60	35.05	0.05	0.05

years before and three years after an executive transition, excluding the year of the transition. We require that the firm have at least two years of financial data before the executive transition. We limit the observations to only three years after the transition both to increase our sample size for female transitions and to mitigate serial correlation bias from difference-in-differences approaches (Bertrand, Duflo, and Mullainathan, 2004)⁸. Our main regressions are as follows:

$$Y_{i,t+1} = \mu + v_i + \tau_t + \beta_1 Post_{i,t+1} + \beta_2 Female_i \times Post_{i,t+1} + \theta X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t+1}$ is the decision variable of interest (e.g., acquisitions) measured at the end of year $t+1$, v_i are firm fixed effects, τ_t are year fixed effects, $Female_i$ is an indicator variable for whether firm i is a male-to-female transition firm, $Post_{i,t+1}$ is an indicator variable for whether year $t+1$ is after the executive transition, and $X_{i,t}$ is a set of control variables [profitability, size, market-to-book ratio, and property, plant, and equipment (PPE)] for firm i measured at the end of year t (including a *Female* dummy variable is unnecessary in this framework specifically because we

include firm fixed effects). Appendix B provides the definitions of the variables for our tests.

We conduct two other specifications for robustness. The first is a more traditional panel data regression with firm fixed effects with a female executive dummy variable. We prefer the difference-in-differences specification for identification, but one advantage of this specification is that firms that have a female-to-female executive transition or a male-to-female-to-male transition are included. To maintain one of the advantages of the difference-in-differences tests, we again require that the executive, to be included in the panel, be in power for at least two years after the transition year. The second alternate specification uses propensity score matching. The matching begins with a probit regression of a female dummy variable on profitability, size, market-to-book ratio, PPE, year, and industry dummies, all of which are lagged by one year, and a CEO indicator. We then use the propensity scores from this probit estimation and perform a nearest neighbor match with replacement to other firms. This procedure ensures that a female firm-year is paired with a male firm-year with statistically the same lagged profitability, size, market-to-book ratio, PPE, year, and industry membership, and the position of the executive (CEO versus CFO). We then run univariate regressions on the matched sample to examine the gender differences in corporate decisions.

⁸ In unreported tests, we also aggregate the pre- and post-variables into one observation each. In these tests, the results are weaker, but they are qualitatively unchanged.

Table 3

Probit regression of hiring a female executives.

This table presents regression analysis of the likelihood of hiring a female executive. The dependent variable is a binary variable that equals one if a transition firm hires a female executive (Chief Executive Officer or Chief Financial Officer) and zero otherwise. See Appendix B for the definition of the independent variables. In regressions with industry dummies (Columns 2–4), we exclude industry code 12 (Others) in Fama and French 12 industry classifications. Numbers in parentheses are *t*-statistics based on Huber-White standard errors clustered by industry. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	(1)	(2)	(3)	(4)
Profitability	0.048 (1.00)	0.030 (0.62)	-0.021 (0.40)	0.026 (0.27)
Log(Size)	0.004 (0.82)	0.006 (1.30)	0.007 (1.20)	-0.026*** (3.08)
Market-to-Book	0.002 (1.45)	0.002** (2.08)	0.002** (2.20)	0.005*** (3.64)
PPE	-0.002 (0.28)	-0.003 (0.52)	-0.002 (0.34)	0.020 (1.61)
Firm Age	-0.000 (0.31)	-0.000 (0.14)	-0.000 (0.27)	0.000 (0.35)
Board Independence			0.030 (0.77)	0.057 (1.05)
Board Size			-0.018 (1.56)	-0.017 (0.87)
CEO/Chairman Duality			-0.018 (1.37)	-0.047* (1.91)
MBA				0.017 (0.81)
Executive Age				-0.240*** (3.82)
Hired from Inside				0.047*** (3.73)
Consumer Non-durables	-0.008*** (3.67)	-0.012*** (4.14)	-0.088*** (5.80)	
Consumer Durables	-0.036*** (20.37)	-0.038*** (15.19)	0.070*** (6.40)	
Manufacturing	-0.020*** (5.99)	-0.022*** (6.22)	0.010 (1.04)	
Energy	-0.043*** (8.37)	-0.050*** (10.70)		
Chemicals	-0.031*** (11.74)	-0.030*** (11.54)	0.015** (2.34)	
Business Equipment	-0.033*** (8.19)	-0.039*** (7.66)	0.024 (1.33)	
Telecommunications	-0.015*** (4.41)	-0.034*** (6.97)	0.089*** (3.50)	
Utilities	-0.018 (1.64)	-0.022** (2.21)	0.030 (1.14)	
Shops	0.003** (2.30)	-0.003* (1.87)	0.051*** (6.44)	
Health Care	-0.031*** (10.20)	-0.035*** (7.05)	0.043*** (2.82)	
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,805	1,805	1,628	521
Pseudo R-squared	0.02	0.03	0.04	0.13

Results from these regressions are reported in Table 4. Panel A reports the results of our main difference-in-differences specification, Panel B reports the results using the full panel of firms, and Panel C reports the results using propensity score matching. The first two columns in Panels A and B and the first column in Panel C report results from tests with asset growth as the outcome variable. We use year-on-year percentage change in total assets to measure asset growth. The negative and significant coefficient on *Post × Female* indicates that female executives increase the

size of the firm at a significantly lower rate than men. The coefficient in Column 1 of Panel A can be interpreted to indicate roughly that the percentage growth in assets for a firm for the three years after a transition to a female executive is 2.5 percentage points lower than it is for a firm that transitions to another male executive. We report *t*-statistics based on Huber-White standard errors. The asset growth result is robust to the main difference-in-differences specification as well as the two alternate specifications⁹.

Columns 3 and 4 of Panels A and B and Column 2 of Panel C examine acquisitions specifically. These columns consistently show that women make fewer acquisitions than men. In separate calculations, we determine that this lower level of acquisitions accounts for roughly 20% of the lower asset growth reported in the first two columns. These results indicate that firms with female executives grow more slowly, both internally and through external acquisitions, and are consistent with male executives being more overconfident.

Columns 5–10 in Panels A and B and columns 3–5 in Panel C conduct similar tests for leverage, debt issuance, and equity issuance. These tests show some evidence that females are associated with lower leverage. The coefficient on the *Post × Female* variable is negative and statistically significant (at 5%) in three out of five specifications. For instance, Column 5 of Panel A shows that the average market leverage decreases by 2 percentage points in the three years after a male-to-female transition. For debt issuance, evidence shows that firms with female executives are less likely to issue debt. In Column 7 in Panel A, the coefficient on the *Post × Female* variable is negative and statistically significant (at 5%). The coefficient on the female dummy variable is also negative and significant (at 5%) in the panel regressions in Columns 7 and 8 of Panel B. For equity issuance decisions, the gender of executive does not seem to make a significant difference. Overall, the evidence of this subsection shows that women are less likely to make significant corporate decisions, consistent with male overconfidence.

3.4. Announcement returns for major corporate decisions

To evaluate the impact of the increased likelihood for acquisition and debt activity by firms with male executives, we examine the announcement returns associated with those transactions. If male overconfidence leads to transactions being undertaken that are negative net present value, we expect male executive firm transactions to have worse market reactions than those of female executive firms.

We examine announcement returns in the two years after the transition compared with two years before the transition (again excluding the transition year itself). This criterion yields 86 acquisitions in the pre-transition period and 58 in the post-transition period for male-to-female

⁹ We also conduct a falsification test conducting the same tests of Panel A, but defining year *t*–3 as a fictitious transition year instead. In those cases the estimates are insignificant for all of the outcome variables, which supports the identifying assumptions of our empirical strategy. Results from these tests are in the Internet Appendix on our website.

Table 4

Asset growth and capital structure decisions.

This table presents results on asset growth and capital structure decisions using three specifications. The dependent variables are the decision variables of interest, including asset growth, acquisitions, and capital structure decisions. Panel A reports difference-in-differences regression results from Eq. (1). Panel B reports the regression results using the full panel of firms. Panel C reports results from a propensity score matching approach. We first run a probit regression to pair each female-year observation with five male-year observations with statistically the same profitability, size, market-to-book ratio, plant, property, and equipment (PPE), year, industry membership, and an indicator for Chief Executive Officers. We then run a univariate regression of the decision variables of interest on the female dummy. See Appendix B for the definition of the independent variables. We winsorize all financial ratios at the 2.5% level to reduce the effect of outliers. Numbers in parentheses are *t*-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A: Difference-in-difference regressions.										
	Asset Growth		Acquisitions		Leverage		Debt Issuance		Equity Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Post</i> × <i>Female</i>	−0.025** (2.29)	−0.016* (1.69)	−0.050** (2.28)	−0.045* (1.91)	−0.018** (2.03)	−0.010 (1.55)	−0.335** (2.10)	−0.280* (1.88)	0.169* (1.84)	0.074 (0.74)
<i>Post</i>	−0.029*** (4.45)	−0.009 (1.42)	−0.031*** (2.81)	−0.005 (0.51)	−0.020*** (4.41)	−0.006** (2.25)	−0.124** (2.36)	0.000 (0.00)	0.037 (0.81)	0.007 (0.16)
<i>Profitability</i>	−0.126** (2.47)	0.619*** (7.49)	0.193** (2.24)	0.671*** (5.50)	−0.647*** (22.36)	−0.379*** (11.62)	−1.442*** (3.66)	0.961* (1.70)	−2.663*** (8.98)	−0.912** (2.02)
<i>Log(Size)</i>	−0.003 (0.69)	−0.030* (1.76)	0.161*** (17.48)	0.127*** (7.31)	−0.072*** (16.74)	0.000 (0.06)	0.792*** (21.37)	0.537*** (5.99)	0.995*** (26.76)	0.627*** (8.35)
<i>Market-to-Book</i>	0.058*** (14.59)	0.078*** (8.60)	−0.086*** (11.11)	−0.054*** (4.73)	−0.030*** (10.38)	−0.021*** (8.64)	−0.395*** (10.88)	−0.115** (2.04)	0.108*** (4.29)	0.116*** (3.16)
<i>PPE</i>	−0.021*** (5.59)	−0.137*** (6.95)	−0.198*** (22.21)	−0.243*** (11.34)	0.082*** (22.94)	0.037*** (7.09)	−0.050 (1.58)	0.072 (0.81)	−0.114*** (3.77)	−0.198*** (2.89)
<i>CapEx</i>	0.633*** (9.77)	0.725*** (5.06)	−0.347*** (3.83)	0.328** (2.43)	−0.577*** (11.22)	0.080* (1.66)	2.555*** (5.56)	2.692*** (3.77)	2.304*** (4.30)	−0.027 (0.04)
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	10,183	10,183	9,357	9,357	10,180	10,180	7,206	7,206	8,261	8,261
Adj. <i>R</i> -squared	0.15	0.33	0.17	0.33	0.41	0.80	0.25	0.48	0.39	0.57
Panel B: Panel regressions.										
	Asset Growth		Acquisitions		Leverage		Debt Issuance		Equity Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Female</i>	−0.032*** (3.09)	−0.014 (1.16)	−0.050** (2.24)	−0.043* (1.68)	−0.013 (1.53)	−0.013** (2.31)	−0.282** (2.00)	−0.282** (2.05)	0.097 (1.08)	0.018 (0.19)
<i>Profitability</i>	0.004 (0.08)	0.615*** (8.12)	0.293*** (3.07)	0.806*** (5.44)	−0.677*** (20.96)	−0.343*** (9.52)	−1.989*** (4.58)	2.014*** (2.95)	−1.548*** (4.77)	−0.154 (0.33)
<i>Log(Size)</i>	0.013*** (3.12)	−0.092*** (7.15)	0.187*** (17.84)	0.089*** (2.86)	−0.072*** (19.59)	−0.005 (0.71)	0.818*** (20.47)	0.392*** (3.44)	1.077*** (32.25)	0.620*** (7.84)
<i>Market-to-Book</i>	0.044*** (9.80)	0.110*** (13.44)	−0.100*** (9.95)	−0.028 (1.51)	−0.042*** (13.69)	−0.024*** (6.94)	−0.412*** (9.42)	−0.034 (0.44)	0.031 (1.13)	0.086* (1.95)
<i>PPE</i>	−0.023*** (6.34)	−0.122*** (9.19)	−0.211*** (21.02)	−0.303*** (8.79)	0.078*** (25.63)	0.036*** (5.36)	−0.076** (2.33)	0.183 (1.53)	−0.105*** (3.88)	−0.269*** (3.44)
<i>CapEx</i>	0.680*** (10.00)	0.811*** (7.55)	−0.302*** (3.11)	0.295* (1.77)	−0.511*** (10.17)	0.116** (2.13)	3.255*** (6.61)	3.900*** (4.86)	2.075*** (3.99)	0.152 (0.18)
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	9,094	9,094	8,418	8,418	9,079	9,079	6,449	6,449	7,486	7,486
Adj. <i>R</i> -squared	0.10	0.35	0.17	0.40	0.41	0.84	0.21	0.52	0.41	0.62
Panel C: Propensity score matching.										
	Asset Growth		Acquisitions		Leverage		Debt Issuance		Equity Issuance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Female</i>	−0.031*** (3.08)		−0.038* (1.75)		−0.019** (2.07)		−0.103 (0.89)		0.355*** (3.69)	
Constant	0.144*** (26.15)		0.239*** (20.61)		0.274*** (57.78)		5.152*** (102.69)		2.714*** (61.07)	
Number of observations	3,129		2,911		3,113		2,160		2,629	
Adj. <i>R</i> -squared	0.01		0.01		0.01		0.01		0.01	

transition firms (and approximately 1,300 acquisitions in the pre- and post-periods for male-to-male transitions as our control group). Because not every firm in our sample conducts a significant acquisition or debt offering both before and after a transition, we modify the specification of Eq. (1) by including a male-to-female fixed effect instead of individual firm fixed effects (as well as including a different set of controls based on previous literature examining similar announcement returns). Using firm fixed effects would require all variation to occur within the same firm, which significantly reduces the relevant sample because only a small percentage of firms have acquisitions or debt offerings both before and after the transition. The broader male-to-female fixed effect instead eliminates any time invariant effect within male-to-female transition firms:

$$CAR_{i,t} = \mu + \tau_t + \beta_0 Female_i + \beta_1 Post_{i,t} + \beta_2 Female_i \times Post_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where $CAR_{i,t}$ is the cumulative abnormal announcement return for an acquisition measured either as a raw return or market-adjusted return; τ_t is year fixed effects; $Female_i$ is an indicator variable for whether firm i is a male-to-female transition firm; $Post_{i,t}$ is an indicator variable for whether year t is after the executive transition; and $X_{i,t}$ is a set of control variables for firm i measured at the start of year t (including size, market-to-book ratio, a dummy for if the deal was hostile, a dummy for a stock deal, and so on). We exclude the year of the transition again to separate this year from our main inference.

Table 5 presents results from a difference-in-differences test for acquisition announcement returns with control variables. The results are economically and statistically significant. Women have about 2% higher announcement returns compared with male executives, and the result is reliably statistically significant. This return difference is at least as large as the overall negative returns found for stock-financed acquisitions as a whole (see, e.g., Andrade, Mitchell, and Stafford, 2001). These results indicate that the market views acquisitions made by firms with female executives to be more value increasing on average than those made by male executives¹⁰.

We also examine announcement returns around debt offerings (and seasoned equity offerings for completeness). Difference-in-differences results are presented in Table 5. These tests indicate that debt offerings are better received if the firm has a female executive than if it has a male executive. The economic magnitudes of the differences are also large (approximately 3.7% in the market-adjusted tests). The results are also statistically significant. Generally,

the market interprets major decisions, whether they are acquisitions or significant capital market decisions, made by firms with female executives more favorably than men. This evidence is consistent with male overconfidence, because overconfidence leads firms to pursue transactions that have on average lower net present values¹¹.

3.5. Instrumental variable approach

While our main identification strategy of difference-in-differences around executive transitions largely excludes alternate explanations for our main results, we use an instrumental variable approach to rule out any lingering concerns, as discussed in detail in Section 3.1. The instrument we use for a firm having a female executive is based on a previous study that calibrates a state's level of gender status equality (Sugarman and Straus, 1988). We conjecture that the more friendly a state is to women's equality generally, the more likely a firm located in that state is to have a female executive. We assign the state-level gender status equality value to each firm based on the firm's headquarters location, with higher values indicating more favorable gender equality.

Specifically, we estimate the following 2SLS model:

$$\text{First stage: } Female_i = \phi + \tau_t + \gamma Gender\ Equality_i + \theta X_{i,t} + \eta_{i,t} \quad (3)$$

and

$$\text{Second stage: } Y_{i,t} = \alpha + \tau_t + \beta Instrumented\ Female_i + \theta X_{i,t} + \varepsilon_{i,t}, \quad (4)$$

where $Y_{i,t}$ is either acquisitions or the announcement return for acquisitions of firm i ; $Female_i$ is a dummy variable that equals one if the firm has a female CEO or female CFO; $Instrumented\ Female_i$ is the fitted value of the female indicator from the first-stage regression; $Gender\ Equality_i$ is the state-level gender equality index proposed by Sugarman and Straus (1988); and $X_{i,t}$ is a set of control variables. Columns 1 and 3 of Table 6 report the results from the first-stage ordinary least squares (OLS) regressions with the female dummy as the dependent variable. The coefficients on our instrumental variable in the first stage are significant at 1%, suggesting a strong relation between state-level gender equality and having a female executive. The F -statistic from the first-stage regression ranges from 8.2 to 8.4. Because it does not meet the rule of thumb threshold of 10 implied by Stock and Yogo (2005), we caution that we cannot rule out weak instrument issues entirely. Columns 2 and 4 of Table 6 report the results for the second-stage regressions with acquisition and acquisition announcement returns as the dependent variables. Importantly, the results that females make less acquisitions and that they have better acquisition announcement returns remain robust¹².

¹⁰ We conduct other unreported tests that directly or indirectly measure the impact of the decisions on shareholder value. We examine the long-term stock performance and operating performance, and in both cases, the coefficients for a female executive are positive, but not statistically significant. Because we measure long-run stock performance after the initial announcement return, that test indicates that the market appropriately adjusts in the initial announcement return, and this initial positive reaction does not reverse in the long run. We also examine the announcement returns when a female executive is first hired. Once again, the coefficient is positive, but not statistically significant. Results of these tests and unreported robustness tests are provided on our website.

¹¹ In unreported tests, we use weighted least squares (WLS) to run the regressions, weighting by the size of the transaction. The results are qualitatively similar to our ordinary least squares results.

¹² These results are similar in reduced form, including the gender equality measure directly in regressions explaining acquisition decisions and announcement returns. We also conduct this alternate

Table 5

Announcement returns for acquisitions, debt issuance, and equity issuance.

This table presents regression results from Eq. (2). The dependent variable is the three-day cumulative abnormal announcement return (CAR) around announcements of acquisitions, equity issuance, and debt issuance. We consider four years surrounding the year of the executive transition, i.e., two years before the transition and two years after. *Toehold* is a dummy that equals one if the acquirer holds a minority interest position (less than 50%) in the target's stock before the announcement. *Stock Deal* is a dummy variable that equals one if the fraction of equity value as a payment method in the deal exceeds 50%. *Public Target* a dummy variable that equals one if the target is a publicly listed firm. *Diversifying* is a dummy variable that equals one if the acquirer and the target are not from the same Standard Industrial Classification industry. *Hostile*, *Contested*, *Tender*, and *Merger of Equals* are dummy variables that equal one if the takeover is unsolicited or unfriendly, has multiple bidders, is a tender offer, and is classified as merger of equals by Securities Data Company, respectively. *Return Volatility* is the standard deviation of daily stock return during the trading period (−90, −11) prior to the announcement date (trading day 0). *Share Turnover* is the ratio of average daily share trading volume during the trading period (−90, −11) prior to the announcement date (trading day 0) divided by pre-issuance total shares outstanding. See Appendix B for the definition of other variables. Numbers in parentheses are *t*-statistics based on Huber-White standard errors clustered by industry. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Acquisition CARs		Debt Issuance CARs		Equity Issuance CARs	
	Raw	Market-adjusted	Raw	Market-adjusted	Raw	Market-adjusted
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Post*Female</i>	2.114** (2.61)	1.858** (2.22)	5.447** (2.19)	3.693* (1.95)	−0.377 (0.27)	0.415 (0.32)
<i>Post</i>	−0.120 (0.27)	−0.140 (0.34)	−0.596 (0.41)	−0.323 (0.30)	0.243 (0.50)	0.054 (0.11)
<i>Female</i>	0.572 (1.17)	0.426 (0.85)	−0.361 (0.26)	−1.232 (1.12)	0.550 (0.45)	0.754 (0.70)
<i>Log(Size)</i>	−0.324** (2.24)	−0.340*** (2.68)	−1.710 (1.03)	−0.511 (0.45)	0.973 (0.35)	0.579 (0.22)
<i>Market-to-Book</i>	0.078** (2.18)	0.058* (1.73)	0.053 (0.05)	−0.362 (0.46)	0.201** (2.25)	0.196** (2.28)
<i>Cash Flow</i>	0.314 (0.24)	0.655 (0.68)	0.631 (0.03)	13.082 (0.93)	−25.851** (2.47)	−21.371** (2.33)
<i>Sales Growth</i>	−0.145 (0.78)	−0.116 (0.60)	0.002 (0.00)	−0.274 (0.16)	−0.134 (0.67)	−0.152 (0.93)
<i>Hostile</i>	−1.034 (0.69)	−0.826 (0.54)				
<i>Toehold</i>	−1.856 (0.76)	−2.335 (1.03)				
<i>Stock Deal</i>	0.029 (0.04)	0.050 (0.07)				
<i>Public Target</i>	−1.981*** (4.51)	−2.467*** (5.79)				
<i>Diversifying</i>	−0.107 (0.25)	−0.148 (0.34)				
<i>Contested</i>	0.653 (0.50)	0.370 (0.31)				
<i>Tender</i>	1.986** (2.46)	2.279*** (3.74)				
<i>Merger of Equals</i>	1.842 (1.44)	1.517 (1.22)				
<i>Profitability</i>			−0.207 (0.64)	−0.298 (1.33)	9.061 (1.11)	9.479 (1.31)
<i>PPE</i>			1.334 (1.00)	0.063 (0.07)	0.252 (0.94)	0.320 (1.23)
<i>Return Volatility</i>			19.369 (0.10)	82.802 (0.56)	−16.969 (0.51)	−24.578 (0.79)
<i>Share Turnover</i>			2.360 (1.22)	1.097 (0.66)	−1.504** (2.14)	−1.473** (2.20)
<i>Log(Net Proceeds)</i>			0.361 (0.77)	−0.024 (0.07)	−0.138 (0.49)	−0.046 (0.16)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,783	2,783	111	111	592	592
Adj. R-squared	0.02	0.03	0.23	0.34	0.13	0.10

(footnote continued)

specification for other tests of the paper, the results of which are not reported due to space concerns. Most of the other results of the paper are robust to using this alternate empirical design, with the exception of the debt issuance CAR result. Although the IV results are

(footnote continued)

not robust for debt issuance CARs, this is due to a lack of significance of the instrument in the first stage on what is a significantly reduced sample in this test (only 111 public debt issuance observations during the sample period).

Table 6

Acquisitions and acquisition announcement returns: instrumental variable approach.

This table presents the two-stage least squares regression results from Eq. (3). Columns 1 and 3 report the results from the first-stage ordinary least squares regressions with the female dummy as the dependent variable. *F*-statistics and Wald test statistics from the first-stage regressions are reported at the bottom of the table. Columns 2 and 4 report the results for the second-stage regressions with acquisition and acquisition announcement returns as the dependent variables. *Instrumented Female* is the fitted value of the female indicator from the first-stage regression. *Gender Equality_i* is the state-level gender equality index proposed by Sugarman and Straus (1988). See Appendix B for the definition of other variables. Numbers in parentheses are *t*-statistics based on Huber-White standard errors. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Acquisitions		Acquisition CARs (percent)	
	First stage	Second stage	First stage	Second stage
	(1)	(2)	(3)	(4)
<i>Instrumented Female</i>		−3.178** (2.35)		24.541** (2.39)
<i>Profitability</i>	0.041 (1.46)	0.431*** (3.33)	0.017 (0.26)	3.432* (1.76)
<i>Log(Size)</i>	0.006** (2.47)	0.206*** (13.83)	0.006 (1.02)	−0.166 (0.85)
<i>Market-to-Book</i>	−0.001 (0.40)	−0.101*** (8.79)	−0.007 (1.31)	0.053 (0.30)
<i>PPE</i>	−0.002 (1.01)	−0.220*** (19.62)	0.000 (0.07)	0.033 (0.22)
<i>Hostile</i>			−0.016 (0.33)	−0.083 (0.06)
<i>Toehold</i>			−0.003 (0.14)	−1.979*** (2.79)
<i>Stock Deal</i>			−0.033*** (2.72)	−0.265 (0.53)
<i>Public Target</i>			0.009 (0.87)	−2.282*** (7.12)
<i>Diversifying</i>			−0.012 (1.45)	0.245 (0.89)
<i>Contested</i>			0.003 (0.10)	0.755 (0.94)
<i>Tender Offer</i>			0.033* (1.75)	0.305 (0.48)
<i>Merger of Equals</i>			−0.028 (0.50)	2.225 (1.31)
<i>Gender Equality</i>	0.001*** (2.90)		0.002*** (2.86)	
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	14,786	14,786	2,898	2,898
<i>F</i> -statistic	8.42***		8.17***	
[<i>p</i> -value]	[0.00]		[0.00]	
Wald test (χ^2) statistic	15.34***		5.72**	
[<i>p</i> -value]	[0.00]		[0.01]	

4. Additional tests of male executive overconfidence

To this point, we have shown that female executives undertake fewer significant financial actions and that the market reacts more favorably to major decisions made by firms with female executives. While these results are

consistent with male overconfidence, they are also potentially consistent with other explanations. In this section we conduct additional tests to pinpoint male overconfidence relative to other explanations. We employ four sets of tests to distinguish between hypotheses for the differences in behavior we have identified: earnings forecasts, career outcomes, stock purchase and stock option exercise, and value-destroying acquisitions.

4.1. Earnings forecasts

We examine earnings forecasts to distinguish between male overconfidence and other explanations for the evidence we have provided so far. We obtain all point and range management forecasts of annual and quarterly earnings per share (EPS) made by our sample of executives in the two years before the transition and the two years after the transition from the First Call Company Issued Guidelines database. This procedure results in a sample of 7,285 forecasts. Using this data, we evaluate whether male executives provide narrower earnings estimate ranges compared with female executives.

We define management forecast spreads as the difference between the lower bound and the upper bound of the forecast range divided by the midpoint of the forecast range. In the case of point forecasts, the forecast spread is zero (excluding point forecasts from the sample does not change the results). Table 7 presents difference-in-differences tests on management forecasts of EPS. This test indicates that firms with female executives are more likely to give a wider forecast range than those with male executives. The first row shows that the forecast spread is 11.3% for the two years after a female executive takes over, compared with 3.5% for the two years prior to the female executive taking over. When the difference-in-differences is taken, we find that female executives make EPS forecasts that are 6.3% wider than male executives, and this result is significant at 1%. These results provide direct support that male executives are overconfident relative to women. In unreported tests, we do

Table 7

Earnings forecasts.

This table presents univariate difference-in-differences results on the spread of management earnings per share forecasts. We consider four years surrounding the year of the executive transition, i.e., two years before the transition and two years after. The spread of management EPS forecasts is defined as the difference between the lower bound and the upper bound of the forecast range divided by the midpoint of the forecast range. In the case of point forecasts, the forecast spread is zero. Numbers in parentheses are *t*-statistics, and numbers in square brackets are the numbers of observations for each subsample. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Before	After	Difference (after–before)
Male-to-female	0.035 (5.15) [149]	0.113 (5.77) [350]	0.078*** (3.74)
Male-to-male	0.034 (20.61) [1,844]	0.049 (42.48) [4,942]	0.014*** (7.05)
Difference (female–male)	0.001 (0.11)	0.064*** (3.27)	0.063*** (5.61)

Table 8

Career outcomes and stock option exercises.

This table reports results on career outcomes of executives and their option exercising and stock purchasing behaviors. Panel A reports the probability of an executive to remain in the position for at least three years. Panel B reports the proportion of executives that exhibit certain option exercising and stock purchasing behaviors. We use the measures proposed by Malmendier and Tate (2005). In particular, a Holder 67 is an executive who doesn't exercise his options in the first five years after vesting although the options are 67% in the money at some point during the five years, a Long Holder holds an option until the last year of its duration, and a Net Buyer is a net buyer of his company's stock during the first three years of his tenure. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

<i>Panel A: Employment outcomes.</i>				
	Male	Female	Difference	t-statistic
Prob(Staying for at least four years as a Chief Executive Officer)	54.83%	63.89%	−9.06%	1.09
Prob(Staying for at least four years as a Chief Financial Officer)	44.16%	51.12%	−6.96%	2.02**
<i>Panel B: Option exercising and stock trading behavior.</i>				
	Male	Female	Difference	t-statistic
Holder 67	31.29%	18.18%	13.11%	2.04**
Long Holder	33.21%	19.61%	13.60%	2.01**
Net Buyer	38.90%	31.37%	7.52%	1.07

not find statistically significant differences in accuracy (defined as the absolute difference between the actual EPS and the midpoint of the forecast range, scaled by the actual EPS, and the probability of the outcome falling within the range) however.

4.2. Career outcomes

If men undertake more negative NPV investments (e.g., acquisitions) due to overconfidence, they should be more likely to be removed from their position as executive, so we can distinguish the overconfidence interpretation from other explanations by examining career outcomes. For example, if women avoid positive NPV transactions due to risk aversion, they should be more likely to be removed from their position, not men. We examine the likelihood that an executive remains in her position for four years after the date she is hired. Here the implicit assumption is that if an executive leaves her position within four years of being hired, this is likely a negative outcome (positive outcomes, in the form of a promotion, for example, would generally require more time at the position). Panel A of Table 8 reports the results of this test on the CEO and CFO samples separately. The table shows that both female CEOs and CFOs are more likely to remain in their position for at least four years after being hired than a male CFO. A female CFO is approximately 7.0% more likely to remain as executive compared with a male CFO, and the difference is statistically significant at 5%. Although the magnitude of the difference for male and female CEOs is also large (about 9.1%), the difference is not statistically significant¹³. The results indicate that female executives have better

career outcomes on average than male executives, consistent with a negative net loss to shareholders from male executives being overconfident.

4.3. Stock purchases and stock option exercise

Malmendier and Tate (2005) construct three measures of overconfidence derived from an executive's stock purchase and stock option exercise decisions. In Panel B of Table 8, we reconstruct those three measures for the male and female executives in our sample. Holder 67 indicates whether an executive holds company stock options that are 67% in the money. Long Holder indicates that an executive hold options all the way until expiration. Net Buyer indicates that an executive buys shares in company stock despite already high exposure to company risk. Malmendier and Tate (2005) argue that overconfident executives have higher values or likelihoods in all cases. We find that, for all three measures, men have higher values. Men are more likely to hold stock options that are deep in the money, more likely to hold options until expiration, and more likely to buy stock in the company. Two of these three differences are statistically significantly different at 5%¹⁴. These tests provide additional evidence consistent with male executives being more overconfident.

4.4. Value destruction in acquisitions

In the context of acquisitions, male overconfidence implies not only that announcement returns for acquisitions will be lower for male executive firms than for

¹³ We also use the algorithm proposed by Parrino (1997) that more carefully identifies the rationale for the departure of executives. This leads to a significantly reduced sample for us, because not all turnovers can be classified in this manner. Specifically, we are able to identify the rationale for the turnover of females in only 26 out of 130 cases. This

(footnote continued)

significantly reduces our power, so any tests using this smaller sample lead to insignificant results.

¹⁴ We report only the univariate results because of space constraints. Results do not change with controls.

female executive firms, but also that male executive firms will undertake a higher percentage of value-destroying acquisitions. No such implication is indicated for other potential explanations for the results of this paper, such as female risk aversion (a risk averse manager will avoid otherwise positive NPV transactions, but is not more or less likely to undertake a value destroying acquisitions). We test this formally in Table 9 (we focus in this subsection only on acquisitions given the robustness of the overall results on this dimension throughout the paper).

Panel A of Table 9 reports a difference-in-differences test for the full sample of acquisitions. Among male-to-female transition firms, over half of acquisitions were value destroying (with negative announcement returns) when the firm had a male executive. After a female executive takes over, only about one-third of acquisitions are value destroying. Among male-to-male transition firms, the likelihood for value destroying acquisitions is similar before and after a transition. Because acquisitions financed with equity generally have worse announcement returns than those financed with cash, we conduct the same test but with acquisitions funded by cash only. For this sample, the results are similar, indicating that the

results for the full sample are not driven by the financing source for the acquisitions. These tests show that men are more likely to conduct value destroying acquisitions, consistent with male overconfidence¹⁵.

While no single test can rule out all potential competing behavioral explanations, the male overconfidence explanation appears most consistent with the weight of the evidence presented in this subsection and the rest of the paper. Several of the tests also suggest that decisions made by men are to the detriment of shareholders. Male executives are more likely to execute value-destroying acquisitions, and male executives are more likely to be removed from their position as executive.

5. Conclusion

Women make different corporate financial and investment decisions than men. Firms with female executives are less likely to make acquisitions and are less likely to issue debt than firms with male executives. Investors also react more favorably to significant corporate financial decisions made by firms with female executives. Announcement returns are higher around acquisitions and debt offerings when the firm has a female executive compared with when the firm has a male executive. This empirical evidence is consistent with men being overconfident relative to women. We confirm that men are overconfident by showing that men provide narrower earnings forecasts and are less likely to exercise options early. Further, we show that firms with male executives are more likely to execute value destroying acquisitions, and male executives are more likely to be removed from their position as executive. While other explanations, such as female risk aversion, are also consistent with some of the results of the paper, we conclude that overconfidence in male executives is most consistent with the breadth of the evidence. Regardless of the interpretation, the empirical evidence reveals significant differences between firms with male executives versus those with female executives, implying that models of capital structure and acquisitions that focus on firm characteristics alone miss this important factor for explaining differences in firm behavior.

Because our evidence suggests that firms with female executives make decisions that are better for shareholders, the small representation of women in the executive ranks is perhaps surprising. One explanation is that since we examine only a subset of corporate decisions made by

Table 9

Value-destroying acquisitions.

This table presents results on the probability of value-destroying acquisitions (i.e., acquisitions with negative abnormal returns around announcement). We consider four years surrounding the year of the executive transition, i.e., two years before the transition and two years after. Panels A and B report the univariate difference-in-differences result for all acquisitions and the subsample of cash offers, respectively. Numbers in parentheses are *t*-statistics, and numbers in square brackets are the numbers of observations for each subsample. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A: All acquisitions.			
	Before	After	Difference (after–before)
Male-to-female	50.00%*** (9.22) [86]	29.31% (4.86)*** [58]	–20.69%** (2.51)
Male-to-male	50.51%*** (37.59) [1,386]	49.59%*** (36.53) [1,357]	–0.91% (0.48)
Difference (female–male)	–0.51% (0.09)	–20.28%*** (3.03)	–19.78%** (2.27)
Panel B: Cash offers.			
	Before	After	Difference (after–before)
Male-to-female	46.15%*** (6.61) [52]	26.09%*** (3.99) [46]	–20.07%** (2.08)
Male-to-male	47.58%*** (27.71) [847]	46.85%*** (28.95) [952]	–0.73% (0.31)
Difference (female–male)	–1.43% (0.20)	–20.76%*** (2.77)	–19.34%* (1.87)

¹⁵ One might reasonably be concerned that firms with male executives could be making riskier acquisitions generally, which leads to both a greater probability of a value destroying acquisition, and a greater probability of a significantly value-increasing acquisition. We examine this directly in two ways. First, we conduct a probit examining the likelihood of a firm with a male executive conducting an acquisition with announcement returns 1 standard deviation above the mean and 1 standard deviation below, compared to firms with female executives. Male executives are only significantly more likely to conduct an acquisition with announcement returns 1 standard deviation below the mean. Second, we model the variance of the residual announcement returns in a model of multiplicative heteroskedasticity. In that model as well, we do not find any evidence that female-led acquisitions are less risky in general.

Table A1

Company name	Executive name	Position	Start	Tenure	Predecessor name	Industry classification
AGL Resources Inc.	Paula G. Rospot	CEO	2000	6	Walter M. Higgins	Utilities
Alaska Communications Systems	Liane Pelletier	CEO	2003	3	Charles E. Robinson	Communication
Albertson's Inc.	Felicia D. Thornton	CFO	2001	5	A. Craig Olson	Retail
Alpharma Inc.	Ingrid Wiik	CEO	1999	7	Einar W. Sissner	Pharmaceutical products
American Electric Power	Susan Tomasky	CFO	2001	5	Henry W. Fayne	Utilities
American Water Works Inc.	Ellen C. Wolf	CFO	1999	4	J. James Barr	Utilities
Amgen Inc.	Kathryn E. Falberg	CFO	1998	3	Robert S. Attiye	Pharmaceutical products
Applied Materials Inc.	Nancy H. Handel	CFO	2002	4	Joseph R. Bronson	Machinery
Atlantic Richfield Co.	Marie L. Knowles	CFO	1996	5	Ronald J. Arnault	Petroleum and natural gas
Automatic Data Processing	Karen E. Dykstra	CFO	2001	5	Richard J. Haviland	Business services
Avon Products	Andrea Jung	CEO	1999	7	Charles R. Perrin	Consumer goods
Axcelis Technologies Inc.	Mary G. Puma	CEO	2001	5	Brian R. Bachman	Machinery
Banta Corp.	Stephanie A. Streeter	CEO	2002	4	Donald D. Belcher	Business services
Barnes & Noble Inc.	Irene R. Miller	CFO	1994	4	Mitchell Clipper	Retail
Belo Corp.	Dunia A. Shive	CFO	1998	4	Michael D. Perry	Printing and publishing
Benchmark Electronics Inc.	Gayla J. Delly	CFO	2001	5	Cary T. Fu	Electronic equipment
Bio-Rad Laboratories Inc.	Christine A. Tsingos	CFO	2002	4	Norman Schwartz	Measuring and control equipment
Brown-Forman Corp.	Phoebe A. Wood	CFO	2000	6	Steven B. Ratoff	Beer and liquor
Brunswick Corp.	Victoria J. Reich	CFO	1999	4	Peter B. Hamilton	Shipbuilding, railroad equipment
Carlisle Companies Inc.	Carol P. Lowe	CFO	2002	4	Kirk F. Vincent	
CDW Corp.	Barbara A. Klein	CFO	2001	5	Harry J. Harczak Jr.	Retail
Central Vermont Public Service	Jean H. Gibson	CFO	2002	4	Francis J. Boyle	Utilities
Champion Enterprises Inc.	Phyllis A. Knight	CFO	2002	4	Anthony S. Cleberg	Construction materials
Charming Shoppes Inc.	Dorrit J. Bern	CEO	1995	11	David V. Wachs	Retail
Claire's Stores Inc.	Marla L. Schaefer	CEO	2002	4	Rowland Schaefer	Retail
Cleco Corp.	Dilek Samil	CFO	2001	4	Thomas J. Howlin	Utilities
Cleveland-Cliffs Inc.	Cynthia B. Bezik	CFO	1997	7	John S. Brinzo	Mining
Clorox Co.	Karen M. Rose	CFO	1998	6	William F. Ausfahl	Consumer goods
Coherent Inc.	Helene Simonet	CFO	2002	4	Robert J. Quillinan	Measuring and control equipment
Compuware Corp.	Laura L. Fournier	CFO	1997	9	Ralph A. Caponigro	Business services
Consolidated Edison Inc.	Joan S. Freilich	CFO	1997	8	Raymond J. McCann	Utilities
Constellation Energy Group Inc.	E. Follin Smith	CFO	2001	5	David A. Brune	Utilities
Corn Products International Inc.	Cheryl K. Beebe	CFO	2003	3	James W. Ripley	Food products
Cree Inc.	Cynthia B. Merrell	CFO	2001	8	Alan J. Robertson	Electronic equipment
Cummins Inc.	Jean S. Blackwell	CFO	2002	4	Tom Linebarger	Machinery
Cymer Inc.	Nancy J. Baker	CFO	2002	4	William A. Angus III	Machinery
Darden Restaurants Inc.	Linda J. Dimopoulos	CFO	2002	4	Clarence Otis	Restaurants, hotels, motels
Delta Air Lines Inc.	M. Michele Burns	CFO	2000	4	Edward H. West	Transportation
DirecTV Group Inc.	Roxanne S. Austin	CFO	1997	4	Charles Noski	Communication
Donnelley (R R) & Sons Co.	Cheryl A. Francis	CFO	1995	5	Frank R. Jarc	Business services
DPL Inc.	Elizabeth M. McCarthy	CFO	2000	4	James P. Torgerson	Utilities
Dun & Bradstreet Corp.	Sara Mathew	CFO	2001	5	Chester J. Geveda Jr.	Business services
Federal Signal Corp.	Stephanie K. Kushner	CFO	2002	4	Henry L. Dykema	Automobiles and trucks
First Data Corp.	Kimberly S. Patmore	CFO	1999	7	Lee Adrean	Business services
Flowserve Corp.	Renee J. Hornbaker	CFO	1997	8	Bruce E. Hines	Machinery
Freeport-McMoran Copper and Gold	Kathleen L. Quirk	CFO	2003	3	Stephen M. Jones	Mining
Gannett Co.	Gracia C. Martore	CFO	2002	4	Larry F. Miller	Printing and publishing
Gap Inc.	Heidi Kunz	CFO	1999	3	Warren R. Hashagen	Retail
Gartner Inc.	Regina M. Paolillo	CFO	1999	4	John F. Halligan	Business services
GenCorp Inc.	Yasmin R. Seyal	CFO	2001	5	Terry L. Hall	Defense
General Electric Co.	Keith S. Sherin	CFO	1998	8	Dennis D. Dammerman	
Getty Images Inc.	Elizabeth J. Huebner	CFO	2000	6	Christopher J. Roling	Business services
Graybar Electric Co. Inc.	Juanita H. Hinshaw	CFO	2000	5	Carl L. Hall	Wholesale
Great Plains Energy Inc.	Andrea F. Bielsker	CFO	1996	10	John DeStefano	Utilities
Hewlett-Packard Co.	Carleton S. Fiorina	CEO	1999	6	Lewis E. Platt	Computers
Home Depot Inc.	Carol B. Tome	CFO	2001	5	Dennis J. Carey	Retail
Houghton Mifflin Co.	Gail Deegan	CFO	1995	6	Stephen O. Jaeger	Printing and publishing
IMS Health Inc.	Nancy E. Cooper	CFO	2001	5	James C. Malone	Business services
Ingles Markets Inc.	Brenda S. Tudor	CFO	1998	7	Jack R. Ferguson	Retail
International Game Technology	Maureen T. Mullarkey	CFO	1998	8	David P. Hanlon	
International Paper Co.	Marianne M. Parrs	CFO	1995	6	Robert C. Butler	Business supplies
International Speedway Corp.	Susan G. Schandel	CFO	1999	7	H. Lee Combs	Entertainment
ITT Corp.	Heidi Kunz	CFO	1995	4	Robert A. Bowman	Electronic equipment
Lee Enterprises Inc.	Mary E. Junck	CEO	2001	5	Richard D. Gottlieb	Printing and publishing
Lennox International Inc.	Susan K. Carter	CFO	2003	3	Richard A. Smith	Machinery
Limited Brands Inc.	V. Ann Hailey	CFO	1997	9	Kenneth B. Gilman	Retail

Table A1 (continued)

Company name	Executive name	Position	Start	Tenure	Predecessor name	Industry classification
Lucent Technologies Inc.	Patricia F. Russo	CEO	2002	4	Henry B. Schacht	Computers
Macy's Inc.	Karen M. Hogue	CFO	1995	11	Ronald W. Tysse	Retail
Mastec Inc.	Carmen M. Sabater	CFO	1998	4	Edwin D. Johnson	Construction
Mattel Inc.	Francesca Luzuriaga	CFO	1994	3	Michael G. McCafferty	Toys recreation
Medimmune Inc.	Lota S. Zoth	CFO	2003	3	Gregory S. Patrick	Pharmaceutical products
Miller (Herman) Inc.	Elizabeth A. Nickels	CFO	1999	6	Brian C. Walker	Business supplies
Millipore Corp.	Kathleen B. Allen	CFO	1999	7	Francis J. Lunger	Measuring and control equipment
New York Times Co.	Diane P. Baker	CFO	1995	3	David L. Gorham	Printing and publishing
Nicor Inc.	Kathleen L. Halloran	CFO	1999	4	David L. Cyranoski	Utilities
NL Industries	Susan E. Alderton	CFO	1997	4	Joseph S. Compofelice	Machinery
Oakwood Homes Corp.	Suzanne H. Wood	CFO	2000	3	Robert A. Smith	Construction materials
OMI Corp.	Kathleen C. Haines	CFO	2000	6	Vincent J. de Sostoa	Transportation
Owens & Minor Inc.	Ann Greer Rector	CFO	1996	3	Glenn J. Dozier	Wholesale
Pathmark Stores Inc.	Eileen R. Scott	CEO	2002	3	James Donald	Retail
PepsiCo Inc.	Indra K. Nooyi	CFO	2002	4	Matthew M. McKenna	Beer and liquor
Pharmaceutical Product Development Inc.	Linda Baddour	CFO	2002	4	Philippe M. Maitre	Business services
Plum Creek Timber Co. Inc.	Diane M. Irvine	CFO	1995	4	Rick R. Holley	Construction materials
Portland General Electric Co.	Peggy Y. Fowler	CEO	2000	6	Ken L. Harrison	Utilities
Range Resources Corp.	Eddie M. LeBlanc III	CFO	1999	4	Thomas W. Stoelk	Petroleum and natural gas
Reliance Steel & Aluminum Co.	Karla R. McDowell	CFO	1998	8	Steven S. Weis	Wholesale
Reynolds American Inc.	Dianne M. Neal	CFO	2001	5	Kenneth J. Lapiejko	Tobacco products
Rite Aid Corp.	Mary F. Sammons	CEO	2003	3	Robert G. Miller	Retail
Ruby Tuesday Inc.	Marguerite N. Duffy	CFO	2001	4	J. Russell Mothershed	Restaurants, hotels, motels
Ryder System Inc.	Tracy A. Leinbach	CFO	2003	3	Corliss J. Nelson	Personal services
Sara Lee Corp.	Judith A. Sprieser	CFO	1995	5	Michael E. Murphy	Food products
Smith International Inc.	Margaret K. Dorman	CFO	1999	7	John J. Kennedy	Chemicals
Sotheby's	Diana D. Brooks	CEO	1994	5	Michael L. Ainslie	Business services
Spherion Corp.	Cinda A. Hallman	CEO	2001	3	Raymond Marcy	Business services
Steris Corp.	Laurie Brlas	CFO	1999	7	Mark L. Fagerholm	Medical equipment
Sunoco Logistics Partners L P	Deborah M. Fretz	CEO	2001	5	John G. Drosdick	Transportation
Supervalu Inc.	Pamela K. Knous	CFO	1997	9	Jeffrey C. Girard	Retail
Telephone & Data Systems Inc.	Sandra L. Helton	CFO	1998	7	Murray L. Swanson	Communication
TeleTech Holdings Inc.	Margot O'Dell	CFO	2000	3	Michael E. Foss	Business services
Tellabs Inc.	Joan E. Ryan	CFO	2000	3	Peter A. Guglielmi	Electronic equipment
Unisys Corp.	Janet B. Haugen	CFO	1999	7	Robert H. Brust	Computers
United States Steel Corp.	Gretchen R. Haggerty	CFO	2002	4	John P. Surma	Steel works, etc.
USEC Inc.	Ellen C. Wolf	CFO	2003	3	Henry Z. Shelton Jr.	Chemicals
Varian Medical Systems Inc.	Elisha W. Finney	CFO	1999	7	Robert A. Lemos	Medical equipment
Verizon Communications Inc.	Doreen A. Toben	CFO	2002	4	Frederic V. Salerno	Communication
Vons Companies Inc.	Pamela K. Knous	CFO	1994	3	Michael F. Henn	Retail
Watsco Inc.	Ana M. Menendez	CFO	2003	3	Barry S. Logan	Wholesale
Weatherford International Ltd.	Lisa W. Rodriguez	CFO	2000	6	Curtis W. Huff	Machinery
Weight Watchers International Inc.	Ann M. Sardini	CFO	2002	4	Thomas S. Kiritis	Personal services
Wendy's International Inc.	Kerri B. Anderson	CFO	2000	6	Frederick R. Reed	Restaurants, hotels, motels
West Pharmaceutical Services Inc.	Linda R. Altemus	CFO	2001	3	Steven A. Ellers	Rubber and plastic products
Williams-Sonoma Inc.	Sharon L. McCollam	CFO	2000	6	John W. Tate	Retail
Xerox Corp.	Anne M. Mulcahy	CEO	2001	5	Paul A. Allaire	Computers
Yahoo! Inc.	Susan L. Decker	CFO	2000	6	Gary Valenzuela	Business services
Zale Corp.	Mary L. Forté	CEO	2002	4	Robert J. DiNicola	Retail
Zale Corp.	Sue E. Gove	CFO	1998	5	Louis J. Grabowsky	Retail

executives, it is possible that male executives are better along other dimensions, such as strategy or compliance. Another explanation is that perhaps the availability of qualified female executives is scarce, due to lower numbers of female MBA graduates or different weights placed on family time for men versus women. The increase in representation over time can then be explained by a greater supply of candidates. This argument, however, implies higher salaries for female executives due to a shortage of these highly qualified executives, but the evidence on female compensation does not seem to support this [Bertrand and Hallock (2001) find that female executives are not paid more than male executives, and we

also examine compensation within our specific sample and find no evidence of differences in levels or composition of compensation for female executives]. Yet another explanation is that discrimination plays a role in the hiring of executives. Becker (1971) argues that employers with a taste for discrimination hire desired employees despite higher costs associated with hiring these employees. Employers who discriminate against women, therefore, employ fewer than the profit-maximizing number of women. This implies that women who are hired will on average be of higher quality, because they were able to overcome discriminatory preferences, so decisions made by female executives will be better for shareholder value

creation. Our study could be viewed as providing empirical evidence in support of this theory (indicating that gender discrimination leads in some cases to the hiring of over-confident men). Future research could disentangle these potential explanations.

Appendix A. Female executives succeeding male predecessors

Table A1 provides the list of male-to-female executive transitions in our sample. For each executive transition, we report the name of the succeeding executive, the name of the company, whether she is a Chief Executive Officer (CEO) or Chief Financial Officer (CFO), the year she is appointed the position, tenure (i.e., the number of years she serves in the position), the name of the predecessor, and the industry using Fama and French 48 industry classification.

Appendix B. Variable definitions

This Appendix provides the definition of main variables.

Acquisition: acquisitions (Compustat item 129) as a fraction of net plant, property, and equipment (item 8).

Asset Growth: percentage change in total assets (item 6).

Book Leverage: long-term debt (item 9) plus debt in current liabilities (item 34) over long-term debt plus debt in current liabilities plus the book value of common equity (item 60) plus preferred stock liquidating value (item 10) minus deferred taxes and investment tax credits (item 35).

CapEx: capital expenditures (item 128) divided by total assets (item 6).

Debt Issuance: logarithm of long-term debt issuance (item 111).

Equity Issuance: the logarithm of sale of common and preferred stock (item 108).

Market Leverage: long term debt plus debt in current liabilities over long term debt plus debt in current liabilities market capitalization at the end of the fiscal year (item 199 \times item 25) plus preferred stock liquidating value (item 10) minus deferred taxes and investment tax credits (item 35).

Market-to-Book: the ratio of market value of assets (item 9 + item 34 + item 199 \times item 25 + item 10 – item 35) to book value of assets (item 6).

Operating ROA: operating cash flow (item 308) divided by lagged total assets.

PPE: the logarithm of net plant, property, and equipment (item 8).

Return on Assets (ROA): earnings before interest, taxes, and depreciation (item 13) divided by lagged total assets.

Size: the sum of market capitalization (item 199 \times item 25) and book value of total debt (item 9 + item 34).

References

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

- Agnew, J., Balduzzi, P., Sundén, A., 2003. Portfolio choice and trading in a large 401(K) plan. *American Economic Review* 93, 193–215.
- Andrade, G., Mitchell, M., Stafford, E., 2001. New evidence and perspectives on mergers. *Journal of Economic Perspectives* 15, 103–120.
- Atkinson, S., Baird, S., Frye, M., 2003. Do female fund managers manage differently? *Journal of Financial Research* 26, 1–18.
- Barber, B., Odean, T., 2001. Boys will be boys: gender, overconfidence, and common stock investment. *Quarterly Journal of Economics* 116, 261–292.
- Barsky, M., Juster, R., Kimball, M., Shapiro, M., 1997. Preference parameters and behavioral heterogeneity: an experimental approach in the health and retirement study. *Quarterly Journal of Economics* 112, 537–579.
- Becker, G., 1971. *The Economics of Discrimination*. University of Chicago Press, Chicago, IL.
- Ben-David, I., Graham, J., Harvey, C., 2010. Managerial miscalibration. Unpublished working paper. Duke University, Durham, NC.
- Bergmann, B., 1974. Occupational segregation, wages and profits when employers discriminate by race or sex. *Eastern Economic Journal* 1, 103–110.
- Bernasek, A., Shwiff, S., 2001. Gender, risk, and retirement. *Journal of Economic Issues* 2, 345–356.
- Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics* 114, 249–275.
- Bertrand, M., Hallock, K., 2001. The gender gap in top corporate jobs. *Industrial and Labor Relations Review* 55, 3–21.
- Bertrand, M., Schoar, A., 2003. Managing with style: the effect of managers on firm policies. *Quarterly Journal of Economics* 118, 1169–1208.
- Bharath, S., Narayanan, M., Seyhun, H., 2009. Are women executives disadvantaged? Unpublished working paper. University of Michigan, Ann Arbor, MI.
- Birley, S., 1989. Female entrepreneurs: are they really any different? *Journal of Small Business Management* 2, 32–37.
- Business Trend Quarterly, 2007. Balancing More Than Just Books: Transforming the Role of a CFO (December).
- Camerer, C., Lovo, D., 1999. Overconfidence and excess entry: an experimental approach. *American Economic Review* 89, 306–318.
- CFO Magazine, 2007. Board Battles. May Issue, pp. 61–65.
- Chava, S., Purnanandam, A., 2010. CEOs vs. CFOs: incentives and corporate policies. *Journal of Financial Economics* 97, 263–278.
- Fee, E., Hadlock, C., Pierce, J., 2011. Managers who lack style: evidence from exogenous CEO changes. Unpublished working paper. Michigan State University.
- Frank, M., Goyal, V., 2010. Corporate leverage: how much do managers really matter? Unpublished working paper. University of Minneapolis, Twin Cities.
- Graham, J., Harvey, C., Puri, M. Managerial attitudes and corporate actions. *Journal of Financial Economics*, forthcoming.
- Kaplan, S., Klebanov, M., Sorensen, M., 2012. Which CEO characteristics and abilities matter? *Journal of Finance* 67, 973–1003.
- Larwood, L., Whittaker, W., 1977. Managerial myopia: self-serving biases in organizational planning. *Journal of Applied Psychology* 62, 94–198.
- Levin, I., Snyder, M., Chapman, D., 1989. The interaction of experiential and situational factors and gender in a simulated risky decision-making task. *Journal of Psychology* 122, 173–181.
- Lundeberg, M., Fox, P., Punccohar, J., 1994. Highly confident but wrong: gender differences and similarities in confidence judgments. *Journal of Educational Psychology* 86, 114–121.
- Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment. *Journal of Finance* 60, 2661–2700.
- Master, R., Meier, R., 1988. Sex differences and risk-taking propensity of entrepreneurs. *Journal of Small Business Management* 1, 31–35.
- Niederle, M., Versterlund, L., 2007. Do women shy away from competition? Do men compete too much? *Quarterly Journal of Economics* 122, 1067–1101.
- Parrino, R., 1997. CEO turnover and outside succession: a cross-sectional analysis. *Journal of Financial Economics* 46, 165–197.
- Prince, M., 1993. Women, men, and money styles. *Journal of Economic Psychology* 14, 175–182.
- Puri, M., Robinson, D., 2007. Optimism and economic choice. *Journal of Financial Economics* 86, 71–99.
- Sapienza, P., Zingales, L., Maestripieri, D., 2009. Gender differences in financial risk aversion and career choices are affected by testosterone. In: *Proceedings of the National Academy of Sciences*.

- Schubert, R., Brown, M., Gysler, M., Brachinger, H., 1999. Financial decision-making: are women really more risk averse? *American Economic Review* 89, 381–385.
- Stock, J., Yogo, M., 2005. Testing for weak instruments in IV regression. In: Andrews, D., Stock, J. (Eds.), *Identification and Inference for Econometric Models: A Festschrift in Honor of Thomas Rothenberg*, Cambridge University Press, Cambridge, UK, pp. 80–108.
- Sugarman, D., Straus, M., 1988. Indicators of gender equality for American states and regions. *Social Indicators Research* 20, 229–270.
- Sunden, A., Surette, B., 1998. Gender differences in the allocation of assets in retirement savings plans. *American Economic Review* 88, 207–211.
- Svenson, O., 1981. Are we all less risky and more skillful than our fellow drivers? *Acta Psychologica* 47, 143–148.
- Verheul, I., Thurik, R., 2001. Start-up capital: does gender matter? *Small Business Economics* 16, 329–345.
- Wall Street Journal, 2006. The Other Women to Watch (November 20).