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Ceo gender and firm performance[☆]



Walayet A. Khan^{a,*}, João Paulo Vieito^b

^a University of Evansville, IN, USA

^b Dean, School of Business Studies, Polytechnic Institute of Viana do Castelo, Portugal

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ABSTRACT

Based on a panel of US firms over the period of 1992 to 2004, we evaluated whether firms managed by female CEOs exhibit the same performance as firms managed by male CEOs. We also examined if the gender of the CEO affects the firm risk level, and if the compensation packages that boards give to female CEOs have less risky components than those given to male CEOs.

Our results revealed new insights: on average, the gender of the CEO matters in terms of firm performance. When the CEO is a female, the firm risk level is smaller than when the CEO is a male. Another important finding is that boards are not attending to the risk aversion differences between male and female CEOs when they design the compensation packages, especially equity based compensation, which can be understood as an incentive to female CEOs to take risks.

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1. Introduction

Literature shows that gender diversity enhances the monitoring process (Molero, 2011) and should enhance the performance of firms seeking growth (Dwyera, Richard, & Chadwick, 2003; Krishnan & Parsons, 2008). However, whether the gender of the CEO has an impact on the performance of the firm has remained an unexplored empirical question.

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* Corresponding author at: School of Business Administration, University of Evansville, 1800 Lincoln Avenue Evansville, IN 47722, USA. Tel.: +1 812 4792869.

E-mail addresses: wk3@evansville.edu (W.A. Khan), joaovieito@esce.ipv.pt (J.P. Vieito).

Based on a panel of U.S. firms from 1992 to 2004, we examine whether or not the gender of the CEO matters in terms of firm performance and in terms of firms risk. We also explore if the board awards female CEOs with less risky compensation components, recognizing the fact that women are more risk averse than men (Jianakoplos & Bernasek, 2007; Schubert, Brown, & Brachinger, 2000, among others) or alternatively whether the board uses a higher proportion of equity based compensation components, particularly options, to create incentives for the female CEOs to take risks (i.e. to reduce their risk aversion by paying them with more options).

Our results reveal something new: firms managed by female CEOs are associated with better performance compared to the firms managed by male CEOs. We also find that firm risk is smaller when the CEO is a woman. Finally, boards provide the same proportion of stock options to female CEOs as they provide to male CEOs, presumably as an incentive to female CEOs to take risks.

The paper is organized as follows: Section 2 discusses the literature review. Section 3 describes the research questions and hypotheses. Section 4 explains the research methodology. Section 5 explains the results, and Section 6 presents the conclusions.

2. Theoretical background

2.1. Gender and firm performance

The relationship between gender and firm performance is a relatively new area of inquiry. Krishnan and Parsons (2008) find that firms with gender diversity in senior management are associated with higher earnings quality. They also find that, after the IPO process, firms with a higher number of women in senior management are more profitable and have higher stock returns than firms with fewer women in the management ranks. Also Erhardt, Werbel, and Shrader (2003), based on Fortune 500 firms, find evidence that firms with a higher number of female executives have higher profitability relative to their average sector profitability, and Welbourne (1999, p.2), based on empirical findings, states that the results from long term study indicate that having women on the top management team results in high earnings and greater shareholders wealth.

Dwyera et al. (2003) complements this information, finding that the impact of gender diversity on firm performance is dependent on the organizational context in which it resides and suggest that gender diversity in management should enhance performance for firms seeking growth. Smith, Smith, & Verner (2006), using a sample of Danish firms, also document a positive gender-firm performance effect in relation to a variety of accounting-based performance measures. However, they caution that any effect is closely tied to the attributes of individual female managers.

These studies show that having a mix of women and men in top management positions leads to better firm performance and higher return to shareholders in the longer time period. However, there is no study yet which examines if the gender of the CEO has an impact on firm performance. Our research query is among the first to focus on this question.

Ford and Richardson (1994) believe that women are more concerned with ethical behavior than men in the work place. Campbell and Minguez-Vera (2008), based on a sample of Spanish firms, find no clear relationship between female board representation and corporate value, while Adams and Ferreira (2008) document that the average effect of gender diversity on both market valuation and operating performance appears to be negative in companies with greater shareholder rights and positive in firms with weaker shareholder rights. The results suggest that establishing gender quotas for company boards may not increase board effectiveness on average but may reduce it for well-governed firms where additional monitoring is counterproductive.

Another interesting issue is what happens to a company's stock price when it announces the appointment of either a male or female CEO. Using data from US-based Russell 3000 companies and using the Fama-French three factor model, Gondhalekar and Dalmia (2007) find that the abnormal returns at the announcement of a CEO appointment are weakly positive for female CEOs but zero for male CEOs (p. 395). Female CEOs who get the top position usually have a good network (Bartlett & Miller, 1985) with the top professionals in the industry and command higher academic qualifications (Adams, Haughton, & Leeth, 2007). Moreover, women who gain the top positions appear to be younger, on average, than their male counterparts (Bures & Zucca, 2004). In addition, as Guthrie and

Roth (1999) attest, the promotion of women to top jobs in the US is often conditioned by the institutional/legal environment enveloping the industry (i.e., public versus private) where employment is sought. They also note that the internal labor market of a given business is decisive in determining overall hiring decisions. King and Cornwall (2007) complemented these findings by describing that those industries that sell products or services primarily purchased by women (or women are the main decision makers in the purchasing process) offer greater leeway for female advancement to the top positions. Employing women in top positions is valuable for companies selling such products because female executives can better understand the needs and the behavior of female consumers.

2.2. Gender, executive compensation and risk aversion levels

Mohan and Ruggiero (2003) and Jordan, Clark, and Waldron (2007), among others, found that women in top management positions receive less compensation than their male counterparts. These findings and insights provide us motivation to explore if female CEOs are paid with the same proportions of risky compensation components (such as stock options and restricted stock(1)) as men are and whether or not this pattern is the same in new versus old economy firms. Hersch (1998) indicates that women prefer to find safer (stable compensation) jobs, but when they get risky (variable compensation) jobs, they receive, on average, less than men doing the same functions. Hersch does not, however, empirically examine whether female and male CEOs are awarded a similar ratio of risky compensation components.

Vandergrift and Brown (2005) and Wei (2007) also confirm the theory that women are more risk-averse than men, and the differential risk attitudes and characteristics between men versus women affect corporate financial decisions. In addition, Schubert et al. (2000) indicate that women are normally more risk averse than men when it comes to investing, and this difference increases with increased ambiguity and uncertainty of investment. If women make investment decisions in a secure, less uncertain and less ambiguous environment, they take practically the same risk as men. Jianakoplos and Bernasek (2007), among others, also describe women as more risk averse than men and note that this differential risk attitude is reflected in their financial and investment decisions. The difference in risk tolerance is also reflected in mutual fund investing, where female fund managers seem to take less unsystematic risk and opt for more stable investments than male fund managers (Niessen & Ruenzi, 2006). Male fund managers trade more frequently, reflecting a significantly higher turnover ratio compared to female managers.

Some studies indicate that men and women behave differently in the workplace, particularly when the question is how to manage money and finances. Betz, O'Connell, and Shepard (1989) and Bernardi and Arnold (1997) document that women are more comfortable with activities related to helping people, while men are more comfortable with money-making activities. Powell and Ansic (1997) claim that women are less able as financial decision makers. Also, Bliss and Potter (2002) and Barber and Odean (2001) describe women as more risk averse than men and more worried with money matters. Risk aversion differences between men and women tend to lead women to allocate retirement plans in a more conservative way, choosing retirement plans with less risky assets than those chosen by men (Hinz, David, McCarthy, & Turner, 1997; Sunden & Surette, 1998). However, all these studies conclude that women do not necessarily make sub-optimal choices and destroy value when they are in a management team or the CEO of the firm.

Becker (1957) argues that part of the difference in executive compensation between men and women can be associated with differences in education. Given that the difference in education is diminishing between men and women, we would expect that the difference in executive compensation is also decreasing. In recent years, women have made remarkable progress in receiving education. In 2004, women outnumbered men as students in degree-granting institutions of higher education by 33%. Women are now increasingly entering into graduate fields, such as business, law, and medicine. The number of women that are in graduate schools in the USA increased 66% between 1994 and 2004, and in the case of men the increase was just 25%.

Normally top executives are remunerated with a high proportion of equity essentially because firms desire to link changes in executive personal wealth directly to changes in stock price, providing executives with incentives to maximize shareholder wealth (Core, Wayne, & Larcker, 2003; Smith &

Stulz, 1985; Jensen & Murphy, 1990). To motivate the executive to take actions that are in the best interests of the shareholders, compensation risk is imposed on the executive by linking the executive's wealth to firm performance (Core et al., 2003). From the above literature, one can see that no study analyzes if the proportions of equity compensation diverge depending on whether company has a male or female CEO.

Literature about the relationship between firm stock ownership, gender and risk aversion is practically nonexistent. Only Laakso (2010) analyzes the relationship between gender, degree of risk aversion and stock market investment participation. He finds that men are less risk averse on a 4 point scale (3.59 out of a 4), and women are more risk averse (3.76 out of 4). Results showed that risk aversion has a significant impact on stock market participation with the probability of investing in risky assets (i.e. stock market) higher for men compared to women. He describes that the effect of risk aversion is larger for male respondents, which may result from the fact that males on average are less risk averse in this sample than females.

2.3. Research hypotheses

Literature (Barber & Odean, 2001; Bliss & Potter, 2002, among others), notes that women, in addition to being more risk averse, worry more about the way the company money is spent and normally extract less personal benefits from the company than men. Ford and Richardson (1994) complement this information, stating that women make more ethical decisions in the workplace than men. Based on the above, our first null hypothesis is proposed:

Hypothesis 1. Firms managed by female CEOs, on average, perform better than firms managed by male CEOs.

Based on the described characteristics of women we expect that, on average, companies with female CEOs perform better than companies with male CEOs.

Authors like Vandergrift and Brown (2005) argue that women are more risk averse than men, and this differential risk attitude affects financial decisions. Niessen and Ruenzi (2006) complement this information and describe that women who manage mutual funds seem to take less unsystematic risk and opt for more stable investments than men. Based on these findings and insights, we extend our investigation to corporations and develop the following null hypothesis:

Hypothesis 2. Firms managed by female CEOs have a lower risk level than firms managed by male CEOs.

Based on insights about the leadership style of women developed in previous studies, we expect that female CEOs will make more conservative decisions than men, and therefore, their firm risk level will be smaller than firms managed by male CEOs.

As described above, Core et al. (2003) argue that compensation risk is imposed on the executives by linking the executives' personal wealth to firm performance. Based on this, we develop the last null hypothesis:

Hypothesis 3. On average, boards compensate female CEOs with a higher proportion of risky compensation components compared to male CEOs.

We expect that boards will create incentives for women to take more risk by paying them more options.

3. Research methodology

3.1. Sample and data collection

Data is from the Standard and Poor's ExecuComp database that collects information about the five most well paid executives from companies listed on the S&P 1500 Indexes. We use Unbalanced Panel Data, and our final sample is composed of 11315 observations of executive compensation for the 13 year period from 1992 to 2004.

We apply a few restrictions to develop our sample. We remove observations with no data on total compensation and also observations that have the sum of salary and bonus equal to zero. In other words, we remove the CEOs who do not receive any compensation at all, and we do not include the CEOs who receive neither salary nor bonus during the year.

Using the Consumer Price Index (CPI) compiled by the Bureau of Labor Statistics, we adjust the monetary variables to 2004 for inflation.

3.2. Measurement of dependent variable(s)

The dependent variables that we use are LN (Total Compensation), ROA Adjusted and LN (BS Volatility).

LN (Total Compensation) is the total of remunerations gained by the executives and is the sum of salary, bonus, stocks options, restricted stocks, LTIP (2), other annual compensations and all other compensations. This variable, without logarithm, is used by Aggarwal and Samwick (1999) to evaluate the contracts offered to executives in a context of strategic competition between products and evaluation of relative performance, and by Fields and Fraser (1999) to unmask the commercial banks when they use compensation to link executives to their performances.

To analyze if firms managed by female CEOs have more risk than firms managed by male CEOs, we use the dependent variable LN (BS Volatility), which is the natural logarithm of the standard deviation of returns calculated over 60 months with Black and Scholes' methodology.

3.3. Measurement of independent variables

We use two sets of independent variables, financial and governance, as described below.

3.4. Financial variables

Generally, the firm size in executive compensation literature is used as one of the following variables: LN (Mktval), that is the natural logarithm of the market value of the firm, defined as the closing price for the fiscal year multiplied by the common shares outstanding (Datta, Iskandar-Datta, & Raman, 2005); LN (Sales) is the natural logarithm of net annual sales as reported by the firm, and this proxy is used by many, including Elston and Goldberg (2003) and Aggarwal and Samwick (2003); LN (Assets) that is the natural logarithm of the total assets as reported by the firm, and this proxy is used by many including Anderson and Bizjak (2003) and Grinstein and Hribar (2004). One of the problems in all these studies is that the researchers use one of these variables at the expense of other variables. They expect to receive better results by using one variable and ignoring the others, but there is no sound reason for ignoring one variable and selecting another. Because these variables are highly correlated, and cannot be introduced at the same time to explain dependent variables, we use Principal Component Analysis to extract a factor that contains optimal information from the three variables. The final component is:

$$\text{Firm Size Component} = 0.975 * \text{LN(Assets)} + 0.945 * \text{LN(Sales)} + 0.909 * \text{LN(Mktval)} \quad (1)$$

Based on Sharpe (1990), as discussed earlier, we expect that when the firm size increases, the volatility of stock returns will reduce.

We use the variable LN (BS Volatility), which is the natural logarithm of the standard deviation calculated over 60 months with Black and Scholes' methodology, to investigate firm risk level.

We also use the variable LN (Ownership), which is the natural logarithm of the percentage of the company's shares owned by the named executive officer, to investigate the impact of stock ownership on firm performance.

To measure firm performance, we use the variable ROA Adjusted. ROA is the Net Income before Extraordinary Items and Discontinued Operations divided by Total Assets. To obtain the ROA Adjusted variable, we subtract the average industry ROA (using the 2 digit SIC code for the relevant sector) from the ROA of each firm.

This quotient is then multiplied by 100. We use this variable to analyze the relationship between the CEO gender and firm performance. We expect a positive relationship between ROA Adjusted (dependent) and the Female CEOs dummy (independent) variable.

3.5. Governance variables

LN (Tenure) is the natural logarithm of the number of years that the executive has been on the job, for example, in the capacity of CEO.

We use LN (Number Meetings), which is the natural logarithm of the number of board meetings held during the indicated fiscal year, to examine the impact of the number of board meetings on firm performance. Vafeas (1999) found an inverse relationship between frequency of board meetings and firm performance. We expect that the higher the monitoring, the lower will be the firm performance.

New Economy is a dummy that assumes a value equal to 1 when the firm is classified as a new technology firm, according to the methodology used by Murphy (2003), and zero otherwise. New economy firms have been described as paying the top executives with greater equity based compensations relative to the traditional firms (Murphy, 2003).

Female CEO is a dummy that assumes the value 1 when the CEO is a woman and zero otherwise. The variable is also used to analyze the impact of CEO gender on firm performance and on firm risk level.

To control for the effect of time, we use year dummy variables as in Barron and Waddel (2003) and Grinstein and Hribar (2004). We expect that the dummy variables will be significant in explaining executive compensation and firm risk level, particularly in the bubble period of 1998 to 2000.

4. Statistical analysis

4.1. CEO and firm characteristics

Table 1 presents summary statistics on CEO and firm characteristics. We see from the table that, on average, female CEOs are younger than male CEOs. It is important to note that the Execucomp database has no information about age for a large number of CEOs.

In the case of tenure, we do not find statistical differences, but in the case of ownership, there are statistically significant differences between male and female CEOs.

We also observe that male CEOs manage companies with higher market value, and this observation is congruent with the literature that indicates female CEOs manage smaller sized companies. The number of board meetings and the sales growth are not statistically different in companies with female and men CEOs.

Table 1
Male versus female CEOs.

	Female CEOs		Male CEOs		T test-mean difference
	N. obs.	Mean	N. obs.	Mean	
Personal characteristics					
Age	74	53.19	3368	58.48	5.29***
Tenure	136	12.45	10,578	13.70	1.25
Ownership	85	8.96	5644	5.15	-3.81***
Firm characteristics					
Firm size (Mktval)	138	18.21	11,074	20.00	1.79***
Number of meetings	128	6.82	10,767	7.23	0.41
Sales5LS	136	27.80	11,074	18.70	-9.1

Age is the CEO age. Tenure is the number of years that the executive has been on the job. Ownership is the percentage of the company's shares owned by the named executive officer. The firm size is measured based on firm market value. Number Meetings is the number of board meetings held during the indicated fiscal year. "SALES5LS" is the 5-years least square annual growth rate of firm sales

Statistically significant at 1% level ***, 5% level ** and 10% level *.

Table 2

Two stage least squares: female CEOs and firm performance.

Independent variables	ROA adjusted	
	Coef.	(z-Statistics)
Constant	5.594	0.055
LN (total compensation)	−9.049	−0.416
Firm size component	2.894	0.984
Female CEO	28.747	2.458**
LN (ownership)	−0.166	−0.062
New economy	1.154	0.214
Year 1993	5.043	1.224
Year 1994	7.480	1.225
Year 1995	6.808	1.214
Year 1996	6.991	0.911
Year 1997	5.753	0.610
Year 1998	4.764	0.440
Year 1999	6.945	0.528
Year 2000	5.293	0.369
Year 2001	−3.732	−0.269
Year 2002	−1.306	−0.099
Year 2003	0.0670	0.006
Year 2004	1.655	0.126
Industry dummies	Yes	Yes **
No. of observations	11,315	
Adjusted R-square	4.3%	

Data is from Execucomp database. We use OLS Regression. Using the Consumer Price Index (CPI), compiled by the Bureau of Labor Statistics, and 1982 base of 100, we have adjusted monetary variables for inflation reporting the values to the year 2004. The dependent variable ROA Adjusted is the Net Income before Extraordinary and Discontinued items adjusted to industry. We developed Industry adjusted ROA by subtracting the ROA of a firm from the ROA of its respective two Digit SIC Sector code Operations divided by Total Assets. LN (Total Compensation) is the natural logarithm of executive total compensation. Firm Size Component is a variable extracted with Principal Component Analysis that measures firm size. Female CEOs is a dummy variable that assumes the value 1 when the CEO is a woman and 0 otherwise. LN (Number Meetings) is the natural logarithm of the number of board meetings during a year. LN (Ownership), which is the natural logarithm of the percentage of the company's shares owned by the named executive officer. New Economy is a dummy that assumes the value of 1 when the company is from the new economy and 0 otherwise (Murphy, 2003). Finally we also control for the time effect by inserting a dummy variable for each year from 1992 to 2004.

Statistically significant at 1% level ***, 5% level ** and 10% level *.

5. Multivariate statistical analysis

5.1. Relationship between CEO gender and firm performance

We next analyze whether the gender of the CEO has an impact on firm performance. Since the endogeneity problem might be the concern for two independent variables, LN (Total compensation) and Female CEOs, we apply the Two Stage Least Square method, in which LN (tenure) and LN (Number Meetings) are the instrument variables. The Hausman test confirms that this is the right approach (Table 2).

The coefficient of Female CEOs is positive and significant; indicating that, holding all other factors constant, the ROA increases much more if the firm is managed by a female CEO instead of a male CEO. Results are congruent with Catalyst's (2004) findings that women in top management will produce better return to equity and return to shareholders.

5.2. Are firms managed by female CEOs more risky than firms managed by male CEOs?

As discussed earlier, we expand the findings of Niessen and Ruenzi (2006) for mutual funds to test if publicly traded firms with female CEOs are less risky than those managed by male CEOs. Again, the endogeneity problem might occur here, since appointment of a female CEO might share the same motivation of having lower risk. We apply the Two Stage Least Square method again, and use LN

Table 3

Two stage least of squares regression: impact of CEO gender on firms' risk level.

Independent variables	LN (BS volatility)	
	Coef.	(z-Statistics)
Constant	1.659	6.683***
Female CEO	-0.112	-2.251**
Female CEOs*new economy	-0.229	-0.066
Firm size component	-76.536	-4.416***
Female CEOs*firm size Component	3.910	4.206***
LN (ownership)	-0.037	-4.349***
Female CEOs * LN (ownership)	2.074	1.910*
Year 1993	-0.153	-2.064**
Year 1994	-0.132	-1.348
Year 1995	-0.223	-2.692***
Year 1996	-0.215	-2.723***
Year 1997	-0.166	-2.031**
Year 1998	-0.013	-0.151
Year 1999	0.059	0.687
Year 2000	0.259	2.402**
Year 2001	0.394	3.153***
Year 2002	0.230	2.017**
Year 2003	0.203	1.779*
Year 2004	0.112	0.979
Industry dummies	Yes	Yes
No. of observations	11,315	
Adjusted R-square	1.3%	

We perform Regression Analysis on Unbalanced Panel Data. Using the Consumer Price Index (CPI) compiled by the Bureau of Labor Statistics, and 1982 base of 100, we adjust monetary variables for inflation, reporting the values to the year 2004. The dependent variable LN (Bs Volatility) is the firm's stock return volatility. Female CEO is a dummy that assumes the value 1 when the CEO is a female and zero 0 otherwise. New Economy is a dummy variable that assumes the value 1 when the firm is from new economy and 0 otherwise. Based on the Principal Component method, we extract a factor (Firm Size Component), which is the best combination of the three stated variables to measure the firm size: LN (assets), LN (market value), LN (sales). LN (Ownership) is the natural logarithm of the percentage of the company's shares owned by the named executive officer. Finally we also control for the time effect by inserting a dummy variable for each year from 1992 to 2004.

Statistically significant at 1% level ***, 5% level ** and 10% level *.

(tenure) and LN (Number Meetings) as instrument variables. The Hausman test confirms that there is an endogeneity problem and the Two Stage Least Square method is indeed necessary.

The results are presented in Table 3.

The variable Female CEO is negative and statistically significant, indicating that the firms headed by female CEOs are less risky than firms with male CEOs. The same relationship holds for firms with female CEOs in the new economy firms, but the relationship is not statistically significant. The results are congruent with the findings of Niessen and Ruenzi (2006), who show that female fund managers invest in relatively safer, less risky assets.

Results show that the relationship between firm risk level and size is negative, meaning that the higher the size of the firm, the smaller the risk. The results are congruent with Sharpe (1990). When we introduce interaction of the dummy Female CEOs with the firm size component, the relationship is positive and statistically significant with firm risk level, meaning that the risk level increases for the growing firms even when headed by female CEOs. Female CEOs work for relatively small firms, which are inherently more risky even with their growth compared to large firms.

Also interesting is the fact that the interaction of Female CEO with ownership is positive, meaning that when the firm stock ownership of female CEO grows, the firm's risk level also grows. The results are congruent with the (Core et al., 2003) argument that to align the interests of shareholders with the executive, compensation risk is imposed on the executives by linking their personal wealth gains to firm performance.

Finally, we can also see that the overall stock return volatility increased during our sample period. Therefore, we estimate the impact of each factor on risk level after controlling for the time factor.

Table 4
CEO compensation components as a percentage of total compensation (1992–2004).

Year	Full sample						Male vs female												
							N		Salary		Bonus		Stock options		Restricted stocks		LTIP		
	N	Salary	Bonus	Stock Options	Restricted Stock	LTIP	M	F	M	F	M	F	M	F	M	F	M	F	
1992	197	38.8%	20.0%	25.9%	4.6%	6.0%	196	1	38.9%	32.2%	20.0%	16.1%	25.9%	42.8%	4.5%	0.0%	6.1%	0.0%	
1993	655	41.8%	19.8%	25.3%	4.1%	3.2%	653	2	41.7%	66.5%	19.8%	22.8%	25.4%	0.0%	4.15%	0.0%	3.3%	0.0%	
1994	862	39.4%	20.6%	28.9%	3.4%	2.5%	858	4	39.4%	58.0%	20.6%	28.0%	29.0%	8.5%	3.4%	0.0%	2.5%	0.0%	
1995	899	39.5%	20.8%	27.4%	3.7%	3.2%	894	5	39.5%	44.78%	20.8%	21.2%	27.4%	26.7%	3.7%	0.0%	3.2%	0.0%	
1996	920	36.1%	19.7%	31.5%	4.0%	3.3%	913	7	36.2%	30.1%	19.7%	16.7%	31.4%	48.0%	4.1%	0.0%***	3.4%	0.0%***	
1997	952	33.2%	19.8%	34.2%	3.9%	3.8%	944	8	33.2%	28.7%	19.9%	15.4%	34.1%	40.3%	3.9%	0.5%	3.8%***	0.3%	
1998	981	33.6%	17.4%	37.8%	3.7%	2.7%	968	13	33.5%	39.5%	17.3%	24.2%	38.0%	19.2%**	3.7%	4.6%	2.7%	4.6%	
1999	1043	30.8%	17.3%	41.1%	3.2%	2.6%	1032	11	30.7%	44.4%*	17.2%	21.9%	41.3%	26.1%	3.2%	0.0%***	2.6%	0.0%***	
2000	1027	30.9%	17.2%	30.9%	3.8%	2.2%	1012	15	30.9%	35.2%	17.2%	15.2%	40.9%	39.1%	3.7%	4.8%	2.1%	0.0%***	
2001	952	30.9%	13.0%	45.0%	4.1%	1.7%	936	16	35.5%	30.8%	13.0%	11.0%	45.0%	44.4%	13.02%	11.0%	1.7%	0.0%***	
2002	937	30.3%	15.8%	42.0%	5.1%	2.3%	918	19	30.4%	22.0%**	15.8%	15.8%	41.8%	51.9%	5.0%	5.6%	2.3%	0.0%***	
2003	940	31.4%	17.7%	35.9%	7.2%	3.0%	919	21	31.5%	29.1%	17.7%	17.9%	35.8%	39.8%	7.2%	8.6%	3.1%	0.2%***	
2004	950	27.9%	20.7%	33.8%	10.1%	2.9%	931	19	27.9%	27.3%	20.8%	18.0%	33.8%	35.3%	10.0%	13.9%	2.9%	1.0%*	

Note 1: Data is from the ExecuComp database. Salary is the executive salary for the year. Bonus is the dollar value of bonus (cash and non-cash) earned by the executive officer during the fiscal years. Stock Options is the aggregate value of stock options granted to the executive during the fiscal year valued using S&P's Black-Scholes methodology. Restricted Stocks is the value of restricted stocks granted during the year (determined as of the date of the grant), LTIP is the amount paid out to the executive under the company's long-term incentive plan. Execucomp also aggregates the executive compensation for two more components: "Other annual compensation" and "all other compensation". Because these two components represent a small percentage of total compensation, and essentially because they aggregate several different forms of compensation, it is not possible to make a comparison between executives. We do not include these items in our data set.

Note 2: Difference between men and women is statistically significant at 1% level ***, 5% level ** and 10% level *.

Note 3: Note: M – male; F – female.

5.3. Do female CEOs receive the same proportion of risky compensation components as Male CEOs?

Table 4 displays proportions (compensation items divided by the total compensation) of each compensation component received by CEOs during the sample years, for both the full sample and for the male versus female sub-samples. Such time series analysis also enables us to investigate if the compensation proportions change during the sample period. Two important events took place during this period that can affect the way companies pay the CEO: the NASDAQ crash in the year 2000 and the introduction of the Sarbanes Oxley Act in 2002.

We note from the above table (full sample) that the compensation proportion of the salary changed from 38.8% in 1992 to 27.9% in 2004, meaning that companies are using less fixed compensation components to remunerate top executives. Another important finding is that stock options represents, on average, 25.9% of total compensation in 1992, and this situation changed to 33.8% in 2004. Also important is the fact that, essentially after 2002 (introduction of Sarbanes Oxley Act), the proportion of the restricted stocks increased.

When we look at male versus female CEOs sub-samples, we note that the proportion of the salary compensation is practically the same for both male and female in 2002, and it decreases across time from 1992 to 2004. In the case of stock options, and essentially after 2000, female CEOs' start to be compensated with a higher proportion of stock options than male CEOs. It is also important to mention that, essentially after the introduction of Sarbanes Oxley Act, we observe a small reduction of the use of stock options and increase in restricted stocks in the years 2003 and 2004. This change is a little higher in the case of female CEOs.

6. Summary and conclusions

Based on a panel of new and old economy US firms over the period of 1992 to 2004, we examine if the firms run by male CEOs exhibit the same performance as the firms run by female CEOs, if the firm risk level is different when a firm is managed by a female CEO, and if the compensation package that boards give to female CEOs has less (or more) risky components than what the boards give to male CEOs.

Our results reveal new insights in the area: firms with female CEOs are associated with an increase in performance compared to the firms managed by male CEOs.

We also find that when the CEO is a woman, the firm risk level is smaller than when the CEO is a man. Also, the boards do not appear to consider the risk aversion differences between male and female CEOs when they design the compensation packages since they award female CEOs practically the same proportions of risky compensation components (stock options) as they award to male CEOs. An alternative and plausible explanation is that the boards are awarding the same proportion of risky components to female CEOs as they award to male CEOs to induce female CEOs to take risks.

Notes

- (1) Restricted stocks are stocks subject to restrictions on sale and risk of forfeiture until vested by continued employment. Restricted stock typically vests in increments over a period of several years. Dividends or dividend equivalent rights may be paid, and award holders may have voting rights during the restricted period.
- (2) A Long Term Incentive Plan (LTIP) is any plan that provides compensation that is intended to serve as an incentive for performance and that occurs over a period longer than one year but not including restricted stock, stock option or stock appreciation rights plans.

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