Does Gender Matter?
A Comparative Study of Performance of American CEOs

Jelena Strelcova

The Leonard N. Stern School of Business
Glucksman Institute for Research in Securities Markets
Faculty Advisor: Eli Bartov
April 1, 2004

INTRODUCTION

Female senior managers are becoming an increasingly widespread phenomenon, attracting a significant amount of media attention. For example, according to USA Today (2003), the average stock price performance of eight Fortune 500 companies run by female Chief Executive Officers (CEOs) significantly exceeded that of the S&P 500 index in 2003.

The primary question addressed by this paper is whether the performance of female CEOs is different from the performance of their male counterparts. This question is motivated by prior research discussed below suggesting that there are substantial "glass ceilings" for the promotion of women in corporate America. If so, it is arguable that those women who are eventually promoted to the CEO level possess superior skill sets compared to an average male CEO, which may translate into a superior performance. In addition to the main research question, the current paper also investigates whether female CEOs and male CEOs differ in their attitude towards financial risk. This second question follows from the findings of prior research documenting differences in risk tolerance between males and females (e.g. Jianakoplos and Bernasek (1996)).

Studying a sample of 58 companies run by female CEOs over the 20-year period between January, 1985 and December 2004, I find that the stock price returns of the companies run by newly appointed female CEOs, are significantly lower then the stock price returns of comparable companies run by male CEOs during the year following the female CEO appointment. Moreover, this paper doesn't find evidence of leverage differences between the female CEO and male CEO run companies.

The paper proceeds as follows. Section II reviews prior research. Section III discusses research design, sample selection procedure, variable definitions and sample descriptive statistics. Section IV outlines the tests, discusses the results and highlights the limitations underlying the study. Section V summarizes research questions and major findings.

I PRIOR RESEARCH

In developing the first research question, I build on the strand of research investigating female status and performance in corporate America. For example, Zelechowski and Belemoria (2004), who study the characteristics of female and male corporate inside directors in the US, find that women insiders differ significantly from a random set of men insiders on several characteristics relevant to their dual positions as directors and officers of the corporation. While they do not differ on the experience-based qualifications of board tenure or corporate tenure, women insiders hold fewer directorships of other corporations, hold less powerful corporate titles, occupy disproportionately more staff functions, are less likely to be top earners of the corporation, and earn considerably less than men inside directors.

Another example, Cobb-Clark (2001) documents that women are less likely to be promoted than men, and that had men and women faced the same promotion standards, promotion rates would have been higher for women than for men. One way to interpret these findings is that there are substantial glass ceilings for female promotion to the highest levels of companies. Further, Bertrand and Hallock (2001) study the five highest paid executives in a sample of large US firms, and find that women represent only 2.5% of the sample and earn 45% less then their male counterparts. As much as 75% of the gap

could be explained by under-representation of women in larger companies and in the positions of CEO, Chairperson of the board, or President. The authors point out that the results of the research don't rule out the possibility of discrimination via gender segregation and unequal promotion.

This research leads me to my first research question: does the performance of female CEOs differ from the performance of male CEOs?

Related research has also studied financial risk taking by women. Several studies such as Bajtelsmit and VanDerhei (1996), and Hinz, McCarthy, and Turner (1996) have found that women invest their pensions more conservatively than men. In addition, Jianakoplos and Bernasek (1996) studied the relationship between the percentage of risky assets to total assets and several explanatory variables including gender and wealth. Their study showed that single women are relatively more risk averse then men or married couples. The study also compared the self-reported risk tolerance among different groups and revealed that women also perceive themselves as being risk averse. Zinkhan and Karande (1991) surveyed MBA students using the Kogan and Wallach (1964) Choice Dilemmas Questionnaire as risk-taking behavior measurement tool. They found that female MBA students were significantly less likely to take business risks then males.

This literature leads me to my second research question: do female CEOs have different attitude towards financial risk then male CEOs?

II METHODOLOGY

II.1 Research Design

The main research question is whether the performance of companies run by female CEOs differs from the performance of companies run by male CEOs. There are

several different metrics that can be used to evaluate performance, such as return on equity, return on assets, stock performance, etc. I choose to measure company performance as abnormal buy-and-hold stock returns around the appointment of a new female CEO. To calculate abnormal return, I subtract the raw return from the expected return. Finance literature offers numerous ways to compute expected return such as the market model, CAPM, three-factor model, four-factor model, etc. However, given my research question and my unique sample, I adjust for the expected return by computing the stock returns on a matched pair sample as in Bartov and Mohanran (2004). Specifically, each company from the female CEO sample is paired with a male CEO led company from the same 2-digit SIC code group. The pairings are then refined by sales and market capitalization to form a three-dimensional match based on data at the end of the calendar year preceding the respective female CEO nomination. I chose to match by both variables simultaneously in order to control for company size and potential under or over valuation, measured by the relationship between sales and market capitalization. To measure the proximity of two companies based on the above described variables I introduced the following variable:

$Z^* = (Z_{SALES}\text{ (female)} - Z_{SALES}\text{ (male)})\text{^}2 + (Z_{CAP}\text{ (female)} - Z_{CAP}\text{ (male)})\text{^}2,$

where Z_{SALES} and Z_{CAP} are calculated as number of standard deviations from the sample average sales and average market capitalization for the respective 2-digit SIC code group in the given year.

The above described matching procedure has an obvious limitation of not controlling for the CEO change. Prior academic research suggests that CEO transition might have a significant influence on stock price performance around the CEO

appointment date. For example, Berman and Lin (2000) demonstrate a negative market reaction to the announcements of top executive departures, especially when the CEO is dismissed or leaves to take up another job. In addition, a study of listed French companies by Dherment-Ferere and Renneboog (2002) finds that the nomination of an external manager following a performance related forced resignation of a CEO is rewarded by the market by a 2% increase in abnormal return, while promotion of an internal CEO in a poorly performing firm is followed by a 1% drop in abnormal return on the date of announcement. This research implies that, ideally, the match sample would have to consist of male CEO run companies that have experienced a CEO transition on the same date as the respective companies in the female CEO sample, in addition to being comparable on sales and market capitalization dimensions. Constructing such a matched sample, however, would be quite challenging due to data collection and matching difficulties, and thus is left for future research.

The second research question is whether the attitude towards financial risk differs between female and male CEOs. I chose financial leverage as a measure of company risk since this variable can be promptly changed by the CEO. Financial leverage can be defined in several ways using either market value of debt, book value of debt or book value of long-term debt in the nominator and either market capitalization, book value of equity or book value of assets in the denominator. Since my sample period spans twenty years, I use the book value of debt because it is readily available in a machine readable form. Since Compustat does not provide a consistent measure of short-term debt, I use long-term debt in the nominator of the leverage ratio. I chose book value of assets for the

denominator of the leverage ratio since this measure is stable and does not fluctuate significantly with stock performance.

II.2 Sample Selection

Studying the companies listed on the AMEX, NYSE and Nasdaq exchanges allowed the gathering of a sample of 84 female CEOs. The sample data was collected from three sources. First, I retrieve the biographies of company officers, which in most cases determined a CEO's gender, from the Hoover's database. However, Hoover's only provides the biographies of current CEOs. To retrieve the gender of CEOs who no longer held their position at the time of the study, I use the Compustat Execucomp database. Finally, I study the proxy statements of all sample companies to verify the CEO gender, as well as to collect the data on outsider/insider status of newly elected female CEOs. While the initial sample consisted of 84 companies, the final sample size is 58 companies. I lost 26 sample companies due to data limitations.

Monthly stock returns data were retrieved from CRSP. Accounting and stock price data were retrieved from the Compustat. The sample period spans from January, 1985, to December, 2004.

II.3 Descriptive Statistics

The results in Table 1 demonstrate that the matching procedure described above has proved efficient. Specifically, the findings indicate that there is little evidence of statistically significant differences between the female and male samples on either of the matching variables.

Matching Variable	Female Sample Mean	Male Sample Mean	Differentials Mean	P-value
Sales	2276	2474	-197	0.876
Market Capitalization	2226	2048	177	0.899

Table 1. Sample Statistics

III Results

III.1 Tests of the First Hypothesis

To test the first hypothesis of whether the stock returns of female CEO led companies are significantly different from the returns of comparable companies led by male CEOs, I perform a two-sided Student's t-test for mean of return differentials as well as Wilcoxon test for the median of return differentials between the stock prices of companies in female and male samples. To separate the long-run effects of female CEO performance from the market reaction on the appointment of a new female CEO I study annual as well as monthly return differentials around the CEO appointment date. To examine the long-run effect of female CEOs on stock price performance, I study annual returns during a six-year period around the female CEO appointment. The results are presented in Table 2.

Year Relative to the Female CEO Appointment Date (t)	Female Sample		Male Sample		Differentials			
	Mean	Median	Mean	Median	Mean	P-value	Median	P-value
t-3	20.67%	7.80%	14.71%	10.00%	5.96%	0.703	-1.80%	0.799
t-2	19.36%	1.10%	14.42%	5.70%	4.94%	0.811	-6.50%	0.512
t-1	17.73%	4.70%	29.81%	18.80%	-12.07%	0.312	-12.00%	0.247
t	1.15%	1.10%	26.70%	21.60%	-25.55%	0.010	-21.00%	0.013
t+1	32.22%	16.60%	15.82%	9.10%	16.40%	0.259	6.90%	0.398
t+2	26.20%	20.20%	8.92%	9.00%	17.28%	0.100	11.00%	0.148

Table 2. The Test of Annual Return Differentials

The results of both Student's T-test and Wilcoxon test of annual return differentials indicate that the stocks of companies run by newly appointed female CEOs

under-perform the stocks of comparable companies run by male CEOs by more than 20% over a one year period following the appointment of a female CEO. This result is statistically significant at 1% significance level. No statistically significant return differentials were observed in either second or third year after the female CEO appointment. This finding is inconsistent with the implications of prior research suggesting that female CEOs might have a more positive influence on company performance.

To study the immediate effect of the announcement of a female CEO appointment on the stock price performance, I examine monthly returns in a six-month period around the announcement date. The results are presented in Table 3.

Month Relative to the Female CEO Appointment Date (t)	Female Sample		Male Sample		Differentials			
	Mean	Median	Mean	Median	Mean	P-value	Median	P-value
t-3	8.18%	6.02%	5.91%	5.91%	2.27%	0.462	1.50%	0.554
t-2	8.15%	3.34%	2.85%	1.07%	5.30%	0.169	3.00%	0.280
t-1	-0.48%	-1.95%	-1.18%	-1.74%	0.70%	0.846	-0.25%	0.932
t	3.10%	3.49%	5.12%	3.79%	-2.01%	0.553	-1.05%	0.651
t+1	3.74%	1.08%	0.19%	0.34%	3.55%	0.240	2.00%	0.384
t+2	2.53%	1.79%	3.08%	0.46%	-0.55%	0.848	-0.55%	0.818

Table 3. The Test of Monthly Return Differentials.

Interestingly, the monthly return differentials during the three months following the announcement and the three months before the announcement are not statistically significant.

One potential explanation for this observed pattern in the stock price returns may be that newly appointed CEOs engage in earnings manipulations as documented by Wells (2002). Using a sample of Australian firms, Wells demonstrated that incoming CEOs undertake earnings management using abnormal and extraordinary items to reduce the income in the year of CEO change. These activities aim at establishing a low earnings base against which the performance of a new CEO will be measured. Downward earnings

management in turn can depress company stock price. Therefore, if the newly appointed female CEOs as well as their male counterparts engage in earnings manipulations, and the write-offs are announced over the course of the year that could potentially result in underperformance of the stocks of the respective companies during the year after the new CEO appointment.

III.2 Tests of the Second Hypothesis

To test the second hypothesis of whether the leverage of companies led by female CEOs is equal to the leverage level of comparable male CEO led companies I run a two-sided Student's T test as well as Wilcoxon test for the differences in leverage ratios between the female and male samples during a six-year period around the female CEO appointment. As Table 4 demonstrates, neither test shows statistically significant discrepancy between the two samples. Thus the null hypothesis of leverage equality cannot be rejected.

Year Relative to the Female CEO Appointment Date (t)	Female Sample		Male Sample		Differentials			
	Mean	Median	Mean	Median	Mean	P-value	Median	P-value
t-3	25.70%	15.00%	17.81%	13.10%	7.89%	0.463	-0.50%	0.788
t-2	18.17%	16.40%	18.05%	13.00%	0.12%	0.969	-0.96%	0.576
t-1	15.95%	13.40%	17.06%	12.50%	-1.11%	0.681	-0.92%	0.543
t	15.72%	12.10%	16.58%	12.69%	-0.86%	0.805	1.07%	0.633
t+1	15.95%	15.80%	17.13%	13.80%	-1.18%	0.711	-0.46%	0.851
t+2	14.29%	12.40%	16.88%	14.50%	-2.60%	0.341	-1.29%	0.546

Table 4. The Test of Leverage Differentials

One way to interpret this result is that the attitude towards risk among female CEOs is not different from that of male CEOs. The results of the leverage test also have implications for the stock performance test. Since leverage after the female CEO appointment does not change comparative to male run companies, changes in leverage cannot explain the differentials in stock returns in the year following the female CEO appointment.

III.3 Limitations of the Study and Future Research

One limitation of this study is its small sample size. A second limitation concerns the matching procedure, which does not control for the effect of a leadership change in the female CEO sample. This limitation may be serious since the prior research suggests that such factors as voluntary versus forced resignation and insider versus outsider succession are significant explanatory factors of stock price performance.

Recognizing the limitations of this research, I suggest several directions for future research. To separate the pure effect of CEO gender, the control sample could be constructed of companies that experienced a CEO transition during the same time period. Another approach could be to introduce additional explanatory variables suggested by prior research, such as the reason for the incumbent CEO departure and the successor CEO origin. However, given the relatively small sample size, explanatory power of those variables is not expected to be significant.

Still, to assess the possibility of incorporating additional variables into my current research design I run a regression of stock price return differentials on the successor CEO origin. I chose successor CEO origin as the explanatory variable since this variable is the most directly observable. The origin of a new female CEO was measured by a dummy variable Outsider, which is given a value of 1 if the successor CEO is an outsider and a value of 0 if the successor CEO is an insider. Out of 58 companies in the sample only 13 incoming CEOs were outsiders. I use the annual returns one year after the female CEO appointment since only during this period the return differentials are statistically significant. The regression produced the following equation: Return Differential = -0.243 – 0.057 Outsider. This result is not statistically significant since the p-value of the Outsider variable is 0.808 with R^2 of 0%.

Another approach to separate the effect of CEO gender is to add a random sample of companies run by newly appointed male CEOs matched with comparable companies run by continuing male CEOs to the current sample. After that the differentials between the stock price returns of sample companies run by newly appointed CEOs and sample companies run by continuing CEOs can be regressed on the successor CEO gender along with new CEO origin and the reason for the departure of the previous CEO.

IV Summary

This paper investigates whether there are gender related differences with respect to the CEO's contribution to company performance and the choice of leverage. Based on prior research showing that women are discriminated when it comes to promotion to higher management positions, I hypothesize that women who ultimately reach the position of CEO possess superior skills relative to their male counterparts. Therefore, I predict superior performance from female CEO led companies. Another strand of research shows that women are more risk averse when financial decisions are concerned. To test the relevance of this phenomenon for women in CEO position this paper studies the differences in leverage between female CEO and male CEO led companies.

This study demonstrates that female CEO run companies significantly under-perform male CEO run companies in the year following the female CEO appointment. Starting from the second year after the female CEO appointment no statistically significant differences in stock price performance between female CEO and male CEO run companies was observed. However, this result is inconclusive since the underperformance can also result from other factors, such as the mere CEO succession itself or earnings management, which were not controlled for. This study also does not

find any statistically significant difference between the leverage levels of female CEO and male CEO run companies.

References

Bajtelsmit, V. L., VanDerhei, J.A.(1996). Risk aversion and retirement income adequacy. University of Pennsylvania Press.

Bartov, E., Mohanram, P. (2004). Private information, earnings manipulations and executive stock options exercises.

Bertrand, M., Hallock, K. (2001). The gender gap in top corporate jobs. Industrial and Labor Relations Review , vol 50.

Cobb-Clark. D. (2001) Getting ahead: the determinants of and payoffs to internal promotion for young U.S. men and women. Australian National University Working Paper No. 395; IZA Discussion Paper No. 288

Dharment-Ferere, I. Renneboog, L. (2002) Share price reactions to CEO resignations and large shareholder monitoring in listed French companies Oxford University Press

Jianakoplos, N., Bernashek, A.(1996). Are women more risk averse? Colorado State University Working Paper.

Khurana, R., Nohria, N. The performance consequences of CEO turnover.

Wells P. A. (2002) Earnings management surrounding CEO changes Accounting and Finance, Vol. 42, pp. 169-193, 2002

Zelechowski, D. D, Bilimoaria, D. (2004) Characteristics of women and men corporate inside directors in the US. Corporate Governance: An International Review, Vol. 12, No. 3, pp. 337-342, July 2004

Zinkhan, G. M., Karande, K. W. (1991) Cultural and gender differences in risk taking behavior among American and Spanish decision makers. The Journal of Social Psychology.

USA Today (2003) http://www.usatoday.com/money/companies/management/2003-12-30-womenceos_x.htm

Appendix

Study Samples

Female CEO Sample				Male CEO Sample			
Company Name	SIC Code	Sales	Market Cap	Company Name	SIC Code	Sales	Market Cap
E.piphany Inc	7372	96.13	538.75	Interwoven Inc	7372	111.51	516.90
Allied Healthcare International	8082	294.38	139.03	Radiologix Inc	8093	257.01	73.72
Sonesta International Hotels	7011	90.13	17.00	Arlington Hospitality Inc	7011	76.53	17.17
The Boyds Collection	3942	131.34	393.09	Wms Industries Inc	3990	174.69	478.97
Alaska Communications Systems Group	4813	343.50	56.57	Talk America Holdings Inc	4813	317.51	153.83
Bitstream Inc	7372	8.47	14.03	Plm Equip Growth Fd V -Lp	7359	9.28	11.87
Tower Automotive	3460	2,754.46	252.23	Silgan Holdings Inc	3411	1,988.28	449.94
Global Epoint	3571	0.18	5.34	Silicom Limited	3576	2.73	1.23
Rite Aid Corporation	5912	15,800.92	1,262.03	Toys R Us Inc	5945	11,305.00	2,125.00
Advent Software	7372	159.44	447.79	Open Text Corp	7372	152.48	456.15
Russ Berrie & Co Inc	3942	321.36	693.33	Yankee Candle Inc	3990	444.84	869.74
Cyberoptics Corp	3827	24.63	39.00	Mocon Inc	3829	19.93	38.78
The Phoenix Companies	6311	2,452.90	714.74	Landamerica Financial Gp	6361	2,586.55	650.47
Claire's Stores	5600	918.74	734.92	Pacific Sunwear Calif Inc	5651	684.84	669.18
Banta Corporation	2750	1,457.94	730.03	Standard Register Co	2761	1,187.64	514.26
Pathmark Stores	5411	3,963.30	741.13	Pao De Acucar Brasil -Gdr	5411	3,515.39	1,090.98
Rubio's Restaurants	5812	112.94	29.09	Elxsi Corp	5812	105.40	30.69
Zale Corp	5944	2,068.24	1,458.05	Insight Enterprises Inc	5961	2,082.34	1,031.31
Salix Pharmaceuticals	2834	22.35	338.36	Novavax Inc	2836	24.07	328.46
Ihop Corp	6794	324.44	606.83	Colonial Properties Trust	6798	318.68	653.43
Axcelis Technologies	3559	365.26	1,255.16	Cirrus Logic Inc	3576	417.53	1,096.98
Edgewater Technology	7370	26.57	45.80	Mitcham Industries Inc	7359	27.18	39.82
Lucent Technologies	7370	21,294.00	21,509.25	Electronic Data Systems Corp	7370	21,543.00	32,719.94
Qrs Corp	7372	143.49	187.87	Pegasus Solutions Inc	7370	161.53	170.86
Argonaut Technologies	2835	17.45	155.30	Columbia Laboratories Inc	2834	13.17	131.51
Xerox Corporation	3577	18,701.00	3,092.16	Sanyo Electric Co Ltd -Adr	3579	18,072.56	15,672.14
Cns Inc	3842	68.89	50.29	Candela Corp	3845	75.39	58.91
Immunomedics	2835	4.78	1,060.57	Cerus Corp	2836	1.85	1,057.41
Visx Incorporated	3845	200.25	634.14	Cooper Companies Inc	3851	197.32	576.59
Gymboree Corp	2300	448.61	389.06	Oshkosh B'Gosh Inc -Cl A	2300	453.06	225.18
Lee Enterprices Inc	2711	422.14	1,306.09	Journal Register Co	2711	463.97	720.47
Carver Bancorp	6035	30.86	20.25	Independence Fed Svgs Bk	6035	25.99	16.97
Chester Valley Bancorp	6020	34.58	61.30	Sterling Bancorp/Ny	6020	97.73	133.84
Agl Resources	4924	1,068.60	970.70	Equitable Resources Inc	4923	1,062.74	1,092.36
Hot Topic Inc	5600	168.95	224.62	Christopher & Banks Corp	5621	143.40	141.73
Coachmen Industries Inc	3716	606.47	487.68	Orbital Sciences Corp	3760	461.44	554.78
Aspect Communications Corp	3661	489.11	1,935.20	Adtran Inc	3661	367.21	1,976.18
Alpharma Inc -CL A	2834	732.44	910.60	Church & Dwight Inc	2840	730.04	1,036.97
Columbia Banking System	6020	94.50	139.16	Sterling Bancorp/Ny	6020	97.73	133.84
Ventas Inc	6798	149.93	826.91	Choice Hotels Intl Inc	6794	165.38	776.45
Avon Products	2844	5,212.70	11,616.55	Air Products & Chemicals Inc	2810	4,919.00	8,458.80
Zale Corp	5944	1,427.01	1,173.90	Systemax Inc	5961	1,435.65	844.49
Hewlett-Packard Co	3570	47,061.00	69,364.72	Nec Corp -Adr	3571	40,334.00	14,724.44
Tennant Company	3580	389.39	366.50	Kulicke & Soffa Industries	3559	411.04	414.76
Johnson Outdoors	3690	328.53	74.87	Lamson & Sessions Co	3640	270.91	68.91
Cascade Bancorp	6020	23.15	116.82	Riverview Bancorp Inc	6035	22.78	103.11
Syms Corp	5651	352.96	211.96	Amern Eagle Outfitters Inc	5651	405.71	349.01
Vermont Teddy Bear	3942	17.04	12.26	Womens Golf Unlimited Inc	3949	8.56	2.07
Firstfed Financial Corp	6035	308.09	231.64	Webster Financial Corp	6035	291.06	291.28
Department 56 Inc	3260	252.05	826.83	Waterford Wedgwood Plc -Adr	3260	551.20	667.84
Siebert Financial Corp	6211	21.04	8.02	Crown Financial Group Inc	6211	24.95	9.97
Avant Immuterapeutics	2835	3.96	62.13	Interferon Sciences	2836	3.31	46.84
Charming Shoppes	5621	1,272.69	681.67	Burlington Coat Factory Wrhs	5651	1,468.44	483.25
Theragenics Corp	2834	4.38	58.21	Interferon Sciences	2836	3.31	46.84
Autodesk Inc	7372	237.85	1,238.91	Cadence Design Systems Inc	7372	392.26	1,060.17
Playboy Enterprices	4841	161.77	118.75	Clear Channel Communications	4832	32.46	39.78
Pinnacle Systems	3577	331.08	540.70	Ionics Inc	3559	347.41	570.05
Books-a-Million	5940	460.16	106.30	Chronimed Inc	5912	435.71	106.35