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Are IPOs Priced Differently Based Upon Gender?

Nancy J. Mohan and Carl R. Chen

Differences between male and female management style, risk aversion, investment strategies, and financial decision making can be found in economic, management, psychology, and social literature. There are no published studies, however, linking gender issues with valuation. In this article, we consider differences in pricing female- versus male-led initial public offerings. Specifically, we find no difference in firm characteristics between a female-led and a male-led IPO, and no difference in underpricing between male-led and female-led IPOs after controlling for firm-specific variables. Our evidence suggests that in a market such as IPOs, where subjects share more similar opportunity sets, wealth, and knowledge, gender bias does not exist.

This article examines differences in financial characteristics between female- and male-led initial public offerings. In particular, we consider whether a CEO's gender influences the initial price of the company and, consequently, the early returns to shareholders.

The idea of gender effects on various forms of behavior appears in both the academic and the business press. Differences between male and female social behavior, management style, risk aversion, investment strategies, and financial decision making can be found in economic, management, psychology, and social literature. But do the financial markets view these differences as significant influences on a company's ability to prosper?

One difficulty of this type of research is sample size. The business press often reports on the scarcity of female CEOs and top management in general. Only 1.2% of the Fortune 500, for example, has a female in the top seat; the figure is less than 1% for the Fortune 1000 (Stanley [2002]). In a study of executive pay for the top five officers of 1,500 large publicly traded firms, Bertrand and Hallock [2001] report that just 2.4% of the sample is female. A review of firm commitment initial public offerings for 1999-2001 provides a slightly higher percentage of 3.3%. Relatively speaking, few women progress to the CEO position.

The lack of women running public companies has been explained by both structural and cultural impediments (Oakley [2000]). Consider the structural impediments. Catalyst, the non-profit organization specializing in research on women's issues, analyzed feedback from women in senior positions and from CEOs in Fortune 100 corporations.[1] Both male and female senior executives were asked to cite women's obstacles to obtaining CEO positions. The majority of men cited a "lack of management experience" and "not being in the pipeline long enough." Although women are progressing to the corporate officer level, they are more likely to be in staff or support functions. Because CEOs typically come up from line experience, the increasing numbers of women in staff or support functions may not indicate more women CEOs in the future.

Cultural difficulties are more difficult to quantify. Good job performance should lead to promotion. However, studies find that even when women are rated more highly for performance and interpersonal skills when compared to men, they were not rated as having superior management potential (Shore [1992]). Heilman et al. [1989] found that "general stereotypes about women appear to be deeply rooted, widely shared, and remarkably resistant to change." They also found that male managers were more often characterized as having leadership ability and skill in business matters than women managers.

Perhaps this is because traditional feminine leadership characteristics may not fit within a traditional CEO style. Merrill-Sands and Kolb [2001, p. 3] summarize recent management studies conducted by consultants as follows: "Paradoxically, when women competently demonstrate the leadership behaviors that are traditionally associated with 'bottom-line results' and conform most closely to masculine norms of leadership, they are often perceived as less rather than more effective as leaders."[2] Interestingly, Kawakame, White, and Langer [2000] suggest that female managers can overcome lack of respect for feminine traits through training for awareness of masculine behavior.

Some psychology and economic researchers suggest that men and women display different financial decision making processes and risk aversion profiles. For example, Estes and Hosseini [1988] report that women are less confident when making investment

Nancy Mohan is an Associate Professor at the University of Dayton. Carl Chen is a Professor at the University of Dayton.

Requests for reprints should be sent to: Nancy J. Mohan, University of Dayton, 300 College Park Ave., Dayton, OH 45469-2251. Email: mohan@udayton.edu

decisions. Barber and Odean [2001], however, argue that men are "overconfident," and as a result turn over their portfolios 77% annually, as compared to 53% for women. Barber and Odean [2001] also find that women tend to hold less risky portfolios than men. This is consistent with Jianakoplos and Bernasek [1998], who report that single women are relatively more risk averse than single men.

After surveying a sample of chartered financial analysts and certified financial planners, Olsen and Cox [2001] found that women professional investors were more concerned about downside risk than their male counterparts. Also, women focused more on risk reduction, given a target return, while men tended to focus on increasing return. Interestingly, Olsen and Cox [2001] also reported on the impact of gender on average financial risk for different asset classes —women rated IPOs as having significantly higher risk.

There is some contrasting research arguing that risk is not perceived differently according to gender, however. Using a different experimental design, Schubert et al. [1999] argue that there is no gender difference in risk propensity when subjects face contextual decisions instead of abstract ones. Although most of the research has been conducted around financial securities investments, the results may be generalized to risk-taking. And perceived differences in risk-taking may affect the ability of women to be promoted to the top spot. Alternatively, IPOs, if managed by women, may be perceived as offering lower risk profiles to investors.

In this study, we examine if there is gender bias in one segment of the financial markets —initial public offerings. Although the impact of this type of stereotyping on IPOs is difficult to estimate, the question of gender is compelling because it concerns the board of directors and may be an issue for investment bankers when preparing a firm for its public debut.[3]

According to Stanley [2002], one executive recruiter reports that some boards raise such issues when it comes to hiring women: "I'll say the unspoken: A lot of companies are still more comfortable with a white male in the job" (p. 10).[4] Consider the following comment attributed to Ellen M. Hancock, former chief executive of Exodus Communications, concerning the board of directors' concerns about hiring women for the top spot, "Can we risk the company on him? Can we risk the company on a her?" (Stanley [2002, p. 10]). Clearly, women may face more scrutiny from the financial press, and choosing a female CEO may result in heightened scrutiny of a firm's performance.

We find no evidence to support a gender bias argument in the IPO markets. IPOs led by female executives appear to have the same firm characteristics as male-led IPOs. Moreover, we find no evidence of differential underpricing, which suggests that underwriters do not differentiate between female- and male-led IPOs in regard to pricing.

The rest of the paper is organized as follows: The second section presents some test hypotheses and the data source. The third section reports the methodology and empirical results and offers some discussion. The fourth section presents survey results, followed by a final concluding section.

Hypotheses and Data

Hypotheses

Prior studies document that the IPO offering price is set so that investors earn abnormally high initial returns. Various theories explaining large first-day returns include asymmetric information (Baron [1982], Rock [1986]), signaling (Allen and Faulhaber [1989], Grinblatt and Hwang [1989]), lawsuit avoidance (Tinic [1988]), and aftermarket support (Rudd [1993], Schultz and Zaman [1994], Hanley, Kumar, and Seguin [1993]).

In general, the more uncertain the value of the company, the higher the discount, or underpricing, required. And a CEO's gender may be seen as creating additional uncertainty for financial markets in gauging the true value of the IPO, perhaps because females are seen as more risk averse and less confident in financial decision making (Jianakoplos and Bernasek [1998], Sunden and Surette [1998], Barber and Odean [2001], Olsen and Cox [2001]).

One consequence of this stereotype would be to discount the potential success of women in the financial and labor markets. If investment bankers share this opinion, and investment bankers are the informed party (Baron [1982], Rock [1986]), larger underpricing may be required for female-led IPOs to induce the market to subscribe to the issue. Therefore, we derive Hypothesis 1 as:

> H1: If investment bankers believe that investors prefer male-led companies, ceteris paribus, female-led IPOs will be more underpriced than male-led IPOs in order to induce the subscription.

Some preliminary research, however, suggests that female managers perform equally well or better than their male counterparts. A study of the Standard and Poor's 500 by Covenant Investment Management ("Managing Diversity..." [1995]) found that "businesses committed to promoting minority and women workers had an average annualized return on investment of 18.3% over a five-year period, compared with only 7.9% for those with the most shatter-proof glass ceilings" (p. 6). And a survey of 22,000 French firms found that women make far more successful managing directors than men (Hunter and Reid [1996]). These

authors found that firms managed by women were twice as profitable and grew twice as fast.

Welbourne [1999] considers IPO performance of firms with women in the top management team and finds they had stronger IPOs and greater financial success over the long term. As a short-term indicator of market success, Welbourne [1999] found at IPO date a positive correlation between the percentage of women participating in management and a modified Tobin's Q.[5] She also documents a long-term positive effect between gender and stock and firm performance.[6] These studies may suggest a positive relationship between gender and market performance.

Current estimates of women-owned businesses exceed 9 million, and these businesses generate $3.6 trillion in sales.[7] However, a low percentage of venture capital flows to women-owned companies. In 2000, $89.8 billion in venture capital was invested in 5,481 deals—but only 5% of the cash went to firms owned or led by women, which was 6% of the deals.[8] The percentage of women-led IPOs is even less than the percentage receiving venture capital. During 1999-2001, 3.3% of IPOs had female CEOs.[9]

Going public is a rigorous process, and the investment banker is an important player—responsible for such tasks as cleaning up the balance sheet and selecting strong management to impress potential investors during the road show.[10] Given the low percentage of women at the top in IPOs, could a female CEO be a signal to the market of exceptionally strong management, one that is reflected in the degree of underpricing?[11] If this is true, smaller underpricing would be needed to market what would be seen as high-quality firms. We therefore derive the second hypothesis:

> H2: Women-led IPOs signal high-quality firms, therefore less underpricing is needed.

Finally, some researchers find little difference between female and male economic behavior after controlling for certain variables (e.g., opportunity set, wealth, knowledge). For example, Schubert et al. [1999] find no evidence that women are more risk averse in financial decision making. The authors argue that there is no gender difference in risk propensity when subjects face contextual decisions. Since risky financial decisions are inherently contextual, gender differences found in prior studies are attributed to differences in opportunity sets rather than stereotypical risk attitudes.

Atkinson, Baird, and Frye [2003] also find that female and male mutual fund managers are similar in performance, risk, and other fund characteristics. Therefore, our third hypothesis is:

> H3: In a market where opportunity set, wealth, and knowledge are similar between female and male executives, investment bankers do not distinguish high-quality firms from low-quality firms based solely on gender. Therefore, female-led IPOs are neither more nor less underpriced than male-led IPOs.

Data

The IPO Monitor provides a comprehensive list of IPOs online for 1999 through 2001.[12] We use this sample period because female-led IPOs were rare before 1999. The listing includes common stock and ADS firm commitment offerings for both domestic and foreign company offerings. In total, there were 1,005 initial public offerings during this period, with most occurring in 1999 (492) and 2000 (422).

These companies were individually checked for the gender of the CEO at the time of the public offering by referencing the prospectus on file with the SEC (available online through Lexis-Nexis). The percentage of IPOs with women CEOs at offering date declined slightly from 1999 to 2000, from 3.5% to 3.3%, but took a steeper drop in 2001 to 2.2%. The absolute numbers are small, with seventeen in 1999, fourteen in 2000, and only two in 2001.

Prior studies document that initial returns are affected by risk, and various proxies are used to measure risk. For purposes of this study, we include the amount of gross proceeds received from the offering, the standard deviation of earlier trading returns, the percentage float, and the market value of the firm's equity at the time of offering. Descriptive data concerning the IPOs came from several sources. Offering date and price, gross proceeds, market capitalization, the percent of shares floated, and executive age came from the IPO profile, available at www.ipomonitor.com.

We referenced the CRSP database to obtain stock returns for the first twenty trading days and the matching CRSP value-weighted index return.[13] Because CRSP did not contain data for some of the IPOs, the sample size is reduced to 757, among which only 33 were female-led IPOs. Executive age and percentage of shares floated was not available for all companies, so, depending on variables used, the number of observations ranges from 731 to 757.

Table 1 contains some descriptive statistics for our sample. The mean excess initial return (ER0), defined as the percentage change from offering price to first closing price adjusted for market return (CRSP equally weighted return), is nearly 37%, with a standard deviation of 43%. The high standard deviation reflects the wide range: the maximum is nearly 208%, while the minimum is -56.7%.

We estimate ex ante risk by measuring risk ex post—calculating the standard deviation of the stock returns for the first twenty days of trading, excluding the initial return. STD19 has a mean of 7.28% and a standard deviation of 3.81%. The mean offering price (OP) is $15.44,

Table 1. *Descriptive Statistics*

Variable	N	Mean	Standard Deviation	Minimum	Maximum
ER0	757	0.3695	0.4283	–0.5673	2.0771
STD19	757	0.0728	0.0381	0.00469	0.3255
OP	757	15.44	6.57	5.00	71.95
GP	757	229.86	710.86	7.50	10,620.0
FLOAT	742	0.2594	0.5798	0.0182	15.1578
MV	742	1,018.01	3,190.04	8.972	60,161.62
AGE	731	45.80	8.23	26.0	79.0

Note: Mean, standard deviation, minimum value, and maximum value of all variables used in the study. ER0 measures the market-adjusted return from IPO date to first closing price, STD19 is the standard deviation of daily stock returns during the first twenty trading days, excluding the IPO date. OP is the offering price, AGE is the CEO's age, GP is the gross proceeds of the offering in millions, FLOAT is the percentage of shares floated, and MV is the market value of equity of the IPO firm in millions.

with a standard deviation of $6.57. The lowest offering price of $5.00 is a small fraction of the $71.95 high.

The offering gross proceeds (GP) averaged $229.86 million, with a standard deviation of $710.86 million. Again, we see a wide range, with the smallest offering, $7.5 million, constituting only 0.07% of the largest, $10,620 million. The percentage of shares floated (FLOAT) has a mean of 25.9%, and the average market capitalization (MV) is slightly over $1 billion, with a standard deviation of $3.19 billion.

During 1999-2001, it was common for companies going public to have very young CEOs. We find the minimum CEO age to be 26, with an average age of 45.8, and a maximum of 79. We considered CEO age based on observation of individual data points—during data collection, a much wider range of ages was observed for the male CEO companies.

Methodology and Empirical Results

Univariate Analysis

Table 2 presents a simple analysis of gender differences for underpricing and other firm characteristics, both means and medians. On average, the means and medians for underpricing, standard deviation of early trading returns, age, and float are slightly higher for female-led companies, but the differences are not statistically significant. The average first-day return for female-led IPOs is 39%, and 36.8% for male-led IPOs. The difference is not statistically significant (via both a t-test and a Wilcoxon non-parametric test).

We also tested for the differences in median values, reported in parentheses, because the distributions for some variables are highly skewed. The Wilcoxon non-parametric test of equal medians, however, cannot be rejected. The averages for offering price, gross proceeds, and market value are less, but again, the differences are not statistically significant. Our preliminary analysis, therefore, suggests little difference between female- and male-led IPOs.[14]

In Table 3, we further examine the initial returns by partitioning the sample by gender and year. One may speculate that because 1999 was a "hot" market for IPOs, the risk premium may have been lower, which would favor a finding of no difference between female- and male-led IPOs. On the other hand, the market cooled off substantially during the second half of 2000 and 2001. A higher risk premium would have been required for perceived lower-quality firms, thus favoring the finding of a difference.

Examining initial excess returns by year, 1999 provides the highest return, with nearly 45%, followed by 34% in 2000. During 2001, the initial return dropped to 12.45%. These numbers seem high when compared to results from earlier studies, e.g., 14.1% in Beatty and Ritter [1986] and 21.67% in Chalk and Peavy [1987]. In retrospect, however, the IPO market during our time period was very active, and historical comparisons may not be meaningful.

Ritter [2002] provides some comparable period data. Underpricing and gross proceeds for firms going public in 1999, 2000, and 2001 averaged 70.89% and $133.3 million, 57.29% and $171.69 million, and 14.15% and $429.30 million, respectively. Our sample companies on average have less underpricing. We suspect this is due to the sample restriction of post-IPO price data availability on CRSP, which results in fewer companies in our sample as compared to Ritter's analysis.

When partitioned by gender and by year, male-led IPOs had less underpricing in 1999 and more underpricing in 2000 than female-led IPOs, although none of the differences is statistically significant. The only significant statistic is found in 2001, when there were only two female-led IPOs, which negates any meaningful conclusions. Results from Table 3, therefore, lend more support to our preliminary findings of little difference between female- and male-led IPOs.

Table 4 reports Pearson correlation coefficients of all variables used in this study, and we then conduct a multivariate analysis. As expected, the initial return (ER0) is positively correlated with the standard deviation of early trading returns (STD19) and negatively

Table 2. *Sample Comparison Based on Gender*

Variable	Female	Male	t-Value	Wilcoxon Z
ER0	0.3928	0.3685	0.33	0.52
	(0.3046)	(0.2346)		(0.54)
STD19	0.0751	0.0727	0.39	0.59
	(0.0726)	(0.6919)		(0.19)
OP	14.82	15.47	–0.69	–0.43
	(13.00)	(14.94)		(–1.24)
AGE	46.03	45.78	0.20	0.13
	(44)	(45)		(–0.17)
GP	174.52	232.38	–1.16	0.60
	(94.88)	(80.00)		(0.90)
FLOAT	0.3065	0.2572	0.54	–0.60
	(0.1808)	(0.2040)		(–1.25)
MV	848.89	1,026.01	–0.70	0.67
	(457.61)	(394.52)		(0.89)

Note: Means and medians by gender. Medians in parentheses. ER0 is the first day excess return from offering price to first market closing price; STD19 is the standard deviation of daily stock returns during the first twenty days, excluding the IPO date. OP is the offering price, AGE is the CEO's age, GP is the gross proceeds of the offering in millions, FLOAT is the percentage floated, and MV is the market value of equity of the IPO firm in millions. t-tests are corrected for unequal sample variances where appropriate. Wilcoxon Z tests the null hypothesis that the female and male distributions are identical. The number of observations for the female sample is 33, and it ranges between 698 and 724 for the male sample, depending on the variables.

Table 3. *Sample Comparison Based on Gender and Year*

Year	Total Sample	Male	Female	Wilcoxon Z	t
1999					
Initial Returns	0.4485	0.4459	0.4998	0.61	0.48
Sample Size	348	331	17		
2000					
Initial Returns	0.3448	0.3484	0.2644	-0.6	0.73
Sample Size	330	316	14		
2001					
Initial Returns	0.1245	0.1178	0.3825	1.70*	2.76**
Sample Size	79	77	2		

Note: Mean initial return segmented by gender and period. * and ** denote significance at the 10% and 5% levels, respectively.

Table 4. *Correlation Matrix*

	ER0	STD19	OP	AGE	GP	FLOAT	MV
ER0	1.0	0.348	0.336	–0.207	–0.085	–0.081	0.0003
		(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.99)
STD19		1.0	–0.051	–0.282	–0.207	–0.092	–0.137
			(0.16)	(0.01)	(0.01)	(0.01)	(0.01)
OP			1.0	–0.017	0.357	–0.06	0.473
				(0.64)	(0.01)	(0.10)	(0.01)
AGE				1.0	0.124	0.087	0.090
					(0.01)	(0.02)	(0.01)
GP					1.0	0.066	0.663
						(0.07)	(0.01)
FLOAT						1.0	–0.033
							(0.38)
MV							1.0

Note: Pearson correlation coefficient between variables. ER0 is the first day excess return from offering price to first market closing price; STD19 is the standard deviation of daily stock returns during the first twenty days, excluding the IPO date. OP is the offering price, AGE is the CEO's age, GP is the gross proceeds of the offering in millions, FLOAT is the percentage floated, and MV is the market value of equity of the IPO firm in millions. *p* values are in parentheses.

correlated with gross proceeds (GP), both popular measurements of IPO risk. The positive correlation between OP and ER0 is counterintuitive. The negative correlation between FLOAT and ER0 is also not consistent with the argument that a higher percentage of shares retained signal quality.

An interesting result is the negative correlation between initial return and age and standard deviation of early returns and age. The older the CEO, the less underpricing and ex post risk. The results in Table 4, nevertheless, are based on univariate analysis and do not consider factors that may also have an impact on IPO underpricing.

Multivariate Analysis

Table 5 reports empirical results based upon multiple regression analysis. The basic regression model is:

$$\begin{aligned} ERO_i = {} & \alpha + \beta_1 STD19_i + \beta_2 LnGP_i + \beta_3 LnMV_i + \\ & b_4 FLOAT_i + \beta_5 AGE_i + \beta_6 OP_i + \lambda_1 d_i + \\ & \lambda_2 d00_i + \lambda_3 d_i d00_i + \mu i \end{aligned} \quad (1)$$

Five equations are presented in Table 5. Equation (1) examines the determinants of IPO underpricing with exogenous variables STD19, LnGP, LnMV, FLOAT, AGE, and OP. All t-statistics reported are heteroscedasticity-consistent. STD19, a proxy of ex ante risk, carries a positive sign and is statistically significant at the 1% level, which is consistent with prior studies. The natural logarithm of gross proceeds (LnGP) is negatively significant, consistent with the argument that larger gross proceeds signal lower risk. The positively significant coefficients of LnMV, FLOAT, and OP are not consistent with a priori expectations. Presumably, large firm market values, higher percentage of shares retained, and larger offering prices all signal higher quality, thus less underpricing is expected.

Of course, this argument holds only if the investment banker is the informed party who prices IPOs based on firm quality, and if the IPO market is always rational and contains no bubble. If the market overreacts, the initial return could contain two components: rationally priced components and overreact components. In the "hot" market of 1999, investors could overreact to high-quality issues, signaled by high offering prices and high market capitalizations, and bid the prices up beyond the level of rational underpricing. The relationship between these exogenous variables and underpricing is thus muddied by investor overreaction.

The age of the CEO (AGE) carries a negative sign and is statistically significant at the 1% level, suggesting that older executives are considered a quality asset that will tend to reduce the underpricing.

In Equation (2), we add a binary variable *d* that takes a value of 1 if a female executive leads the IPO, and 0 otherwise. The purpose is to test whether gender differences impact IPO underpricing, other things held constant. The coefficient of *d* is positive but statistically insignificant, consistent with the results using univariate analysis. Because IPOs led by females share the same firm characteristics as male-led IPOs, this result should be anticipated if IPOs are rationally priced based on firm quality.

In Equation (3), we add another binary variable *d00* that takes a value of 1 if the time period is May 2000 and forward, and 0 otherwise. This binary variable is added to take into account different market conditions. The period starting in 1999 through the first four months of 2000 was a hot market. Variable *d00* carries a negative sign and is statistically significant at the 1% level, consistent with our observation of a cold market after April 2000.

In Equation (4) we add another variable that takes into account the interaction between variables *d* and *d00*. Variable *d*d00* thus tests if there is gender bias under different market conditions. Although *d00* remains statistically significant, *d*d00* is not.

Table 5. *Multivariate Regression Analysis of IPO Underpricing*

	STD19	LnGP	LnMV	FLOAT	AGE	OP	d	d00	d*d00	Adj-R2
(1)	2.9084	–0.2107	0.1177	0.0592	–0.0049	0.0365				0.3318
	(7.01)***	(–5.62)***	(3.46)***	(4.39)***	(–2.96)***	(9.02)***				
(2)	2.9034	–0.2113	0.1177	0.0590	–0.0050	0.03661	0.0421			0.3312
	(7.0)***	(–5.65)***	(3.46)***	(4.39)***	(–2.96)***	(9.04)***	(0.67)			
(3)	2.48	–0.214	0.1343	0.0595	–0.0041	0.0337	0.0282	–0.1227		0.346
	(5.90)***	(–5.87)***	(4.03)***	(4.61)***	(–2.42)**	(8.22)***	(0.45)	(–4.51)***		
(4)	2.477	–0.215	0.1345	0.0595	–0.0041	0.0338	0.0464	–0.12	–0.065	0.346
	(5.89)***	(–5.87)***	(4.04)***	(4.61)***	(–2.43)**	(8.26)***	(0.62)	(–4.34)***	(–0.49)	
(5)	2.901	–0.094		0.000256	–0.0046	0.0372	0.0469	–0.104	–0.059	0.329
	(6.96)**	(–5.59)**		(0.0124)	(–2.72)**	(9.00)***	(0.61)	(3.79)***	(–0.44)	

Note: Multivariate regression results of IPO initial returns. ER0 is the dependent variable. STD19 is the standard deviation of daily stock returns during the first twenty days, excluding the IPO date. OP is the offering price, AGE is the CEO's age, LnGP is the natural logarithm of the gross proceeds of the offering in millions, FLOAT is the percentage floated, LnMV is the natural logarithm of the market value of equity of the IPO firm in millions, d is a binary variable such that its value is one if the CEO is female and zero otherwise, d00 is a binary variable such that its value is 1 if the year is May 2000 to 2001, and zero otherwise, and d*d00 is the product of d and d00. White heteroscedasticity-consistent standard errors are used to estimate t-statistics in Equations (1) through (4), and White adjusted t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. Equation (5) is estimated using Hansen's generalized method of moments (GMM).

Finally, Equation (5) is estimated with two modifications. First, we drop variable LnMV because it is highly correlated with LnGP (with a simple correlation coefficient of 0.663), and such high correlation may affect the regression results. Second, we estimate Equation (5) with Hansen's [1982] generalized method of moments (GMM). GMM does not require specific distributional assumptions, such as the normality assumption, for the variables. Also, the GMM estimate is robust with respect to conditional heteroscedasticity and serial correlation in residuals.

After modifying Equation (5), the only change is that FLOAT becomes insignificant. Therefore, consistent with the univariate results reported in Table 3, there is no evidence to support the argument of gender bias under different market conditions.

To summarize, our analysis supports Hypothesis 3, that in a market where opportunity set, wealth, and knowledge are more similar between female and male executives, investment bankers do not distinguish high-quality firms from low-quality firms based solely on gender. Therefore, female-led IPOs are neither more nor less underpriced than male-led IPOs.

Feedback from Female CEOs and Investment Bankers

Due to the small sample size, we supplemented our market-based results with a survey of the female CEOs and investment bankers involved in the offerings. Of the original sample of thirty-three firms, sixteen CEOs are still with the company, which continues to be publicly traded. We located six other women who are currently in different positions.

A five-question (open-ended) survey was sent to each. The questions, listed in Appendix A, relate to the gender issues studied: risk and managerial style differences. The response rate was 18%, which, although normal for questionnaires, only provided four responses. One CEO, however, offered to follow up the written survey with a telephone interview. The comments from the four respondents, plus the additional remarks from the phone interview, are also in Exhibit 1.

It is difficult to draw any meaningful conclusions from such a small number of responses. However, three respondents supported the empirical research that men are quicker to enter into risky investments (question 3). In addition, there appear to be remaining hurdles for women in heading up a company (questions 1 and 2). Interestingly, one CEO thought her gender resulted in greater investor attention during the road show.

Twenty-eight short questionnaires were sent to investment bankers, but garnered only three responses. The content was very similar to the questions listed in Exhibit 1. The difference between the two questionnaires involved open-ended questions for the CEOs versus limited choice answers for the investment bankers.

Two of the responding firms indicated that less than 3% of initial inquiries from firms wanting to go public have a female CEO; the third investment banker indicated a range from 3% to 10%. All three respondents disagreed with the statements that 1) women lack sufficient management training to obtain the CEO position, 2) women are less willing to undertake risky investment projects than men, and 3) during pre-IPO investor presentations, large investors may ask more questions about management if the CEO is female. However, two of the three investment bankers disagreed with the statement that, on average, the management style of a female CEO is different from that of a male CEO.

Conclusions

We study potential gender bias in the IPO market by comparing the initial underpricing and firm characteristics of female- versus male-led IPOs. First, we find no differences in IPO characteristics in terms of ex ante risk, gross proceeds of the offering, offering price, age of the CEO, market capitalization of the IPO firm, or percentage of shares floated. Second, we find no differences in IPO underpricing between female- and male-led firms after controlling for firm characteristics. Third, although the market condition impacts IPO underpricing, the impact is homogeneous between male- and female-led IPOs. Prior studies find gender bias decreases or is eliminated after certain variables are controlled for (Heilman et al. [1989], Schubert et al. [1999]). Because our focus is the IPO market, differences in opportunity sets, wealth, and knowledge are minimized between genders. Our findings are, therefore, more consistent with studies that find no gender bias in economic behaviors.

Our study, however, is limited by the relatively small number of female-led IPOs, which have occurred more often only in recent bull markets. A natural extension of this research is to track long-term performance of women-led IPOs, which would provide more conclusive evidence concerning management abilities. In addition, an analysis of gender effects in alternative market conditions may provide more clues about the impact of gender on IPO pricing.

Notes

1. "Women in Corporate Leadership: Progress and Prospects" [1996].

2. Also see "Powerfully Nice: Can Women Get Ahead by Being Nice?" [2001]. This news story highlights the Silicon Valley company Bully Broads, which provides anti-assertiveness training for female executives.
3. Before going public, a firm's management must give numerous presentations to security analysts during what are referred to as road shows.
4. Attributed to Jeffrey E. Christian, chairman of Christian & Timbers, an executive search firm in Cleveland, Ohio.
5. For this study, Tobin's Q was defined as share price divided by book value, both at the time of offering and three years later.
6. Welbourne's [1999] results consider risk, measured as the number of paragraphs discussing risk factors in the prospectus, and size, the number of employees.
7. From the *Annual Report of the National Women's Business Council*, 2000, p. 5.
8. From *A Compendium of National Statistics on Women-Owned Businesses in the U.S.*, released by The National Women's Business Council, February 14, 2002, available at www.nwbc.gov.
9. Percentage relates to firm commitment IPOs.
10. For a narrative description about the going public process, see Kerr [1996].
11. Recent research results on the effect of gender and competition on tournament play reported by Gneezy, Niederle, and Rustichini [2001] provide supporting evidence. The authors report that, on average, women's performance is hurt by mixed competition — that is, women scored lower during tournament play when men participated in the tournament. However, the best women were unaffected.
12. The list is available at www.ipomonitor.com.
13. Four of the female CEO companies did not have CRSP data. In those cases, we obtained prices from Yahoo.com or from Bigcharts.com.
14. A comparison of the gross proceeds and price provides some nominal support for Welbourne's [1999] finding that female-led IPOs achieve higher offering prices. Although the average female-led firm had only 75% of the average gross proceeds for male-led firms, the female firms' average offering price was 96% of the male-led firms'.

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APPENDIX A
Survey and Responses from Women CEOs Taking Companies Public

1. In general, the lack of women CEOs has been attributed to insufficient management training, such as not enough time in upper-level positions or having a background in staff or support functions.

   Do you agree with this statement? Are there other explanations for the lack of women CEOs?

   a. No. Plenty of companies train women who are "stars." I certainly had excellent training. Many women do not want the stress/burden of being a CEO if they have a family.
   b. Yes, I agree.
   c. Many of the decision makers who choose the CEO are men and they often have a hard time considering a woman.
   d. Partially agree with this statement. We are seeing increasing numbers of females in upper-level management positions. Many have made lifestyle choices and don't want the responsibility/travel schedule/lack of family time that comes with being a CEO.

2. Did the issue of CEO gender surface during negotiations and discussions with the investment bankers?

   a. Not really. If you are good, you are valued.
   b. Yes—both overtly and otherwise.
   c. In a very positive way, the investment bankers believe that the CEO being a woman made the road show stand out.
   d. No.

3. In your experience, do you find that men are quicker to assume risk or enter into more risky investments than women?

   a. Yes. Women ponder more and are generally less sure of their capabilities.
   b. Yes.
   c. No.
   d. Yes.

4. Could you comment on managerial style differences between women and men, i.e., more or less autocratic, more or less inclusive?

   a. Don't necessarily see this as a gender issue, more of a personality trait/style. Women are not necessarily more nurturing, despite some thought about this.
   b. I believe women are more inclusive, more empathetic, more ccommunicative.
   c. I'm not sure that I would stereotype management styles as male or female. Many women I have worked with manage like the men they have worked for in their careers. I have been told my management style is very different from what people have experienced with other CEOs.
   d. Women are more consensus builders, team players, give credit where credit is due. More inclusive.

5. During pre-IPO investor presentations, did the potential investors provide any behavioral or verbal clues that would indicate they needed reassurance about the experience of the CEO because of her gender?

   a. Not that I could tell.
   b. There was concern expressed about both issues—without direct sexism.
   c. No. In fact, as a woman, I received more attention, probably out of curiosity. Many investors are women and like seeing a female CEO.
   d. No.

**Some comments were slightly edited in order to keep responses anonymous.