Men Are from Mars, Women Are from Venus: Gender and Mergers and Acquisitions*

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Abstract

This paper examines the influence of female directors on corporate boards on mergers and acquisitions (M&As). Using acquisition bids initiated by S&P 1500 firms during 1997-2009, we find that each ten-percent representation of female directors on a corporate board is associated with a reduction in the number of a company's acquisition bids by 7.5 percent: women are less acquisitive than men. Furthermore, using over 450 acquisition bids for which we have data on bidder and target firm characteristics and their board membership, we find that each ten-percent of female directors on a bidder board is associated with a reduction in the bid premium by 13.3 percent. There is no significant effect of female directors on a target board. We argue that these results are what we would expect if, as other researchers have shown, women are less overconfident than men when facing difficult tasks lacking fast, clear feedback.

Keywords: director gender, overconfidence, bid initiation, bid premium, mergers and acquisitions
JEL classification: G34, G38

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Abstract

This paper examines the influence of female directors on corporate boards on mergers and acquisitions (M&As). Using acquisition bids initiated by S&P 1500 firms during 1997-2009, we find that each ten-percent representation of female directors on a corporate board is associated with a reduction in the number of a company's acquisition bids by 7.5 percent: women are less acquisitive than men. Furthermore, using over 450 acquisition bids for which we have data on bidder and target firm characteristics and their board membership, we find that each ten-percent of female directors on a bidder board is associated with a reduction in the bid premium by 13.3 percent. There is no significant effect of female directors on a target board. We argue that these results are what we would expect if, as other researchers have shown, women are less overconfident than men when facing difficult tasks lacking fast, clear feedback.

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It is not necessary to visit other planets to recognize the differences between men and women living right here on Earth. Natural selection has invested in men a stronger drive for dominance than is found in women, which is hardly surprising given the different roles men and women play in procreation and the nurturing of offspring. If we were to seek a single word that would best capture the bio-evolutionary aspect of women, a good candidate would be that women are more "cautious." This has been observed in children's play, alcohol consumption, smoking, driving, sexual activity, choice of jobs, and behavior in the jobs chosen (see for example, Sax (2005), and Sapienza, Zingales, and Maestripieri (2009)).

Caution takes a specific form in one important aspect of behavior with a potential bearing on mergers and acquisitions (M&As), namely a well-documented tendency of women to be less overconfident than their male counterparts (see the survey by Croson and Gneezy (2009)). Overconfidence is typically postulated to take one of two forms. The first concerns the precision of beliefs about future uncertain events (see for example, Barber and Odean (2001)). Specifically, evidence has been gathered and described showing that women view their predictions of how the future will unravel as being less precise than men view the precision of their own predictions. In other words, women see their predictions as belonging to a more dispersed distribution of possible outcomes. The second form of women being less overconfident concerns the level of expectations of what will happen (see for example, Malmendier and Tate (2005, 2008)). It is shown that in the same circumstances, women see future outcomes in less favorable terms than men do: while both are overconfident, men are more so. Whichever form of overconfidence we consider, the less overconfident attitude of women results in a relative hesitation to undertake difficult tasks lacking fast, clear feedback.

This paper investigates whether the lower overconfidence of women is manifested in female directors on corporate boards being less acquisitive than their male counterparts. This will happen if, *ceteris paribus*, the same acquisition is seen as more attractive to men due to their greater overconfidence about the acquisition in either or both of the ways described above. We also investigate whether the lower overconfidence of women on bidder boards results in the payment of lower bid premiums for target firms that are acquired.

M&As are an ideal setting for investigating the implications of male versus female behavioral traits for several reasons. First, takeovers are highly significant economic activities that often do not add shareholder value (see the survey by Andrade, Mitchell, and Stafford (2001), and the recent evidence from Chen, Harford, and Li (2007)), so it is important to understand why so many deals fail. For example, could bidder male directors' overconfidence result in too many acquisitions or in paying too much? Second, according to Lenney (1977), gender differences in overconfidence depend on the lack of clear and unambiguous feedback. Specifically, when feedback is "unequivocal and immediately available, women do not make lower ability estimates than men. However, when such feedback is absent or ambiguous, women seem to have lower opinions of their abilities and often do underestimate relative to men." M&A successes and failures are not easily or immediately identifiable due to their uniqueness, complexity, scale, and other factors that influence overall acquirer performance. It is thus expected that men will be more confident than women about their ability to make acquisitions. These arguments make M&As an excellent platform for asking the following questions: is there any association between women representation on corporate boards and M&A activities and terms, and is any such association consistent with women being less overconfident than men?

Using close to 20,000 firm-year observations for the period 1997-2009, we show a negative and significant association between the fraction of female directors on a corporate board and the number of acquisition bids: women are less acquisitive than men. In terms of the economic significance, each ten-percent of female directors on a board, corresponding to approximately one female director, reduces the number of acquisition bids by 7.5 percent. Having multiple female directors leads to even fewer acquisitions. That is, the effect of female directors on corporate acquisitiveness is non-linear. Since the decision to acquire depends on the confidence of the directors, in terms of either (both) the precision of their estimate of or (and) their expected value of an acquisition, not to acquire is consistent with female directors' lower estimate of the value of an acquisition.

In addition to evidence on acquisitiveness, using data from over 450 acquisition bids for which information on the bidder and target firm characteristics and board membership are available, we find that female directors on a bidder board are negatively and significantly associated with the size of the bid premium. In terms of the economic significance, each ten-percent of female directors on a bidder board is associated with a lower bid premium of 13.3 percent. A lower bid premium is consistent with bidder female directors' relatively lower overconfidence in the precision of their estimate of and/or in their expected valuation of an acquisition.

Our goal in this paper is to report these economically and statistically significant associations between gender and M&A deals and between gender and M&A terms, and to indicate linkages to recent research suggesting that women exhibit less overconfidence (see for example, Lichtenstein, Fischhoff, and Phillips (1982), Beyer (1990), and Barber and Odean (2001)). It should be pointed out that our investigation shares the same endogeneity concerns as

the majority of investigations relating to corporate boards. For example, one could argue that an entrenched CEO prefers a "quiet life" and thus chooses women board members who are generally less overconfident and thereby less acquisitive. Alternatively, maybe a particular CEO by nature is an empire-builder and thus not appealing to women board members who are less overconfident.[1] In these cases, causation does not go from female directors to corporate decisions, including M&As, but from corporate decisions to female directors. Nevertheless, in either case the outcome can be traced back to female board members being less overconfident than male board members. As such, we still have reason to examine the association between female representation on corporate boards and the frequency of M&A deals and the price paid for target firms. Finally, concern over endogeneity is further mitigated by the robustness of the observed association after controlling for firm and director characteristics and industry effects.

The outline of the paper is as follows. The next section reviews the related literature and develops our hypotheses. Despite an absence of prior work on the role of board gender diversity in M&As, studies of gender in other finance contexts provide the basis for the suggested associations we evaluate in this paper. Section II presents the results on the statistical and economic significance of female directors for bid initiation. Section III presents the results on the importance of female directors for bid premiums. Section IV investigates the possibility that our results are capturing effects other than those of gender differences in overconfidence. Section V summarizes and concludes.

I. Literature Review and Hypothesis Development

[1] Acquisitiveness due to CEO overconfidence differs from the conventional view of empire building (Jensen (1986, 1988)) in that CEOs may well believe they are acting in shareholders' interest and as such there may be no agency problem (see Malmendier and Tate (2008)).

Our research is related to prior investigations of the effects of gender on behavior in general and in finance contexts in particular. The behavioral differences of women and men in general are non-controversial. As has been mentioned, women are distinctly more cautious than men, a matter that can be attributed to the greater investment that is made in the process of reproduction and thereby in the survival of our species (see for example, Knight (2002)). This is evidenced by safer play behaviors of girls and women's more cautious behaviors involving sex, drugs and alcohol, gambling, driving, and in employment choices (see for example, Sax (2005), and Sapienza, Zingales, and Maestripieri (2009)).

I.A. Literature on Gender Differences in Finance

In terms of the effects of gender on financial behaviors, the evidence is more equivocal, with not every investigation having identified statistically or economically significant differences in behavior between the sexes.

Using data from the 1992 and 1995 Surveys of Consumer Finances, Sundén and Surette (1998) show that both gender and marital status significantly affect how individuals choose to allocate assets under defined-contribution pension plans. Using account data for over 35,000 households from a large discount brokerage, Barber and Odean (2001) document that men trade more frequently than women, and men's increased trading reduces their net returns as compared to women's, consistent with men being more overconfident than women.

With respect to professional money managers, using data from nearly 2,000 mutual fund investors, Dwyer, Gilkeson, and List (2002) find that women take less risk than men in their mutual fund investments. However, the observed gender difference in risk taking is significantly attenuated after controlling for financial investment knowledge. Similarly, Atkinson, Baird, and

Frye (2003) find that male and female mutual fund managers appear similar in terms of fund performance, risk, and other fund characteristics after controlling for wealth and knowledge differences between them.

Using *Fortune 500* firms during the 1990s, Farrell and Hersch (2005) show that women tend to serve as directors on better performing firms, but they also document that there is no wealth effect associated with the announcement of a woman being added to the board. Using a cross-sectional sample of boards of directors of 1,024 publicly traded US firms, Adams and Ferreira (2009) show that firms facing less uncertainty (as measured by return volatility) have more women directors. They also find that boards with more women directors are associated with more director pay-performance incentives and more board meetings. Using a merged panel of directors and executives for large U.S. corporations between 1997 and 2009, Masta and Miller (2011a) find a positive association between the fraction of female directors on the board in the previous year and the fraction of female top executives in the current year. Ahern and Dittmar (2011) examine the relationship between board structure and firm value using a new law in Norway requiring that 40 percent of corporate board members be women. They find that the law led to a significant negative impact on firm value, due to new (female) board members' younger age and lack of high-level work experience. Examining the same quota system in Norway, Masta and Miller (2011b) further show that firms affected by the quotas faced increased relative labor costs and employment levels, reducing short-term profits. It is worth noting that with the exceptions of Ahern and Dittmar (2011) and Masta and Miller (2011b), research in this area, as mentioned earlier, falls short of establishing a causal relationship between gender and economic outcomes. However, Ahern and Dittmar (2011) and Masta and Miller (2011b) had a natural

experiment from the mandatory change in the minimum representation of women on Norwegian corporate boards.

Given that boards meet infrequently, the role of the board is most likely to be detectable in large, discrete corporate decisions requiring board approval, rather than in the day-to-day operations that contribute to long-run stock and operating performance. This motivates our focus in this paper on the previously unexplored association between female representation on corporate boards and acquisition decisions.

I.B. Our Hypotheses

As mentioned in the introduction, it is well established that while people in general are overconfident, women are less overconfident than men (see the survey by Croson and Gneezy (2009), and earlier work by Lichtenstein, Fischhoff, and Phillips (1982), and Beyer (1990)). Furthermore, it has been shown that people's overconfidence is greatest for difficult tasks and for undertakings lacking fast, clear feedback (Lenney (1977), and Barber and Odean (2001)). Given the complexity and distinct characteristics associated with each deal, M&As represent an ideal setting to examine gender differences in overconfidence that may be due to a less precise view of (Barber and Odean (2001)) and/or a less favorable view of the value of an acquisition (Malmendier and Tate (2008)).[2] As a consequence of either or both channels, might we expect female directors on bidder boards to restrain support for proposed deals relative to their male counterparts, and perhaps to persuade the board to decide against making an offer? That is, does the presence of bidder female directors reduce the likelihood an acquisition is made? Also, as the

[2] Overconfidence has also been interpreted as an "illusion of control:" men have a stronger belief they can control what happens (see Langer (1975), and Deaves, Lüders, and Luo (2009)). Such an interpretation shares elements of the two interpretations discussed in this paper, i.e., men's perception of more precise and/or more favorable target evaluation.

bidder board and shareholders are concerned with not paying too much, is there pressure to accommodate a female director's less favorable view of how much to offer? That is, are female directors associated with smaller bid premiums? As a result, we have the following null and alternative hypotheses:

With respect to acquisition bids:

H_0: *The fraction of female directors on a board is not associated with the propensity to initiate acquisition bids.*

H_1: *The fraction of female directors on a board is associated with the propensity to initiate acquisition bids.*

With respect to the bid premium:

H_0: *The fraction of female directors on a bidder board is not associated with the size of the bid premium.*

H_1: *The fraction of female directors on a bidder board is associated with the size of the bid premium.*

In contrast to the effects of female representation on a bidder board, we do not expect female representation on a target board to affect bid initiation given that bid initiation is most likely discussed between bidder and target CEOs after approval by the bidder board; the target firm is typically the passive responder.[3] We also expect the gender composition of the target board to have a weaker effect on the bid premium than that of the bidder board for the following reasons.

First, there is an information asymmetry between bidder and target boards with respect to the value of the target firm. Both female and male directors on target boards can be expected to have better information than their counterparts on bidder boards regarding the value of their own

[3] Unfortunately we are in any case lacking target board information in our large bid initiation sample.

firms. Hence, even though female directors may be less overconfident than male directors, the potential for a gap between the views of female and male directors on target boards about their own firm value is relatively small: directors of both genders have a more precise view of target value, narrowing room for any gender-based overconfidence differential.[4] This lack of information asymmetry leads to a lack of association between female directors on target boards and the size of the bid premium.[5]

Second, the concern of target firm directors and shareholders is with accepting too little. Given "sell high" preferences of the target board and shareholders, there is less compelling pressure to accommodate a lower (less overconfident) valuation of the target firm by female directors who might be willing to settle for a lower price: the target board does not want to be accused of accepting too little. Hence, we expect that there should be a weaker effect of female directors on the target board than on the bidder board on the size of the bid premium.

II. Gender Diversity and Bid Initiation

II.A. Model Specification

To explore the role of board gender diversity in initiating M&As, i.e., acquisitiveness, we run the following Negative Binomial regression focusing on the fraction of female directors on a board:

[4] This argument is particularly applicable to the precision interpretation of overconfidence: Precision will be more similar the better is the information.

[5] The implication of information asymmetries is less straightforward if we allow for information asymmetry between bidder and target boards with respect to synergies: bidder board members may be better informed than target counterparts about potential synergies. In such a case the outcome depends on the relative magnitudes of the target board members' information advantage concerning their firm versus the bidder board members' information advantage concerning synergies. Ultimately, it is an empirical question.

$$
\begin{aligned}
Log(Bid\ initiation_{it}) = {} & \alpha_0 + \beta_1\ Fraction\ of female\ directors_{it} + \beta_2 Board\ size_{it} \\
& + \beta_3\ Fraction\ of\ independen\ t\ directors_{it} + \beta_4 CEO\ being\ COB_{it} \\
& + \beta_5\ Sales\ growth_{it} + \beta_6 Tobin's\ Q_{it} + \beta_7 ROA_{it} + \beta_8 Book\ leverage_{it} \\
& + \beta_9 Cashholdin\ g_{it} + \beta_{10} Firm\ size_{it} + e_{it}.
\end{aligned} \tag{1}
$$

where bid initiation is the number of acquisition bids made within a fiscal year. The number of bid initiations is an over-dispersed count variable, whose variance is significantly greater than its mean (see Figure 1 and Table 1). In this case, the Negative Binomial regression will produce consistent estimation results (Cameron and Trivedi (1998)).

The key explanatory variable of interest is the measure of board gender diversity in sample firms. The controls for firm characteristics are motivated by Byrd and Hickman (1992), Shivdasani (1993), and Levi, Li, and Zhang (2010). We also control for year and industry fixed effects (based on Fama-French (1997) 48-industry classifications). Because standard errors may be underestimated in panel data sets like ours, we present results based on standard errors clustered by firm (Petersen (2009)).

II.B. The Bid Initiation Sample

To form the bid initiation sample, we start with firms covered by Compustat/CRSP and the RiskMetrics Group's corporate board and director database (covering member firms in the S&P 500 index, the S&P MidCap 400 index, and the S&P SmallCap 600 index—hence S&P 1500 firms). We then retrieve the acquisition bids initiated by these firms during 1997-2009 from the Thomson Financial's SDC database. We require an acquisition bid to take the form of a merger (SDC deal form M), acquisition of majority interest (AM), and acquisition of assets (AA). We include control bids only where the bidder's toehold before the deal announcement is less than 50 percent, and the sum of the toehold and the percentage ownership sought in the deal is greater than 50 percent. The board and director information is taken from RiskMetrics at the

most recent annual shareholder meetings before the bid announcement. Our final bid initiation sample consists of 19,619 firm-year observations.

Panel A of Table 1 presents the descriptive statistics of the variables. The average number of acquisition bids initiated by a firm in any year is 0.57. The number of bid initiations is over-dispersed with a variance of 1.73. About 70 percent of the firm-years have no bid, 18 percent have one bid, and 6.5 percent have two bids (Figure 1). The average corporate board consists of 9.5 members, of which 9.5 percent are women and 67.4 percent are independent outsiders. These numbers are slightly higher than those reported in the study by Farrell and Hersch (2005) who show that female directors comprise 8.6 percent of board members in a sample of *Fortune 500* firms, and in the study by Paul (2007) who shows that independent directors comprise 53 percent of board members in a sample of M&A deals over the period 1982-1996.

About 62.2 percent of the CEOs are also Chairman of the Board. The average sales growth is 13.1 percent; Tobin's Q 1.9; return on assets 4.0 percent; and book leverage 23.7 percent. On average, 13.1 percent of the assets of the firms in our sample are in the form of cash or short-term investments. The firms have an average market capitalization of $7.6 billion.

Panel B of Table 1 presents the correlation matrix of the variables. We show that the fraction of female directors on a corporate board is positively but insignificantly correlated with the number of acquisition bids, while the indicator variable for multiple female directors is positively and significantly correlated with the number of acquisition bids. Given that omitted variable bias in univariate correlations can mask the true relations between the variables, next we employ multiple regressions to examine the determinants of corporate acquisitiveness.

II.C. Main Findings

Panel C of Table 1 presents the Negative Binomial regression results where the dependent variable is the number of bids. We find that the fraction of female directors on the board is negatively and significantly associated with the number of bids. In terms of the economic significance, each ten-percent representation of female directors on the board, corresponding to approximately one female director, reduces the number of bids by 7.5 percent (= 1 – exp(− 0.7831×0.1)). The first term in the exponential function is the coefficient on the fraction of female directors. This finding is consistent with the less overconfident nature of women. Specifically, a less acquisitive board with female directors would result from less overconfidence: women have a less precise and/or more conservative view of the value of an acquisition, and would consequently be less inclined to favor it. That is, documented behavior associated with women in other contexts has the predicted economically and statistically significant association with the propensity of companies to pursue M&As.

Our findings in this paper are consistent with those in Levi, Li, and Zhang (2010) based on the male-dominance hormone, testosterone. By proxying the quantity of the hormone by age, they find higher implied testosterone across a population of male CEOs is positively associated with greater acquisitiveness. It is worth noting that our main findings on board gender diversity remain unchanged when using an indicator variable to capture acquisitiveness in the same way as Malmendier and Tate (2008), and Levi et al. (2010).

As a robustness check to our main findings, we also introduce two indicator variables to capture a potential non-linear association between female representation on the board of directors and acquisitiveness: 'bidder one female director' takes the value of one if a bidder firm has only one female director, and zero otherwise; and 'bidder multiple female directors' takes the value of

one if a bidder firm has more than one female director, and zero otherwise. Panel C Column (2) of Table 1 shows that both female director indicator variables are negatively and significantly associated with the number of bids. In terms of the economic significance, having a lone (more than one) female director on the bidder board reduces the number of bids by 11.4 (21.1) percent. The board gender effect on acquisitiveness is highly non-linear, which is consistent with either female directors feeling more comfortable expressing their less favorable opinion about pursuing an acquisition when there are other female directors present, or their dissenting opinion being taken more seriously when there are multiple female directors with the same point of view.

In addition to the above main findings, we show that the larger is a firm, and the lower is its leverage and its cash holdings, the more acquisitive it is likely to be.

III. Gender Diversity and Bid Premium

We next consider the association between board composition and the size of the bid premium.

III.A. Model Specification

To explore the possible association between board gender diversity and bid premiums in M&As we run the following cross-sectional regression:

$$\begin{aligned} Bid\ \text{Premium}_i = {} & \alpha_0 + \beta_1 Bidder\ fraction\ of\ female\ directors_i + \beta_2 Target\ fraction\ of\ female\ directors_i \\ & + \beta_3 Bidder\ board\ size_i + \beta_4 Bidder\ fraction\ of\ independent\ directors_i \\ & + \beta_5 Bidder\ CEO\ being\ COB_i + \beta_6 Target\ board\ size_i \\ & + \beta_7 Target\ fraction\ of\ independent\ directors_i \\ & + \beta_8 Target\ CEO\ being\ COB_i + Other\ Controls + e_i, \end{aligned} \tag{2}$$

where the key explanatory variable of interest is the measure of board gender diversity in the bidder firms. The governance-related variables and controls for deal- and firm- characteristics

are motivated by Byrd and Hickman (1992), Shivdasani (1993), Cotter, Shivdasani, and Zenner (1997), Bange and Mazzeo (2004), and Chen, Harford, and Li (2007). Deal characteristics include the toehold, as well as indicator variables for all cash deals, all stock deals, tender offers, and unfriendly deals. Bidder/target firm characteristics include sales growth, Tobin's Q, return on assets (ROA), and book leverage. We include year fixed effects and industry fixed effects, and we employ robust standard errors.

III.B. The Mergers and Acquisitions Sample

To form our mergers and acquisitions sample, we start with the acquisition bids made by US public companies for US public targets between January 1, 1997 and December 31, 2009 covered in the Thomson Financial's SDC database, and we impose the same filters on deal types, and initial and final ownership as our bid initiation sample. We end up with 5,301 deals. Data requirements on deal characteristics such as bid premium and transaction value further reduce the number of deals in our sample to 2,679. These deals are then merged with the RiskMetrics Group's corporate board and director database. These steps reduce our sample to 470 deals. Firm characteristics and stock returns are retrieved from Compustat and CRSP. Our final mergers and acquisitions sample consists of 458 acquisition bids.

Table 2 shows that in our sample the average bid premium is 35 percent. Bid premium is defined as the ratio of the final offer price to the target stock price four weeks prior to the bid minus one. On average, about 11 percent of bidder directors are female, with the proportion of female directors ranging from zero at the 5th percentile to 25 percent at the 95th percentile. On average, about 8 percent of target directors are female.

On average, the bidder firms own 0.6 percent of their targets before the bid announcement. In 19 percent of the acquisitions in our sample, the bidder pays the target with cash only, while 35 percent of the bidders pay in equity only. Overall, the deal characteristics in our sample are not very different from much larger samples covering earlier periods.

Table 3 presents the correlation matrix. We show that both the proportion of female directors on a bidder board and the indicator variable for target one female director are negatively and significantly correlated with the bid premium. Overall, the extent of correlation among all pairs of control variables raises little concern for multicollinearity in our regression analysis.

III.C. Female Directors and Bid Premium

Table 4 presents the OLS regression results where the dependent variable is the size of the bid premium. In Column (1) we find that gender diversity on the bidder board, as measured by the fraction of female directors, is significantly and negatively associated with the size of the bid premium. In terms of the economic significance, each ten-percent representation of female directors on the bidder board, corresponding to approximately one female director, reduces the size of the bid premium by 13.3 percent (= 0.10 × 0.47/0.35). The second term in the numerator is the coefficient on the bidder fraction of female directors, and the denominator is the sample mean bid premium as shown in Table 2. There is no significant association between female directors on the target board and the size of the bid premium. Interest in selling high and/or a lack of target male versus female director asymmetry of information about target value would lead us to expect this result.

In Column (2), we add controls for the nature of the bid as well as the relative size of the target firm, and find that gender diversity on the bidder board remains negatively and significantly correlated with the size of the bid premium.

In Column (3), we measure female representation using two indicator variables as defined before. We show that both female director indicator variables are negatively and significantly associated with the size of the bid premium. In terms of the economic significance, having a lone (more than one) female director on the bidder board reduces the size of the bid premium by 22.6 (32.6) percent.

In addition to the main findings above, we show that bids made by better performing bidders and tender offers are positively associated with the size of the bid premium.

IV. Additional Investigation

IV.A. Controlling for Equity Ownership and Incentives

It can be argued that the significant association between board gender diversity and M&As uncovered in this paper could be driven by the directors' economic interests associated with an M&A transaction. To separate the gender effect from directors' financial interests, we need to control for director equity ownership and compensation.

The data on director ownership and compensation in the ExecuComp database is quite limited prior to 2006. As a result, the sample size of our bid initiation sample decreases from 19,619 to 17,979 firm-year observations (for data on director ownership) and to 17,958 firm-year observations (for data on director compensation). There is very little equity ownership by individual directors on either the bidder or the target board, so for each we sum up individual directors' equity ownership to obtain equity ownership by all directors. Further, given the poor

data quality on director equity-based pay, we introduce an indicator variable that takes the value of one if there is any equity-based pay for the directors, and zero otherwise. Table 1 Panel A shows that the average director ownership is 9.0 percent and about 89 percent of boards are paid with equity.

Similarly, our mergers and acquisitions sample is reduced from 458 observations to 315 observations with information on both the bidder and target director ownership and compensation. Table 2 shows that the average ownership by bidder directors is 5.6 percent, while the average ownership by target directors is 7.4 percent. About 88 percent (86 percent) of bidder (target) directors are paid with equity. These numbers in Tables 1 and 2 are largely consistent with each other.

Table 5 Panel A investigates the robustness of our results on bid initiation. Columns (1)-(2) show that director ownership is negatively and significantly associated with the number of bids, while director equity-based pay is not significantly associated with the number of bids. Importantly, after controlling for director equity ownership and equity-based pay, gender diversity is still negatively and significantly associated with the number of initiated bids. In terms of the economic significance, each ten-percent representation of female directors on the board reduces the number of bid initiations by 7.0 percent.

Table 5 Panel B investigates the robustness of our results on the bid premium. Columns (1)-(2) show that neither director equity ownership nor equity-based pay is significantly associated with the size of the bid premium. Importantly, after controlling for director equity incentives, there remains a strong and significant association between gender diversity and the size of the bid premium. As before, the association found in the context of M&As is consistent

with the growing body of evidence in other areas of enquiry that women are less overconfident than men.

IV.B. Distinguishing between Independent and Dependent Female Directors

Prior work such as Byrd and Hickman (1992), Shivdasani (1993), Cotter, Shivdasani, and Zenner (1997), Hermalin and Weisbach (1998), and Paul (2007) has shown that boards dominated by independent directors are more likely to make decisions that are in the interest of shareholders. If independence of directors matters, we expect M&A terms and outcomes to differ depending on whether a female director is an independent or a dependent director. Thus we break down the fraction of female directors into the fraction of independent female directors and the fraction of dependent female directors.

In our bid initiation sample (see Table 1 Panel A), female directors primarily come from outside, consistent with findings in Farrell and Hersch (2005). On average, the fraction of independent female directors on the bidder board is 8.2 percent, compared to the fraction of all female directors, which is 9.5 percent of the bidder board; hence the average fraction of dependent female directors on the bidder board is only about one percent. The distribution of independent and dependent female directors on the bidder and target boards for firms in the mergers and acquisitions sample is similar (see Table 2).

In Column (3) of Table 5 Panel A, we replace the fraction of female directors in Equation (1) with the fractions of independent and dependent female directors (relative to board size) to check the robustness of our findings on gender diversity and bid initiation. We show that both independent and dependent female directors are significantly and negatively associated with the

number of bid initiations. Each ten-percent representation of independent (dependent) female directors on the board reduces the number of initiated bids by 6.3 (12.9) percent.

In Column (3) of Table 5 Panel B, we show that each ten-percent representation of independent (dependent) female directors on the board reduces the bid premium by 11.1 (24.1) percent. Both associations are statistically significant at the ten-percent and five-percent levels, respectively.

As mentioned at the outset, one caveat to our results is the issue of endogeneity. Observable personal characteristics such as employment and educational background could be a large part of the selection criteria for directors. CEOs may even take gender differences in overconfidence into account when recommending directors to shareholders. We are able to alleviate some endogeneity concerns with additional controls. We show that our results are not driven by industry effects, firm characteristics such as size and growth opportunities, or director characteristics such as independence and equity incentives. Further, even if a female director is chosen because of her relatively low overconfidence, the CEO should be aware of this personal trait and take steps to explicitly address it. If that is the case, the observed outcome of a lower frequency of acquisition deals and lower prices paid can be traced back to female board members being less overconfident than male board members. As such, we still have reason to conclude that there is a significant association between female representation on corporate boards and M&As.

V. Conclusions

Consistent with evidence in other finance contexts such as investment, trading, and corporate performance, we have found a further important association between gender diversity

on corporate boards and the functioning of boards in the economically important arena of M&As. This arena is particularly fitting as it involves decisions that lack fast, clear feedback, and due to the fact that unlike day-to-day operating decisions, M&As are major corporate events that involve direct and intensive deliberation among board members.

Using acquisition bids initiated by S&P 1500 firms during the period 1997-2009, we show that female directors appear less interested in empire building than their male counterparts: their presence on the corporate board is negatively associated with their firms' acquisitiveness. Furthermore, using data from over 450 acquisition bids for which we have the necessary information on the bidder and target firms, we show that the representation of female directors on a bidder board is negatively and significantly associated with the size of the bid premium. As expected, there is no effect of female directors on a target board on the size of the bid premium.

Our findings are consistent with women being less overconfident than men, as documented by Barber and Odean (2001) and many others (see the survey by Croson and Gneezy (2009)). With increasing discussion of legislative requirements for more equal female representation on corporate boards around the world (Ahern and Dittmar (2011), and Masta and Miller (2011a)), the evidence from studying mergers and acquisitions becomes of considerable economic, political, and social importance.

Appendix:

Definition of Variables

Variable	Definition
# M&A bid initiations	The number of bids initiated by a firm within a fiscal year. The bid shall take the form of a merger (SDC deal form M), acquisition of majority interest (AM), or acquisition of assets (AA). Also, we include only control bids where the bidder's toehold before the deal announcement is less than 50 percent, and the sum of the toehold and the percentage ownership sought in the deal is greater than 50 percent.
Fraction of female directors	The number of female directors divided by the board size.
One female director	An indicator variable that takes the value of one if there is exactly one female director on the board, and zero otherwise.
Multiple female directors	An indicator variable that takes the value of one if there are at least two female directors on the board, and zero otherwise.
Fraction of independent directors	The number of independent directors divided by the board size.
CEO being COB	An indicator variable taking the value of one if the CEO is also the Chairman of the Board (COB), and zero otherwise.
Board size	The number of directors serving on the board.
Sales growth	The ratio of sales (data item *sale* in Compustat) in the current fiscal year to sales in the last year minus one.
Tobin's Q	The market value of total assets divided by the book value of total assets. Market value of assets is calculated as book value of total assets (data item *at* in Compustat) minus book value of common equity (*ceq*) plus common shares outstanding (*csho*) times stock price (*prcc_f*).
ROA	Income before extraordinary items (data item *ib* in Compustat) divided by the book value of total assets (*at*) at the beginning of the fiscal year.
Book leverage	The sum of debt in current liabilities (data item *dlc* in Compustat) plus long-term liabilities (*dltt*) divided by the book value of total assets (*at*).
Cashholding	Cash and short-term investments (data item *che* in Compustat) divided by book value of total assets (*at*).
Market capitalization	Common shares outstanding (data item *csho* in Compustat) times stock price (*prcc_f*).
Ownership of directors	The aggregate ownership of the directors. The data are from the RiskMetrics database.
Director paid with equity	An indicator variable taking the value of one if the directors are paid with stocks and/or stock options, and zero otherwise. The data are retrieved from the ExecuComp database.
Fraction of independent female directors	The number of independent female directors divided by the board size.

Fraction of dependent female directors	The number of dependent female directors divided by the board size.
Bid premium	The ratio of the final offer price to the target stock price four weeks prior to the original announcement date minus one.
Toehold	The proportion of the target firm's shares owned by the bidder before the bid announcement.
All cash	An indicator variable taking the value of one if only cash is used to pay for the acquisition, and zero otherwise.
All stock	An indicator variable taking the value of one if only equity is used to pay for the acquisition, and zero otherwise.
Tender offer	An indicator variable taking the value of one if SDC regards the bid as a tender offer, and zero otherwise.
Unfriendly	An indicator variable taking the value of one if SDC regards the deal as unfriendly, and zero otherwise.
Relative size	The transaction value divided by the market value of total assets of the bidder at the fiscal year end prior to the bid announcement. Market value of assets is calculated as book value of total assets (data item *at* in Compustat) minus book value of common equity (*ceq*) plus common shares outstanding (*csho*) times stock price (*prcc_f*).

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Figure 1
Histogram of the Number of Bid Initiations

This figure plots the histogram of the number of acquisition bids initiated by the firms in our sample in each year over the period 1997-2009. Our sample consists of 19,619 firm-year observations. The sample is retrieved from Compustat/CRSP and has available data on board characteristics from RiskMetrics.

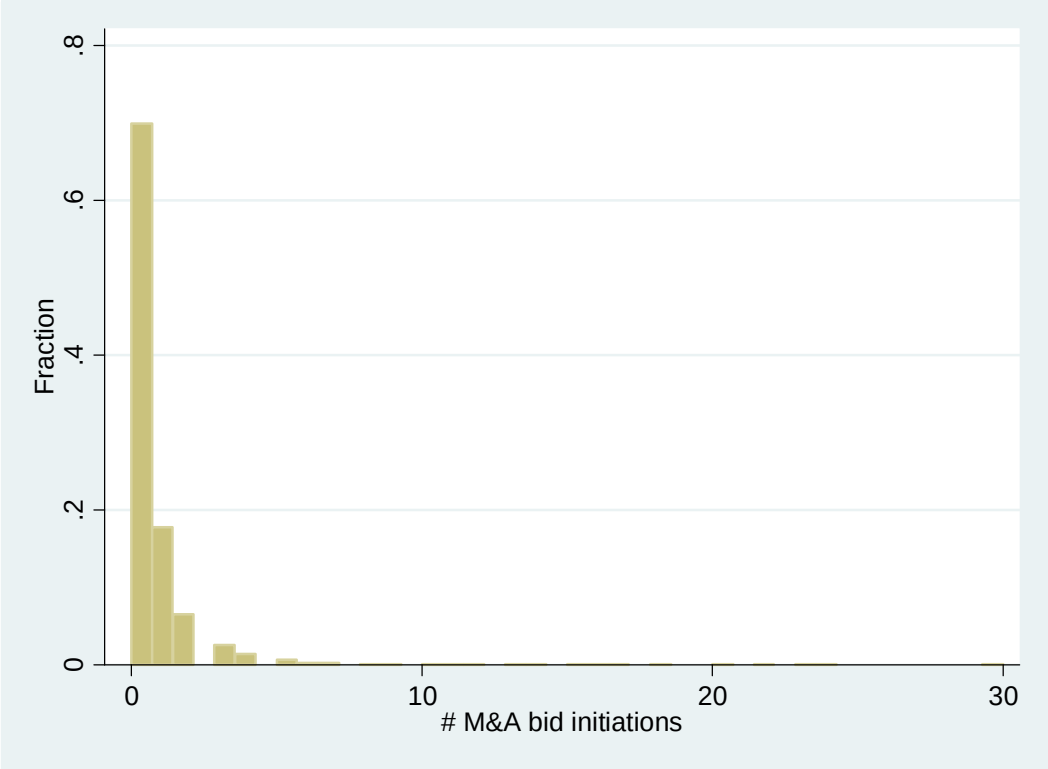

Table 1
Bid Initiation

Our bid initiation sample consists of 19,619 firm-year observations during the period 1997-2009. The sample is retrieved from Compustat/CRSP and has available data on board characteristics from RiskMetrics. All firm characteristics are measured at the fiscal year end prior to the bid announcement date. See the Appendix for definition of the variables. All percentages are in decimal format. Panel A presents the summary statistics. Panel B presents the correlation matrix. Panel C presents the Negative Binomial regression results for the number of bid initiations. All model specifications employ robust standard errors clustered by firm, which are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Summary Statistics of the Bid Initiation Sample

Variable	N	Mean	StdDev	5th Percentile	Median	95th Percentile
# M&A bid initiations	19619	0.570	1.314	0.000	0.000	3.000
Fraction of female directors	19619	0.095	0.092	0.000	0.100	0.250
One female director	19619	0.379	0.485	0.000	0.000	1.000
Multiple female directors	19619	0.251	0.434	0.000	0.000	1.000
Board size	19619	9.469	2.811	6.000	9.000	14.000
Fraction of independent directors	19619	0.674	0.177	0.333	0.706	0.900
CEO being COB	19619	0.622	0.485	0.000	1.000	1.000
Sales growth	19619	0.131	2.739	-0.241	0.074	0.534
Tobin's Q	19619	1.891	1.621	0.922	1.438	4.300
ROA	19619	0.040	0.258	-0.120	0.044	0.181
Book leverage	19619	0.237	0.192	0.000	0.223	0.567
Cashholding	19619	0.131	0.163	0.004	0.060	0.496
Market capitalization ($B)	19619	7.636	24.295	0.154	1.607	30.099
Ownership of directors	17979	0.090	0.134	0.003	0.035	0.376
Directors paid with equity	17958	0.891	0.312	0.000	1.000	1.000
Fraction of independent female directors	19619	0.082	0.085	0.000	0.091	0.231
Fraction of dependent female directors	19619	0.012	0.038	0.000	0.000	0.111

Panel B: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	# M&A bid initiations	1.00																
2	Fraction of female directors	0.00	1.00															
		[0.98]																
3	One female director	0.01	0.12	1.00														
		[0.34]	[0.00]															
4	Multiple female directors	0.01	0.75	-0.45	1.00													
		[0.05]	[0.00]	[0.00]														
5	Board size	0.08	0.24	0.08	0.38	1.00												
		[0.00]	[0.00]	[0.00]	[0.00]													
6	Fraction of independent directors	-0.03	0.24	0.05	0.21	0.09	1.00											
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]												
7	CEO being COB	0.02	0.07	0.00	0.07	0.05	0.07	1.00										
		[0.00]	[0.00]	[0.50]	[0.00]	[0.00]	[0.00]											
8	Sales growth	0.02	0.00	-0.01	0.01	0.00	-0.01	0.01	1.00									
		[0.01]	[0.83]	[0.18]	[0.44]	[0.91]	[0.04]	[0.34]										
9	Tobin's Q	0.10	-0.02	-0.02	-0.03	-0.14	-0.07	-0.02	0.03	1.00								
		[0.00]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]									
10	ROA	0.03	0.04	0.02	0.03	0.02	0.01	0.01	0.73	0.12	1.00							
		[0.00]	[0.00]	[0.01]	[0.00]	[0.01]	[0.24]	[0.09]	[0.00]	[0.00]								
11	Book leverage	-0.05	0.06	0.01	0.07	0.13	-0.01	0.06	0.00	-0.18	-0.08	1.00						
		[0.00]	[0.00]	[0.23]	[0.00]	[0.00]	[0.23]	[0.00]	[0.92]	[0.00]	[0.00]							
12	Cashholding	0.00	-0.11	-0.08	-0.12	-0.29	-0.02	-0.08	0.00	0.34	-0.01	-0.36	1.00					
		[0.69]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.81]	[0.00]	[0.04]	[0.00]						
13	Logarithm of market capitalization	0.21	0.26	0.05	0.31	0.44	0.15	0.11	0.02	0.25	0.12	0.00	-0.06	1.00				
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.64]	[0.00]					
14	Ownership of directors	-0.04	-0.12	-0.05	-0.11	-0.10	-0.41	-0.06	0.00	0.05	-0.01	-0.05	0.06	-0.19	1.00			
		[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.72]	[0.00]	[0.18]	[0.00]	[0.00]	[0.00]				
15	Directors paid with equity	0.00	0.07	0.02	0.06	-0.01	0.20	0.00	0.00	0.02	0.00	0.03	0.05	0.09	-0.19	1.00		
		[0.52]	[0.00]	[0.02]	[0.00]	[0.29]	[0.00]	[0.62]	[0.78]	[0.00]	[0.51]	[0.00]	[0.00]	[0.00]	[0.00]			
16	Fraction of independent female directors	0.01	0.91	0.11	0.70	0.24	0.37	0.08	0.00	-0.03	0.04	0.06	-0.13	0.28	-0.20	0.10	1.00	
		[0.23]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.91]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]		
17	Fraction of dependent female directors	-0.02	0.37	0.04	0.23	0.04	-0.23	-0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.15	-0.04	-0.05	1.00
		[0.01]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.07]	[0.80]	[0.03]	[0.20]	[0.61]	[0.32]	[0.84]	[0.00]	[0.00]	[0.00]	

Panel C: Explaining Bid Initiation

Dependent variable	# M&A bid initiations	
	(1)	(2)
Fraction of female directors	-0.7831***	
	(0.299)	
One female director		-0.1213**
		(0.058)
Multiple female directors		-0.2369***
		(0.075)
Board size	-0.0076	0.0013
	(0.010)	(0.010)
Fraction of independent directors	-0.1638	-0.1405
	(0.145)	(0.145)
CEO being COB	0.0255	0.0247
	(0.047)	(0.047)
Sales growth	-0.0019	-0.0021
	(0.010)	(0.010)
Tobin's Q	-0.0098	-0.0098
	(0.011)	(0.011)
ROA	0.1026	0.1042
	(0.086)	(0.087)
Book leverage	-0.2510*	-0.2491*
	(0.142)	(0.142)
Cashholding	-0.2958*	-0.2986*
	(0.168)	(0.169)
Logarithm of market capitalization	0.3356***	0.3383***
	(0.017)	(0.017)
Constant	-3.0866***	-3.1736***
	(0.428)	(0.431)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Cluster by firm	Yes	Yes
Observations	19,521	19,521
Pseudo R-squared	0.155	0.155

Table 2
Summary Statistics on Bids, Boards, Bidders, and Target Firms, 1997-2009

Our mergers and acquisitions sample consists of 458 deals announced during the period 1997-2009. The data are retrieved from the SDC database and have available information on firm and board characteristics of both bidder and target firms from Compustat/CRSP/RiskMetrics. All firm characteristics are measured at the fiscal year end prior to the bid announcement date. See the Appendix for definition of the variables. All percentages are in decimal format.

Variable	N	Mean	StdDev	5th Percentile	Median	95th Percentile
Bid premium	458	0.354	0.312	-0.016	0.305	0.917
Bidder fraction of female directors	458	0.107	0.078	0.000	0.100	0.250
Bidder one female director	458	0.448	0.498	0.000	0.000	1.000
Bidder multiple female directors	458	0.338	0.474	0.000	0.000	1.000
Target fraction of female directors	458	0.080	0.082	0.000	0.083	0.222
Target one female director	458	0.358	0.480	0.000	0.000	1.000
Target multiple female directors	458	0.223	0.417	0.000	0.000	1.000
Toehold	458	0.006	0.037	0.000	0.000	0.000
Allcash	458	0.192	0.394	0.000	0.000	1.000
Allstock	458	0.349	0.477	0.000	0.000	1.000
Bidder board size	458	11.282	3.728	7.000	11.000	18.000
Bidder fraction of independent directors	458	0.675	0.184	0.286	0.704	0.909
Bidder CEO being COB	458	0.758	0.429	0.000	1.000	1.000
Bidder sales growth	458	0.243	0.475	-0.128	0.126	0.909
Bidder Tobin's Q	458	2.262	1.998	1.053	1.603	5.595
Bidder ROA	458	0.056	0.175	-0.012	0.054	0.210
Bidder book leverage	458	0.252	0.166	0.000	0.241	0.540
Target board size	458	9.762	3.243	5.000	9.000	15.000
Target fraction of independent directors	458	0.672	0.172	0.333	0.692	0.900
Target CEO being COB	458	0.651	0.477	0.000	1.000	1.000
Target sales growth	458	0.148	0.350	-0.189	0.101	0.668
Target Tobin's Q	458	1.851	1.355	0.986	1.438	4.089
Target ROA	458	0.046	0.104	-0.069	0.041	0.181
Target book leverage	458	0.253	0.187	0.000	0.256	0.564
Tender offer	458	0.151	0.358	0.000	0.000	1.000
Unfriendly	458	0.109	0.312	0.000	0.000	1.000
Relative size	458	0.320	0.365	0.008	0.208	1.090
Bidder ownership of directors	396	0.056	0.110	0.001	0.014	0.263
Bidder directors paid with equity	443	0.878	0.328	0.000	1.000	1.000
Target ownership of directors	388	0.074	0.131	0.003	0.030	0.254
Target directors paid with equity	376	0.856	0.351	0.000	1.000	1.000
Bidder fraction of independent female directors	458	0.095	0.076	0.000	0.091	0.231
Bidder fraction of dependent female directors	458	0.012	0.033	0.000	0.000	0.091
Target fraction of independent female directors	458	0.070	0.077	0.000	0.071	0.222
Target fraction of dependent female directors	458	0.011	0.033	0.000	0.000	0.100

Table 3
The Correlation Matrix

Our mergers and acquisitions sample consists of 458 deals announced during the period 1997-2009. The data are retrieved from the SDC database and have available information on firm and board characteristics of both bidder and target firms from Compustat/CRSP/RiskMetrics. All firm characteristics are measured at the fiscal year end prior to the bid announcement date. See the Appendix for definition of the variables. All percentages are in decimal format.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	Bid premium	1.00																																		
2	Bidder fraction of female directors	-0.09	1.00																																	
		[0.04]																																		
3	Bidder one female director	0.01	-0.11	1.00																																
		[0.87]	[0.02]																																	
4	Bidder multiple female directors	-0.07	0.73	-0.64	1.00																															
		[0.14]	[0.00]	[0.00]																																
5	Target fraction of female directors	-0.01	0.16	-0.02	0.17	1.00																														
		[0.83]	[0.00]	[0.67]	[0.00]																															
6	Target one female director	-0.08	0.01	0.05	0.00	0.24	1.00																													
		[0.10]	[0.86]	[0.27]	[0.92]	[0.00]																														
7	Target multiple female directors	0.01	0.13	-0.06	0.18	0.71	-0.40	1.00																												
		[0.76]	[0.01]	[0.20]	[0.00]	[0.00]	[0.00]																													
8	Toehold	0.05	0.05	0.04	0.00	0.02	0.01	-0.02	1.00																											
		[0.25]	[0.25]	[0.43]	[0.96]	[0.64]	[0.80]	[0.70]																												
9	Allcash	0.11	0.12	0.04	0.04	-0.18	-0.04	-0.19	0.11	1.00																										
		[0.01]	[0.01]	[0.39]	[0.42]	[0.00]	[0.39]	[0.00]	[0.02]																											
10	Allstock	-0.14	-0.11	-0.01	-0.01	-0.01	0.08	0.00	-0.11	-0.36	1.00																									
		[0.00]	[0.02]	[0.90]	[0.81]	[0.76]	[0.08]	[0.93]	[0.02]	[0.00]																										
11	Bidder board size	-0.04	0.12	-0.06	0.37	0.20	0.11	0.24	-0.04	-0.10	0.22	1.00																								
		[0.35]	[0.01]	[0.19]	[0.00]	[0.00]	[0.02]	[0.00]	[0.42]	[0.03]	[0.00]																									
12	Bidder fraction of independent directors	-0.08	0.27	0.01	0.20	0.05	0.02	0.02	0.01	0.04	-0.02	0.07	1.00																							
		[0.08]	[0.00]	[0.76]	[0.00]	[0.28]	[0.70]	[0.64]	[0.84]	[0.41]	[0.61]	[0.13]																								
13	Bidder CEO being COB	-0.01	0.10	-0.03	0.08	0.04	0.05	0.02	-0.03	-0.06	0.04	0.01	0.10	1.00																						
		[0.83]	[0.04]	[0.47]	[0.08]	[0.45]	[0.28]	[0.65]	[0.47]	[0.20]	[0.39]	[0.76]	[0.03]																							
14	Bidder sales growth	-0.03	-0.16	-0.01	-0.13	-0.03	0.00	-0.03	-0.07	-0.09	0.13	-0.02	-0.18	0.01	1.00																					
		[0.55]	[0.00]	[0.80]	[0.01]	[0.50]	[0.97]	[0.56]	[0.13]	[0.06]	[0.01]	[0.72]	[0.00]	[0.81]																						
15	Bidder Tobin's Q	0.10	-0.07	0.01	-0.09	-0.07	-0.07	-0.07	0.01	0.03	0.14	-0.16	-0.04	-0.03	0.11	1.00																				
		[0.04]	[0.13]	[0.78]	[0.06]	[0.12]	[0.16]	[0.11]	[0.88]	[0.53]	[0.00]	[0.00]	[0.44]	[0.53]	[0.02]																					
16	Bidder ROA	0.11	0.08	-0.01	0.06	0.01	0.00	-0.02	0.02	0.10	-0.08	-0.05	0.10	0.04	-0.50	0.15	1.00																			
		[0.02]	[0.09]	[0.91]	[0.18]	[0.90]	[0.93]	[0.64]	[0.68]	[0.03]	[0.08]	[0.33]	[0.03]	[0.40]	[0.00]	[0.00]																				
17	Bidder book leverage	-0.05	-0.01	-0.09	0.03	0.11	0.00	0.14	-0.01	-0.12	-0.08	0.03	-0.07	0.05	-0.06	-0.28	-0.06	1.00																		
		[0.29]	[0.86]	[0.07]	[0.46]	[0.02]	[0.93]	[0.00]	[0.90]	[0.01]	[0.08]	[0.54]	[0.15]	[0.32]	[0.23]	[0.00]	[0.24]																			
18	Target board size	-0.10	-0.01	-0.06	0.13	0.27	0.06	0.47	-0.02	-0.22	0.15	0.48	0.00	0.07	-0.01	-0.23	-0.08	0.16	1.00																	
		[0.03]	[0.91]	[0.22]	[0.00]	[0.00]	[0.19]	[0.00]	[0.61]	[0.00]	[0.00]	[0.00]	[1.00]	[0.13]	[0.85]	[0.00]	[0.08]	[0.00]																		
19	Target fraction of independent directors	-0.03	0.14	-0.04	0.12	0.21	0.10	0.15	-0.09	-0.01	-0.04	0.05	0.16	0.01	0.02	-0.14	-0.04	-0.04	0.13	1.00																
		[0.56]	[0.00]	[0.41]	[0.01]	[0.00]	[0.04]	[0.00]	[0.05]	[0.89]	[0.41]	[0.29]	[0.00]	[0.81]	[0.64]	[0.00]	[0.43]	[0.41]	[0.01]																	
20	Target CEO being COB	0.03	-0.06	0.02	0.01	0.13	0.04	0.11	0.03	-0.08	0.10	0.14	-0.04	0.07	-0.05	-0.05	0.08	0.01	0.06	0.10	1.00															
		[0.48]	[0.20]	[0.61]	[0.81]	[0.01]	[0.38]	[0.02]	[0.52]	[0.07]	[0.03]	[0.00]	[0.45]	[0.16]	[0.30]	[0.31]	[0.08]	[0.77]	[0.19]	[0.04]																
21	Target sales growth	-0.09	-0.06	0.01	-0.07	-0.04	-0.01	-0.03	-0.02	-0.08	0.13	-0.07	-0.08	-0.02	0.47	0.19	-0.43	-0.10	-0.02	-0.10	-0.07	1.00														
		[0.06]	[0.20]	[0.90]	[0.16]	[0.40]	[0.80]	[0.46]	[0.72]	[0.10]	[0.01]	[0.16]	[0.10]	[0.71]	[0.00]	[0.00]	[0.00]	[0.04]	[0.72]	[0.04]	[0.13]															
22	Target Tobin's Q	-0.01	0.02	0.02	-0.03	-0.07	-0.08	-0.07	0.02	0.00	0.10	-0.13	0.01	-0.04	0.18	0.43	0.05	-0.16	-0.24	-0.07	-0.02	0.16	1.00													
		[0.86]	[0.74]	[0.73]	[0.55]	[0.16]	[0.10]	[0.13]	[0.69]	[0.96]	[0.03]	[0.00]	[0.76]	[0.42]	[0.00]	[0.00]	[0.27]	[0.00]	[0.00]	[0.12]	[0.66]	[0.00]														
23	Target ROA	-0.01	0.02	-0.08	0.04	0.01	0.00	-0.02	0.04	0.07	-0.09	-0.07	0.03	0.04	-0.15	0.11	0.41	-0.10	-0.06	-0.05	-0.01	-0.16	0.28	1.00												
		[0.78]	[0.62]	[0.11]	[0.40]	[0.86]	[0.95]	[0.69]	[0.36]	[0.16]	[0.06]	[0.12]	[0.54]	[0.42]	[0.00]	[0.02]	[0.00]	[0.04]	[0.22]	[0.27]	[0.89]	[0.00]	[0.00]													
24	Target book leverage	0.02	-0.07	-0.12	0.02	0.11	0.05	0.08	0.05	-0.24	-0.13	0.02	-0.08	0.06	-0.04	-0.20	-0.03	0.39	0.07	-0.05	0.12	-0.06	-0.20	-0.10	1.00											
		[0.62]	[0.14]	[0.01]	[0.73]	[0.02]	[0.25]	[0.09]	[0.29]	[0.00]	[0.00]	[0.63]	[0.10]	[0.20]	[0.34]	[0.00]	[0.49]	[0.00]	[0.11]	[0.26]	[0.01]	[0.19]	[0.00]	[0.04]												
25	Tender offer	0.29	0.02	0.04	0.00	-0.09	-0.09	-0.06	0.16	0.31	-0.28	-0.06	-0.07	-0.02	-0.09	0.03	0.10	-0.06	-0.12	-0.16	-0.02	-0.06	-0.03	0.07	-0.07	1.00										
		[0.00]	[0.70]	[0.41]	[0.92]	[0.07]	[0.07]	[0.17]	[0.00]	[0.00]	[0.00]	[0.17]	[0.15]	[0.70]	[0.05]	[0.49]	[0.04]	[0.18]	[0.01]	[0.00]	[0.60]	[0.20]	[0.50]	[0.15]	[0.15]											
26	Unfriendly	0.07	-0.11	0.05	-0.13	0.02	-0.07	0.08	0.07	0.13	-0.14	-0.07	-0.05	0.07	-0.04	-0.01	0.02	0.04	0.02	0.06	-0.02	-0.06	-0.06	-0.04	0.06	0.13	1.00									
		[0.16]	[0.02]	[0.28]	[0.00]	[0.60]	[0.13]	[0.08]	[0.16]	[0.00]	[0.00]	[0.13]	[0.27]	[0.15]	[0.37]	[0.82]	[0.73]	[0.35]	[0.65]	[0.20]	[0.63]	[0.19]	[0.22]	[0.41]	[0.17]	[0.01]										
27	Relative size	-0.03	-0.19	-0.01	-0.20	0.16	-0.01	0.13	-0.04	-0.19	-0.11	-0.25	-0.18	-0.01	0.10	-0.04	-0.09	0.18	-0.02	0.09	0.00	0.03	0.09	0.10	0.12	-0.09	0.15	1.00								
		[0.57]	[0.00]	[0.80]	[0.00]	[0.00]	[0.82]	[0.01]	[0.36]	[0.00]	[0.02]	[0.00]	[0.00]	[0.89]	[0.03]	[0.44]	[0.05]	[0.00]	[0.73]	[0.05]	[0.95]	[0.55]	[0.06]	[0.04]	[0.01]	[0.06]	[0.00]									
28	Bidder ownership of directors	0.08	-0.25	-0.09	-0.18	-0.04	0.00	-0.04	-0.04	-0.02	-0.09	-0.16	-0.49	-0.11	0.26	0.09	-0.26	0.02	-0.06	-0.05	-0.04	0.08	-0.10	0.00	0.01	0.04	0.14	0.20	1.00							
		[0.13]	[0.00]	[0.08]	[0.00]	[0.39]	[0.98]	[0.38]	[0.39]	[0.66]	[0.07]	[0.00]	[0.00]	[0.03]	[0.00]	[0.07]	[0.00]	[0.66]	[0.27]	[0.31]	[0.45]	[0.10]	[0.06]	[0.98]	[0.84]	[0.37]	[0.00]	[0.00]								
29	Bidder directors paid with equity	0.00	0.10	-0.02	0.09	-0.07	-0.02	-0.09	0.03	0.02	-0.06	-0.06	0.28	-0.12	-0.13	0.09	0.24	-0.05	-0.14	0.00	-0.10	0.05	0.12	-0.01	-0.03	-0.08	-0.07	-0.03	-0.29	1.00						
		[0.95]	[0.03]	[0.61]	[0.05]	[0.14]	[0.71]	[0.05]	[0.58]	[0.65]	[0.23]	[0.21]	[0.00]	[0.01]	[0.01]	[0.05]	[0.00]	[0.26]	[0.00]	[0.97]	[0.04]	[0.29]	[0.01]	[0.90]	[0.59]	[0.11]	[0.16]	[0.47]	[0.00]							
30	Target ownership of directors	0.11	0.00	0.03	-0.04	-0.03	-0.04	-0.02	0.12	0.06	-0.08	-0.08	-0.15	-0.02	0.00	0.07	0.03	0.03	-0.03	-0.28	-0.09	0.13	0.00	0.01	0.02	0.11	-0.11	-0.13	0.08	0.05	1.00					
		[0.04]	[0.97]	[0.52]	[0.39]	[0.51]	[0.38]	[0.65]	[0.02]	[0.26]	[0.11]	[0.13]	[0.00]	[0.74]	[0.96]	[0.20]	[0.61]	[0.59]	[0.51]	[0.00]	[0.09]	[0.01]	[0.98]	[0.79]	[0.74]	[0.03]	[0.03]	[0.01]	[0.11]	[0.32]						
31	Target directors paid with equity	0.04	-0.03	-0.04	-0.03	0.03	-0.03	0.01	-0.06	-0.03	-0.03	-0.14	-0.02	-0.03	0.05	0.07	0.04	-0.11	-0.08	0.11	0.02	-0.08	0.08	0.04	-0.01	-0.06	0.02	0.09	0.01	0.02	-0.05	1.00				
		[0.48]	[0.54]	[0.42]	[0.63]	[0.52]	[0.51]	[0.87]	[0.29]	[0.58]	[0.59]	[0.01]	[0.70]	[0.54]	[0.37]	[0.18]	[0.48]	[0.03]	[0.12]	[0.03]	[0.65]	[0.13]	[0.12]	[0.46]	[0.81]	[0.28]	[0.74]	[0.07]	[0.84]	[0.67]	[0.39]					
32	Bidder fraction of independent female	-0.10	0.91	-0.11	0.69	0.15	0.01	0.12	0.03	0.08	-0.09	0.10	0.39	0.07	-0.16	-0.06	0.07	0.01	0.00	0.16	-0.03	-0.04	0.05	0.02	-0.08	-0.04	-0.11	-0.17	-0.29	0.17	0.00	-0.04	1.00			
		[0.03]	[0.00]	[0.02]	[0.00]	[0.00]	[0.77]	[0.01]	[0.55]	[0.09]	[0.05]	[0.03]	[0.00]	[0.16]	[0.00]	[0.23]	[0.12]	[0.82]	[0.98]	[0.00]	[0.49]	[0.42]	[0.33]	[0.75]	[0.10]	[0.35]	[0.01]	[0.00]	[0.00]	[0.00]	[0.99]	[0.49]				
33	Bidder fraction of dependent female directors	0.01	0.28	0.01	0.15	0.05	-0.01	0.03	0.06	0.10	-0.05	0.05	-0.25	0.08	-0.01	-0.04	0.02	-0.04	-0.02	-0.04	-0.07	-0.05	-0.07	0.02	0.01	0.14	0.00	-0.07	0.07	-0.15	0.00	0.01	-0.15	1.00		
		[0.77]	[0.00]	[0.84]	[0.00]	[0.29]	[0.79]	[0.48]	[0.17]	[0.03]	[0.30]	[0.28]	[0.00]	[0.08]	[0.81]	[0.41]	[0.62]	[0.34]	[0.73]	[0.35]	[0.15]	[0.25]	[0.14]	[0.65]	[0.82]	[0.00]	[0.93]	[0.13]	[0.14]	[0.00]	[0.95]	[0.88]	[0.00]			
34	Target fraction of independent female	-0.05	0.16	-0.03	0.18	0.91	0.20	0.68	0.00	-0.20	0.03	0.19	0.07	0.04	-0.02	-0.09	-0.01	0.08	0.28	0.34	0.11	-0.05	-0.10	-0.01	0.11	-0.14	0.02	0.16	-0.08	-0.06	-0.12	0.03	0.15	0.04	1.00	
		[0.26]	[0.00]	[0.49]	[0.00]	[0.00]	[0.00]	[0.00]	[0.97]	[0.00]	[0.57]	[0.00]	[0.11]	[0.41]	[0.68]	[0.05]	[0.83]	[0.08]	[0.00]	[0.00]	[0.02]	[0.28]	[0.04]	[0.85]	[0.02]	[0.00]	[0.73]	[0.00]	[0.09]	[0.23]	[0.01]	[0.60]	[0.00]	[0.38]		
35	Target fraction of dependent female directors	0.10	0.02	0.03	0.02	0.35	0.13	0.17	0.06	0.01	-0.10	0.05	-0.05	0.00	-0.03	0.03	0.04	0.08	0.02	-0.27	0.06	0.02	0.07	0.04	0.02	0.10	0.02	0.02	0.09	-0.04	0.21	0.02	0.01	0.03	-0.06	1.00
		[0.04]	[0.69]	[0.59]	[0.70]	[0.00]	[0.01]	[0.00]	[0.21]	[0.90]	[0.04]	[0.27]	[0.30]	[0.94]	[0.48]	[0.50]	[0.42]	[0.08]	[0.65]	[0.00]	[0.19]	[0.66]	[0.16]	[0.38]	[0.74]	[0.03]	[0.63]	[0.65]	[0.08]	[0.39]	[0.00]	[0.69]	[0.86]	[0.58]	[0.17]	

Table 4
Bid Premium

This table reports the OLS regression results for the size of the bid premium. Our mergers and acquisitions sample consists of 458 deals announced during the period 1997-2009. The data are retrieved from the SDC database and have available information on firm and board characteristics of both bidder and target firms from Compustat/CRSP/RiskMetrics. All firm characteristics are measured at the fiscal year end prior to the bid announcement date. See the Appendix for definition of the variables. All percentages are in decimal format. All model specifications employ robust standard errors, which are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Dependent variable	Bid premium		
	(1)	(2)	(3)
Bidder fraction of female directors	-0.4693**	-0.4656**	
	(0.198)	(0.193)	
Bidder one female director			-0.0801**
			(0.037)
Bidder multiple female directors			-0.1154**
			(0.046)
Target fraction of female directors	0.0934	0.1183	
	(0.202)	(0.201)	
Target one female director			-0.0180
			(0.033)
Target multiple female directors			0.0633
			(0.054)
Toehold	-0.1229	-0.2960	-0.2840
	(0.387)	(0.426)	(0.426)
Allcash	0.0783	0.0368	0.0428
	(0.056)	(0.052)	(0.052)
Allstock	-0.0824**	-0.0551	-0.0518
	(0.033)	(0.034)	(0.034)
Bidder board size	0.0000	-0.0006	0.0028
	(0.004)	(0.004)	(0.005)
Bidder fraction of independent directors	0.0303	0.0219	0.0343
	(0.086)	(0.087)	(0.088)
Bidder CEO being COB	0.0200	0.0166	0.0159
	(0.031)	(0.031)	(0.032)
Bidder sales growth	0.0283	0.0310	0.0299
	(0.036)	(0.035)	(0.035)
Bidder Tobin's Q	0.0046	0.0058	0.0046
	(0.008)	(0.007)	(0.007)
Bidder ROA	0.1788**	0.1537*	0.1608*
	(0.089)	(0.089)	(0.087)
Bidder book leverage	-0.0981	-0.0766	-0.0939
	(0.099)	(0.098)	(0.098)
Target board size	-0.0073	-0.0066	-0.0099*
	(0.005)	(0.005)	(0.006)
Target fraction of independent directors	0.0693	0.1042	0.1110
	(0.091)	(0.090)	(0.090)
Target CEO being COB	0.0080	0.0083	0.0087
	(0.030)	(0.029)	(0.028)

Target sales growth	-0.0626	-0.0643	-0.0618
	(0.047)	(0.045)	(0.044)
Target Tobin's Q	0.0020	0.0067	0.0053
	(0.013)	(0.013)	(0.013)
Target ROA	-0.2889	-0.2816	-0.2839
	(0.198)	(0.189)	(0.187)
Target book leverage	0.0304	0.0627	0.0587
	(0.107)	(0.110)	(0.113)
Tender offer		0.1809***	0.1788***
		(0.058)	(0.058)
Unfriendly		0.0195	0.0119
		(0.040)	(0.041)
Relative size		-0.0244	-0.0286
		(0.039)	(0.039)
Constant	0.5124***	0.4996***	0.5254***
	(0.122)	(0.121)	(0.120)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Observations	458	458	458
Adjusted R-squared	0.13	0.16	0.16

Table 5
Robustness Checks

This table presents robustness checks on our main results. All firm characteristics are measured at the fiscal year end prior to the bid announcement date. See the Appendix for definition of the variables. All percentages are in decimal format. Panel A reports the Negative Binomial regression results for the number of bid initiations; Panel B reports the OLS regression results for the size of the bid premium. In Columns (1) and (2) of Panels A and B, we control for director ownership and director compensation. In Column (3) of Panels A and B, we decompose female directors into two categories: independent versus dependent ones. Our bid initiation samples in Columns (1)-(2) and Column (3) of Panel A consist of 16,489 and 19,521 firm-year observations during the period 1997-2009, respectively. Our mergers and acquisitions samples in Columns (1)-(2) and Column (3) of Panel B consist of 315 and 458 deals announced during the period 1997-2009, respectively. All model specifications employ robust standard errors. The standard errors in Panel A are also clustered by firm. The corresponding standard error is reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Robustness Checks for Bid Initiation

Dependent variable	# M&A bid initiations		
	(1)	(2)	(3)
Fraction of female directors	-0.7274**		
	(0.313)		
One female director		-0.1242*	
		(0.064)	
Multiple female directors		-0.2303***	
		(0.081)	
Fraction of independent female directors			-0.6507**
			(0.303)
Fraction of dependent female directors			-1.3854*
			(0.759)
Board size	-0.0136	-0.0046	-0.0076
	(0.011)	(0.012)	(0.010)
Fraction of independent directors	-0.3585**	-0.3331*	-0.2108
	(0.173)	(0.173)	(0.150)
CEO being COB	0.0124	0.0119	0.0256
	(0.050)	(0.050)	(0.047)
Sales growth	-0.0128	-0.0131	-0.0021
	(0.014)	(0.014)	(0.010)
Tobin's Q	-0.0106	-0.0106	-0.0098
	(0.012)	(0.012)	(0.011)
ROA	0.2369	0.2416	0.1041
	(0.184)	(0.187)	(0.086)
Book leverage	-0.2627	-0.2612	-0.2521*
	(0.163)	(0.163)	(0.142)
Cashholding	-0.3075*	-0.3103*	-0.2871*
	(0.175)	(0.176)	(0.167)
Logarithm of market capitalization	0.3258***	0.3285***	0.3341***
	(0.018)	(0.018)	(0.017)
Ownership of directors	-0.4785**	-0.4831**	
	(0.244)	(0.244)	
Directors paid with equity	-0.0078	-0.0045	
	(0.088)	(0.088)	
Constant	-6.4341***	-6.5195***	-3.0530***
	(0.646)	(0.650)	(0.427)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
Observations	16,489	16,489	19,521
Pseudo R-squared	0.155	0.155	0.155

Panel B: Robustness Checks for Bid Premium

Dependent variable	Bid premium		
	(1)	(2)	(3)
Bidder fraction of female directors	-0.5818***		
	(0.220)		
Bidder one female director		-0.1307***	
		(0.050)	
Bidder multiple female directors		-0.1781***	
		(0.059)	
Bidder fraction of independent female directors			-0.3910**
			(0.196)
Bidder fraction of dependent female directors			-0.8541*
			(0.489)
Target fraction of female directors	-0.0850		
	(0.238)		
Target one female director		-0.0402	
		(0.042)	
Target multiple female directors		0.0435	
		(0.070)	
Target fraction of independent female directors			0.0012
			(0.191)
Target fraction of dependent female directors			0.7070
			(0.565)
Toehold	-0.0819	-0.0542	-0.2878
	(0.508)	(0.478)	(0.426)
Allcash	0.0552	0.0739	0.0392
	(0.067)	(0.071)	(0.052)
Allstock	-0.0498	-0.0456	-0.0485
	(0.041)	(0.042)	(0.036)
Bidder board size	0.0042	0.0096	-0.0007
	(0.006)	(0.006)	(0.004)
Bidder fraction of independent directors	-0.0244	-0.0084	-0.0050
	(0.137)	(0.140)	(0.090)
Bidder CEO being COB	0.0119	0.0146	0.0197
	(0.038)	(0.038)	(0.032)
Bidder sales growth	0.0346	0.0303	0.0315
	(0.043)	(0.042)	(0.035)
Bidder Tobin's Q	0.0121	0.0098	0.0057
	(0.008)	(0.008)	(0.008)
Bidder ROA	0.0640	0.0849	0.1528*
	(0.117)	(0.119)	(0.088)
Bidder book leverage	-0.0316	-0.0436	-0.0940
	(0.115)	(0.113)	(0.100)
Target board size	-0.0164**	-0.0209**	-0.0066
	(0.007)	(0.008)	(0.005)
Target fraction of independent directors	0.1399	0.1377	0.1507
	(0.114)	(0.113)	(0.094)
Target CEO being COB	0.0123	0.0102	0.0036
	(0.037)	(0.036)	(0.028)
Target sales growth	-0.0575	-0.0492	-0.0670

	(0.073)	(0.070)	(0.045)
Target Tobin's Q	0.0066	0.0051	0.0047
	(0.013)	(0.013)	(0.013)
Target ROA	-0.3956	-0.3971	-0.2707
	(0.248)	(0.244)	(0.191)
Target book leverage	0.1585	0.1470	0.0755
	(0.150)	(0.153)	(0.113)
Tender offer	0.2416***	0.2481***	0.1818***
	(0.080)	(0.081)	(0.059)
Unfriendly	-0.0002	-0.0154	0.0174
	(0.046)	(0.051)	(0.039)
Relative size	-0.0479	-0.0600	-0.0229
	(0.052)	(0.050)	(0.038)
Bidder ownership of directors	0.0073	0.0021	
	(0.172)	(0.178)	
Bidder directors paid with equity	0.0411	0.0530	
	(0.066)	(0.065)	
Target ownership of directors	0.0952	0.0347	
	(0.169)	(0.160)	
Target directors paid with equity	0.0487	0.0478	
	(0.045)	(0.045)	
Constant	0.1005	0.1238	0.4853***
	(0.206)	(0.207)	(0.127)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Observations	315	315	458
Adjusted R-squared	0.18	0.18	0.16