Lehman Sisters[*]

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JEL Classification: G34; G38; G21; G28; J16; J78
Keywords: Women; Risk Aversion; Selection; Risk; Crisis; Banks; Board of Directors

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Abstract

Would the crisis have happened if Lehman Brothers had been Lehman Sisters? Evidence on population gender differences in risk aversion suggests not. But population averages can mask important selection effects. We show that conditional on being in the finance industry, women need not be more risk averse than men. Consistent with the importance of selection, listed banks with more female directors did not have lower risk than other banks during the crisis but they had better performances. While it is possible that diversity is valuable in a crisis, we suggest an alternative policy focus than board gender quotas.

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The "Lehman Sisters" fancy assumes that women are less risk-taking, less obsessed with money and status and generally less full of themselves than men. (The Economist, August 6, 2009)

1. Introduction

Neelie Kroes, European Union Commissioner for Competition, famously said "My clear line is that if Lehman Brothers had been 'Lehman Sisters,' would the crisis have happened like it did? No." Her rationale was that women are more risk averse and would give different perspectives than those of their male colleagues (Kroes, 2009). For similar reasons, Michel Barnier, Europe's internal markets commissioner, proposed mandatory gender quotas on bank boards in 2011 (Treanor, 2011). However, Lehman Brothers was arguably already "Lehman Brothers and Sisters". From 1996 until 2007, it had one woman on the board and in 2004 and 2005 it had two female directors. Moreover, newspapers are rife with stories about female bankers who followed very risky strategies. In fact, the creator of credit default swaps, which many blame for the crisis, was a woman, Blythe Masters, who at the time was heading JP Morgan's Global Credit Derivatives group. Journalists describe Erin Callan, who became the chief financial officer of Lehman Brothers in 2007 as following a "risky, high-profile strategy" (Clark, 2010) and Jamie Dimon, the CEO of JPMorgan Chase, famously described Ina Drew, his then chief investment officer who was later fired over a $6 billion trading loss, as "bold" (Dominus, 2012).

It is, therefore, not clear that we should expect women working in banks or sitting on bank boards to be more risk averse than men. While many experimental and survey-based studies document that women are more risk averse than men (see the surveys in Eckel and Grossman, 2008, Croson and Gneezy, 2009 and the JEBO special issue edited by Croson, Gneezy and Rey-Biel, 2012) most of these studies are based on samples of college students or the general population, not top executives. Adams and Funk (2012) provide evidence that generalizing from the population to the executive ranks may be misleading. In a survey of the population of directors in Sweden, they show that women on boards of publicly-listed firms emphasize different values than both male directors and women in the general population. Female directors are more open to change and less conservation-oriented than both their population counterparts and male directors. Moreover, female directors are *less* risk averse than male directors in their sample. One explanation for their results is self-selection. The women who choose a career leading to a directorship may be very different from those who do not.[1]

This problem is likely to be particularly severe for banks. Sapienza, Zingales and Maestripieri (2009) document that at the University of Chicago only about 36% of female MBA students choose a risky career in finance (e.g., investment banking or trading), whereas 57% of male students do so. They argue one reason for this may be biological. Individuals high in testosterone and low in risk aversion were more likely to choose risky careers in finance in their study. Since these results hold even after controlling for gender, this suggests that women who choose finance careers are less risk averse and have higher levels of testosterone than other women. Using their data, we verify that this is true. Moreover, we show that conditional on choosing a finance career, women are not more risk averse than men. In fact, although the results are not statistically significant, women in finance are *less risk averse* than men in finance in the Sapienza, Zingales and Maestripieri (2009) sample.

The data in studies such as Adams and Funk (2012) and Sapienza, Zingales and Maestripieri (2009) are clearly very stylized. It is possible that in real life situations women generally behave in a more conservative manner than men, even as directors, and that this could lead to less risky firm outcomes. Moreover, for outside directors testosterone may not affect the choice of a directorship in a bank in the same way as it affects the choice of a job in a financial firm. Whether or not more gender diverse boards of banks engage in fewer risk-taking activities is therefore an empirical question. We examine this issue in the context of roughly 300 large publicly-traded U.S. banks and bank holding companies in a 4-year period spanning the 2007-2008 financial crisis. We focus on commercial banks and bank holding companies because the policy discussion concerning gender and finance focuses on these types of institutions. For example, the European Commission added targets for the underrepresented gender in the management body to its 2014 Capital Requirement Directives (CRD IV).

Beyond allowing us to directly examine the "Lehman Sisters" hypothesis, we believe examining the role of diversity in a crisis is of broader interest. Lorsch and MacIver (1995) suggest that boards take on a more important role in a crisis. They quote one director as saying (p. 97): "Directors are like firemen. They sit around doing very little until there's a fire

[1] Another explanation could be adaptive behaviour to the requirements of the job. According to recent research, psychological differences between men and women may be influenced by the environment (e.g. Bertrand, 2010).

alarm and then they spring into action." If the board is more active, it may be easier to detect the effects of diversity in a crisis.

But diversity may also play a different role in a crisis than in normal times. Crises may require out-of-the-box thinking that can occur more easily when directors with different backgrounds bring different perspectives to the table (e.g. European Commission, 2012). Diversity may also play a direct role in weathering a crisis. For example, Lins, Servaes and Tamayo (2015) argue that firms with more CSR investments did better during the financial crisis because they did not lose the trust of their key stakeholders. Since there is evidence that female directors are particularly stakeholder-oriented (Adams, Licht and Sagiv, 2011; Matsa and Miller, 2014), it is plausible that more gender diverse boards perform better in a crisis involving a breakdown of trust.

On the other hand, Kanter (1977) argues that board-level trust is more important in uncertain times and social similarity breeds trust. Thus, it is possible that board-level diversity is more costly during a crisis than in periods of normalcy. To shed some light on the role of diversity in a crisis, we extend our analysis from risk to bank performance, as well as measures of individual behaviour.

We first examine the relationship between boardroom gender diversity and various measures of risk-taking activities in banks, such as the use of mortgage-backed securities. We then examine the relationship between diversity and various measures of overall bank risk. In this analysis, we need to be concerned about the endogeneity of boardroom diversity for at least two reasons. First, if bank executives believe that women are more risk averse than men, they may appoint more (or fewer) women to affect risk outcomes. Second, banks may prefer a more homogenous board as their risk levels increase if Kanter's (1977) argument that social similarity breeds trust is true and trust is important as risk increases.

We try to isolate causal relationships between diversity and risk using two approaches. First, we follow the approach in Cheng, Hong and Scheinkman (2015) and use origin risk (risk measured at the date the banks first appear in CRSP) as an exogenous measure of bank risk to examine whether boardroom diversity responds to changes in risk. Second, we instrument for gender diversity in our risk regressions using a Blau index of gender balance in director connections. This measure increases as the amount of time directors are connected to members of the opposite sex (through a director relationship) becomes more equal.

Our rational behind this instrument is twofold. First, male directors with more balanced connections to women may be better able to identify suitable female candidates to appoint to the board. Second, both male and female directors should be more willing to be on a diverse board when they have more gender-balanced relationships because their intergender trust should be higher. On the other hand, we believe it is unlikely that knowing more women or having higher intergender trust should be correlated with bank outcomes, except through board diversity. Firms run by executives with greater intergender trust could have different outcomes, for example, due to better employee relations. However, our results are economically similar if we restrict the instrument to outside directors.

We find weak evidence that boardroom gender diversity is associated with more risk taking activities around the crisis. For example, the likelihood that a bank issues mortgage backed securities is higher in banks with more women and banks with more women do not engage in more hedging activities. But banks with higher origin risk do not have more women on their boards and total risk is not lower (or higher) when boards are more diverse, even in instrumental variable regressions. This suggests that there is no causal relationship between boardroom gender diversity and firm risk, which is consistent with our intuition that selection may cause female directors' risk preferences to be similar to those of male directors.

These results could be driven by tokenism. If token women are excluded from decision-making, their presence will not have an effect on board behaviour. But our evidence on diversity and performance is inconsistent with tokenism. Diversity is positively associated with measures of bank performance in instrumental variable regressions. A one standard deviation increase in boardroom diversity is associated with a 1.186% increase in Tobin's Q and a 0.736% decrease in the fraction of bad loans. These effects can be considered economically meaningful.

Prior evidence documents negative effects of diversity (e.g. Adams and Ferreira, 2009; Ahern and Dittmar, 2012; Matsa and Miller, 2013) in samples of non-financial firms. We believe there are two plausible reasons why we find positive effects. First, selection may matter not only for director risk preferences, but also for director quality. If it is harder for women to become directors in the finance industry the difference between female and male director quality may be higher in banking than in other industries. Our data suggests that this may be the case. Both the levels and the within-firm variation in the proportion of women on boards appears to be smaller in banking than in size-matched samples of non-financial firms.[2] Moreover, the women in our sample are on average slightly better educated than the men and the relation between the fraction of women and performance becomes weaker after

[2] Adams and Kirchmaier (2015a) document similar results outside of the US.

controlling for education. Since our sample with education data is limited, we view this as suggestive evidence in favour of selection.

Another possibility is that diversity may add value during a crisis. Although Kanter's arguments suggest homogenous groups perform better during a crisis, it is not necessarily clear along which dimension homogeneity is important. The evidence on risk aversion we present for MBA students and the evidence for directors in Adams and Funk (2012) suggests that in this dimension, at least, female and male directors may not be so dissimilar. So it is not clear that gender-diverse boards should underperform other boards in a crisis.

To examine whether there is evidence that more diverse boards behave differently in ways that could enhance their performance, we follow Adams and Ferreira (2009) and examine whether female directors seem to behave differently than male directors and whether boards with more women are different. We find that male directors are less likely to have attendance problems in banks with more women on the board and female directors are more likely to serve on committees, especially monitoring committees. This evidence suggests that female directors do behave differently than male directors in ways that are potentially correlated with performance around the crisis. Notably, we do not find that women were more likely to serve on risk committees which is consistent with the idea that banks do not value them for their lower risk aversion.

Although banks with more women perform better in our sample, our results do not represent compelling evidence for the "Lehman Sisters" hypothesis. Our conclusions are in contrast to several recent papers that use corporate outcomes to make inferences about the preferences of female corporate leaders. For example, Huang and Kisgen (2013) document that firms with more female top executives make fewer acquisitions and argue the evidence is consistent with lower female overconfidence. In a related analysis, Levi, Li and Zhang (2013) assume that women are less overconfident than men. They document that firms with more female board members make fewer acquisitions and take this as corroborating evidence of the lower overconfidence of women. In a cross country study of mostly private firms, Faccio, Machica and Mura (2014) document that firms with female CEOs have lower leverage and less volatile earnings. They interpret these findings as evidence of female risk-avoidance. Our results may be different because of selection. The pool of female corporate leaders in banks may be substantially different from the pool of female corporate leaders in non-financial firms. Our analysis of the Sapienza, Zingales and Maestripieri (2009) sample provides suggestive evidence that this may be true.

However, our results also do not suggest the opposite conclusion, namely that banks with more women are *more* risky, as Berger, Kick and Shaeck (2014) argue is the case for their sample of German banks. As Adams and Funk (2012) argue, the characteristics of female directors may vary across countries as a function of the institutional environment. If it is more difficult for women to advance to the executive level in Germany, it is possible that female directors in Germany are on average much less risk averse than female directors in the U.S.. This could explain the differential effect of gender on corporate risk measures across the two samples.

If board-level risk aversion levels depend on the pool directors come from, then it is not clear that we should reject quotas on bank boards outright-at least if the rationale for quotas is to reduce average risk aversion. If women outside of the regular director pool are more risk averse than women already in the director ranks, then average board level risk aversion may decrease once a quota is put into place. However, it would be difficult to say whether the women who would be next in line to fill a board quota would be more risk averse than women who already sit on boards. Moreover, as the literature on gender composition in teams points out (e.g. Aspetiguia, Azmat and Iriberri, 2012), different teams may have different ways of aggregating individual preferences. Thus, it is unclear that imposing gender quotas on bank boards would be an effective way of increasing their levels of risk aversion. The rationale for quotas is even less compelling if adaptive behaviour plays a dominant role in shaping board-level risk preferences and if positive performance effects are the result of selection.

Putting aside the question of whether quotas would affect board risk-preferences, we believe that policy can still play an important role in improving the representation of women in the financial services industry. Our evidence suggests that barriers to female representation are larger in banking than in other industries. More research needs to be done to uncover what these barriers are, but Sapienza, Zingales and Maestripieri's (2009) evidence that proportionally fewer women enter finance than men suggests that the barriers are not specific to the boards of banks but may already occur at lower levels of the organization.

2. Evidence on the impact of selection on gender differences in risk aversion

A large experimental literature examines differences between risk aversion between men and women. In their survey of this evidence, Croson and Gneezy (2009) conclude that women are indeed more risk averse than men. But they also suggest that this conclusion may not generalize to the managerial level or professional populations because of self-selection or adaptive behavior to the job. Because it is difficult to get managers to participate in experiments, the evidence on gender differences at the managerial level is scant.

An early paper in this literature by Johnson and Powell (1994) examines betting behaviour in a random sample of the betting population in the U.K. as well as decisions in classes of undergraduate students with and without "managerial" education. They find some gender differences in betting behaviour in the population that they argue are suggestive that women are more risk averse than men. However, in their decision-making study, there are no differences in risk-taking behaviour between male and female students with managerial backgrounds. Johnson and Powell (1994) conclude that one cannot infer how female managers will behave by observing women who are not managers.

Adams and Funk (2012) try to measure managerial risk aversion directly using a survey of corporate directors. As part of a larger survey on psychological characteristics, they asked directors of publicly-traded companies in Sweden an investment question designed to measure risk aversion. They find that female directors are less risk averse than men. This finding does not reverse even after they control for differences in individual and firm characteristics. Because they also find that female directors and women in the Swedish population are significantly different in other psychological characteristics, they argue that self-selection may be important for understanding their findings. Because a career leading to a directorship is more unconventional for women, the women who choose to pursue a high-profile career may be precisely the women who are less risk averse.[3]

The importance of selection for risk aversion is likely to be even more important in the financial services industry. For example, Niessen-Ruenzi and Ruenzi (2011) document that the fraction of female fund managers in the U.S. equity mutual fund industry is low-it has hovered around 10% for the last 20 years. It seems unlikely that the women who nevertheless choose a career in this industry are very risk averse. Consistent with this idea, Niessen-Ruenzi and Ruenzi document that female fund managers perform as well as male managers.[4]

Sapienza, Zingales and Maestripieri (2009) find that fewer women choose a career in finance in their sample of University of Chicago MBA students. They argue that one reason for this may be biological. In their sample, women have lower levels of testosterone and

[3] Self-selection may not be the only reason female directors might be less risk averse than women in the population. They may also arise because firms only want women with certain characteristics. However, it is unclear whether they are able to screen on the basis of unobservable characteristics.
[4] Niessen-Ruenzi and Ruenzi (2011) show that female fund managers experience fewer inflows, which they attribute to gender discrimination.

testosterone is positively correlated with the likelihood of choosing a career in finance. They also document that testosterone is negatively correlated with risk aversion and that women have higher levels of risk aversion on average.

Using their data, we provide some evidence on the importance of selection for the risk aversion of women who might eventually end up being executives on the boards of banks. In particular, we ask whether the women who choose a career in finance have different characteristics than the women who do not choose a career in finance and what the gender differences in risk aversion look like conditional on choosing a career in finance.

<Insert Figure I about here>

The sample consists of data on the entire cohort of MBA students in 2008 (550 students). Testing problems and refusal by some students to be included in the sample means not all variables have 500 observations. The data includes the premium individuals would pay to avoid a lottery as a measure of risk aversion, measures of salivary and pre-natal testosterone (Baron-Cohen eye test and Average 2D:4D Digit ratio) and gender. For a restricted subsample, we also have career choice data. In Appendix Table A.I we provide summary statistics for the full sample and restricted sample, stratified by men and women. We then provide summary statistics separately for the group of students who chose a career in finance and those that did not. We report the differences in means between men and women and the t-statistics for the tests of equality of means across gender, as well as the corresponding statistics within gender but across finance and non-finance careers.

The effect of selection on risk aversion is immediately apparent from Figure I which provides a graphical representation of the premia individuals would pay to avoid a lottery in the restricted sample. In line with the general conclusions from the experimental literature, the top left panel illustrates that women are more risk averse than men on average. They will pay $29.47 to avoid the lottery; this is $6.15 dollars more than the average for men. However, the population comparison masks important variation in risk aversion among women, as is evident when we compare means within gender but across career choice.

Men in finance are not significantly different from other men. They will pay only $1.48 less to avoid the lottery. In contrast, women in finance are significantly different from other women and the differences are relatively large as compared to the differences between men and women. For example, women in finance would pay $10.85 less than other women to avoid the lottery. This is a 45% larger difference in risk aversion than the difference between men and women in the full sample.[5]

Since women in finance appear very different from other women, but men in finance do not appear very different from other men, gender differences within occupations should be different. When we compare men and women outside of finance, we observe that the gender differences in characteristics are all larger than in the full sample. Outside of finance, women are 24% more risk averse than men, for example. In contrast, as the bottom left panel of Figure I illustrates, gender differences almost disappear for men and women in finance.[6] In fact, the difference in premia to avoid the lottery between men and women is *positive* in the finance sample. Although the difference is not statistically significant, it appears that, if anything, women in finance are less risk averse than men in finance.

Depending on the context, Figure I and Table A.I suggests that generalizing from characteristics of women in the population at large to subpopulations of women may be misleading. This should be particularly true if the characteristic under consideration plays a key role in the selection into the subpopulation. Sapienza, Zingales and Maestripieri (2009) argue that risk aversion and testosterone play a key role in selection into a finance career. Thus, women in finance should have lower risk aversion and higher testosterone than other women. Since it is plausible that risk aversion and testosterone will also play a role in women's choice to pursue a career leading to a bank directorship, both for executive and outside directors, we believe that one should not expect female bank directors to be more risk averse than male bank directors. As such, we also do not expect risk to be lower in banks with more gender-diverse boards.

3. Board diversity in banks

3.1 Bank data

We obtain data on listed bank holding companies and commercial banks for the fiscal years 2006-2009 from several sources. The initial sample includes all firms in Compustat with SIC codes 6000 to 6300. We restrict this sample to regulated banks by matching their CRSP permcos to the regulatory entity codes of supervised financial institutions using the

[5] Similarly, the difference between women in finance and other women is 53% greater than the difference between men and women in the full sample for the Baron-Cohen eye test and 50% greater for the 2D:4D ratio.
[6] For example, the difference in the Baron-Cohen eye test goes from -0.70 in the full sample to -0.12 in the finance sample and the 2D:4D ratio goes from -0.02 to -0.004.

2007 CRSP-FRB Link file of the Federal Reserve Bank of New York.[7] We end with a sample of 365 banks with proxies available at some point during the sample period. This is close to the number of banks (372) in Aebi, Sabato and Schmid (2012), who use a slightly different sample selection procedure. In Appendix Table A.II, we provide basic information about our sample for each year. The bulk of the sample consists of bank holding companies. Since a number of banks failed since 2007, the decline in the number of banks with proxies from 350 to 296 over the four year period is not surprising.

<Insert Table I about here>

We collect a wide variety of data to proxy for bank activities that might be related to risk-taking, bank risk, bank performance, bank capital structure and the governance structure of banks. The financial information for our banks comes from three sources. Accounting data comes from Compustat and the Financial Institution Reports (FR Y-9C and FR Y-9SP Call Reports for large and small bank holding companies respectively and the Report of Condition and Income for Commercial Banks) collated by the Federal Reserve. We obtain delisting information from the National Information Center. Stock price data is from CRSP. In Table II, we provide summary statistics for our sample. We describe the construction of some of the variables below; Appendix I provides detailed descriptions of all variables as well as the data sources.

Average bank size, as measured by the book value of assets, is approximately $31 billion in our sample. The Tier one capital ratio is on average 11.40%, much higher than the 4% required by the Basel II Accord. We define the loan ratio as total loans deflated by the book value of total assets. On average, loans account for 70% of assets. We document an average deposit-to-loan ratio of 1.16, implying that the banks lend approximately 90 cents for each dollar they receive in deposits.

To measure risky activities, we obtain information on the use of derivatives from the Financial Institution Reports (Schedule HC-D). Derivatives for trading purposes account for approximately 35% of assets. Like Ellul and Yerramilli (2013), we find that banks use derivatives for hedging sparingly – they only account for 4.1% of total assets. We also measure the amount of trading assets in a bank's trading portfolio that are considered to be risky. Banks only need to report this data item if risky assets are more than $2m during any of the four preceding quarters. We account for potential threshold effects by using an indicator variable, Risky-Trading *t*, that is one when banks report that they have risky assets for trading

[7] The version of link file we used was valid from January 1990 to December 2007. This means that Goldman Sachs, which became a bank holding company in late 2007, is not in our dataset.

purposes and zero when risky assets are either zero or missing. We also use a variant, Risky Trading *d*, that records missing values as missing.

We use stock returns to estimate proxies for bank risk, such as origin risk, return volatility, Idiosyncratic risk and Tail risk. Following Cheng, Hong and Scheinkman (2015), we calculate a measure of origin risk as the annualized standard deviation of daily stock returns over the first year after the bank's stock first appears in CRSP. We set origin risk to missing for banks that entered CRSP only as a result of CRSP's expanded coverage of NASDAQ in 1972. Volatility is the standard deviation of excess weekly returns, estimated relative to the value-weighted market index for the 52 weeks preceding the fiscal year end date. Idiosyncratic risk is the annualized standard deviation of the residuals from a market model regression estimated using daily returns over the fiscal year. Following Acharya et al. (2010), Tail risk is the average return for the bank estimated over the 5% worst days for the S&P 500 in the year.

As measures of default risk we use the Estimated Default Frequency (EDF) data from Moody's Analytics and a Z-Score. As in Boyd and Graham (1986) and Boyd, Graham and Hewitt (1993), we compute the Z-Score as the ratio of average ROA plus the capital asset ratio to the standard deviation of ROA. We compute averages and the standard deviation over the last four quarters.

We define Tobin's *Q*, one of our proxies for performance (see the survey by Hughes and Mester, 2014), as the ratio of the firm's market value of assets (book assets minus book equity plus market value of equity) to its book value of assets. Average Tobin's *Q* is 1.035 with a range from 0.899 to 3.115. We also use the fraction of bad loans (bad loans/total loans) as a performance measure for banks with non-zero bad loans. Roughly 2.1% of the banks' loan portfolios end up being classified as non-performing during this period.

Because historically the coverage of banks has been poor in common governance databases, we obtain most governance information from banks' proxy filings. We collect information on board size, the number of independent directors, attendance records at board meetings, the number of board meetings and committee memberships.

<Insert Table II about here>

Mean board size is eleven directors. Female directors make up 9.5% of the board. Only 0.6% of female directors are also bank executives. The total number of unique directors in our sample is 4,871. We source their individual characteristics from BoardEx. To obtain director information, we hand-matched the names of directors in our sample to those in BoardEx. This step is necessary to eliminate matching errors that may arise when there are multiple directors with the same name and also because of subtle differences in names across databases such as the inclusion of a director’s title in the BoardEx name field. We are able to match the names of all but 57 directors. As panel A of Table II shows, 80% of directors serve on committees. Directors are on average 61 years old and they are on the boards of 1.23 public companies. Their tenure on the board of the sample bank (the difference between the sample year and appointment year) is nine years.

Female directors account for 9.9 per cent of director-years. They are younger (58.63 vs. 61.57), have less board experience and shorter board tenures relative to their male counterparts. A higher proportion of female directors sit on committees (84% vs. 79%) and when they do serve, they are on more committees than male directors. The differences in average characteristics across genders are all statistically significant at the 1% level.

3.2 Are banks different when it comes to boardroom gender diversity?

Implicit in the “Lehman Sisters” hypothesis is the assumption that women are relatively underrepresented on bank boards and perhaps more so than on the boards of non-financials. To put the 9.5% average representation of women in our sample into perspective, we compare the representation of women on bank boards to their representation on boards in a size (book value of assets) matched sample of non-financial firms. Consistent with the literature on board composition and diversity on boards, we measure representation in terms of percentages. We adjust for firm size because Adams and Kirchmaier (2015b) show that women are much less likely to sit on the boards of smaller firms and our sample contains both large and small banks.

We take the intersection of our sample with BoardEx and require that banks have at least 4 years of data in the period 2003-2010, a period for which BoardEx coverage is relatively representative of the US market (Adams and Kirchmaier, 2015b). We end with a sample of 321 banks. We define industrial firms in BoardEx to be firms with SIC codes outside of 6000-6300 (financial firms) and SIC code 4900-4949 (utilities). We match banks to industrial firms on the book value of assets (from Compustat) with replacement. A bank’s control firm is the best match within 30% of the bank’s assets. In Figure II we plot the percentage of women on bank and matched industrial firm boards. The percentage of women on bank boards is lower than for industrial firms throughout the whole period except in 2008 where the percentage of women on industrial firm boards drops to the same level as in banking. On average, banks have 0.94% fewer women on boards than the matched industrial firms.

<Insert Figure II about here>

To examine whether the relative underrepresentation of women on bank boards looks different if we focus only on larger banks, we construct an alternative sample of banks and size matched industrials in the S&P 1500 using Riskmetrics' board data. We use the same matching procedure as for the BoardEx sample. Once we restrict our sample to banks with at least 4 years of data between 1996 and 2010, we end with a sample of 192 banks with matching control firms. Even though the banks in the Riskmetrics sample have higher percentages of female directors than the banks in the BoardEx sample, Figure II shows that women still appear to be relatively underrepresented on their boards. On average, banks have 2.07% fewer women on boards than the matched industrial firms.

What is also noticeable from Figure II is that there is more variation in the average percentage of women on the boards of industrial firms in both samples. It is plausible that this is the result of greater within-firm variation in the percentage of women on boards of industrial firms. We provide some suggestive evidence that this is true in Figures III and IV. Because we are interested in within-firm changes, we no longer restrict ourselves to matching firms whose identity may change depending on the best match. To still ensure some degree of comparability, we focus on the 194 banks and 1,865 industrial firms with at least 4 years of data in the Riskmetrics sample. For each firm, we calculate both the absolute value of the year-to year differences in the percentage of women on the board, as well as the average percentage of women over all years the firm appears in the sample. In Figure III, we show separate boxplots of the differences and the averages for banks and industrial firms. The line intersecting the box denotes the median. The lower/upper edges of the box denote the $25^{th}/75^{th}$ percentiles.

<Insert Figure III about here>

Figure III suggests that the distribution of year-to-year differences is more spread out for non-financial firms than for banks because there are more extreme values for non-financial firms. In contrast, the maximum values for the averages are attained by banks, although the difference between the 75^{th} and 25^{th} percentile is larger for non-financial firms. In Figure IV, we restrict our sample to firm-year observations for which the percentage of female directors was non-zero in the previous year. This figure suggests even more strongly that for firms with women on the board, there is greater within-firm variation for non-financial firms than for banks.

<Insert Figure IV about here>

These comparisons suggest that the implicit assumption underlying the "Lehman Sisters" hypothesis is correct. Women are relatively less represented on the boards of banks than on the boards of non-financial firms of similar size. While there is cross-sectional variation in the percentage of women on bank boards, there is less within-firm variation in their representation than is the case for non-financial firms.

3.3 An instrument for board-level gender diversity

Because there is little within-firm variation in gender diversity in banks, we do not use firm fixed effects (e.g. Adams and Ferreira, 2009; Matsa and Miller, 2013) to address endogeneity problems in our analysis of both risk and performance. Instead, we focus on instrumental variable methods. Adams and Ferreira (2009) argue that connections of directors to women help to explain the presence of women on the board. They use a measure of connections male directors have with women through other board seats in their sample as their instrument for the proportion of women on the board.

As our sample consists only of banks, using a within-sample measure of connections is not feasible for us. Federal Reserve Regulation L generally prohibits a management official (including directors) from serving at two non-affiliated depository institutions, depository institution holding companies, or any combination thereof, in situations where the management interlock would likely have an anticompetitive effect. This means bank directors will not have multiple bank directorships.

Instead, we construct a related measure using data on career experience that is available in BoardEx. For each director, BoardEx provides the list of all other individuals who were connected to the same organization at the same time. We use this data to construct our instrument, a Blau index of gender balance in director connections outside our sample banks (EBB = Executive Balance using Blau).

For each director i, we take the list of connected individuals in BoardEx and impose a number of filters to ensure that the director knows the connected individual personally (see Appendix II for more details). We only consider individuals who work at the same organization at the same time to be "potentially connected". To ensure individuals know each other, we require that at least one of them holds a board seat and the other individual holds at least a top executive position, such as CEO, CFO, etc.. Since directors' roles in universities and non-profits are typically vague and often described simply as "Education", "Member" or "Trustee" it is unclear whether "potentially connected" individuals know each other through such ties. Thus, we do not use these types of connections in the construction of EBB.

For the final list of connections, we classify the gender of the connected individual using the gender assigned to first names by the US Census. We calculate the length of the relationship between the director and a connected individual as the difference between the sample year and the start date of the connection. For each director i, we add up the lengths of time they are connected to men and women and calculate a Blau index of gender balance in working relationships, b_i, as follows

$$b_i = 1 - \left(\frac{\text{Number of years connected to executive women}}{\text{Number of years connected to executive women and men}}\right)^2 - \left(\frac{\text{Number of years connected to executive men}}{\text{Number of years connected to executive women and men}}\right)^2$$

Our instrument EBB is the board-level average of b_i. $b_i$increases as the director's relationships become more gender-balanced. It is zero if directors are only connected to one gender. It is equal to ½ if directors are equally connected to both genders. It is equal to 1 if directors have no past connections involving top executives or directors.

The benefit of using a Blau measure is that it is symmetric with respect to type, so we do not need to take a stand on which type is more important for each director. For example, a female director who knows one man for 10 years and one woman for 20 years will have the same level of "balance", $b_i = 1 - \left(\frac{20}{30}\right)^2 - \left(\frac{10}{30}\right)^2 = 0.44$, as a (fe)male director who knows one woman for 10 years and one man for 20 years. Our instrument also combines information about both the number of connections and their length in a concise manner. For example, a director who knows one man for 10 years and one woman for 10 years will have the same level of balance (0.5) as a director who knows two men for a total of 20 years and 5 women for a total of 20 years.

It is easy to tell stories why our instrument should be correlated with board diversity. But it is not so easy to come up with stories why our instrument violates the exclusion restriction. The number of connections directors have at any given point in time may be correlated with bank ties to other firms and hence bank outcomes. But it is not obvious why balance in director relationships should have a correlation with bank outcomes other than through board diversity. While firms run by executives with greater intergender trust could have different outcomes, for example, due to better employee relations, our results are economically similar if we restrict the instrument to outside directors. Thus we believe that our instrument has at least some theoretical justification.

In Table II, we provide some summary statistics for network information. On average bank directors have 18.92 connections. Female directors have on average more connections than male directors (22.38 versus 18.56), which suggests that connections may be relatively more important for them. On average, directors have had a shorter exposure to women (relationship length = 5.57) than to men (relationship length = 6.59). Average director-level EBB is 0.167 and board-level EBB is 0.164. Thus the bank boards in our sample are far from having balanced exposure to both genders in an executive capacity.

4. Boardroom gender diversity and bank risk

Based on the evidence from Section 2, we are sceptical that female bank directors are more risk averse than male bank directors. But the measures of risk aversion we examine are obviously very stylized. When faced with real-world decisions, female directors may advocate for less risky decisions. The presence of female directors may also lead boards to behave in a more conservative manner. Because of the need to reconcile differences in opinions that arise because female directors may have different backgrounds or values (e.g. Adams and Funk, 2012), it is possible, for example, that boards with more women spend more time discussing optimal strategies. More deliberation could lead banks to undertake less risky strategies if there is uncertainty about the distributions of the payoffs of investment projects. Whether or not banks with more female directors have less risky outcomes is, therefore, ultimately an empirical issue.

To examine the relationship between boardroom gender diversity and risk in banks, we first examine how the presence of female directors is associated with investments in risky assets. We then examine how they are associated with measures of overall bank risk. In choosing our risk proxies we follow the literature on bank behaviour during the crisis (Battacharyya and Purnanandam, 2012; Ellul and Yeramilli, 2013; Fahlenbrach, Prilmeier and Stulz, 2012 and Minton, Taillard and Williamson, 2015).

Our proxies for investments in risky assets are banks' use of derivatives for hedging and trading purposes; their risky trading and mortgage backed security positions and two measures of non-traditional banking activities: the ratio of deposits to loans and the percentage of non-traditional income. We expect greater hedging and more deposits to loans to be associated with less risk, but all other measures to be associated with more risk. Because relatively few banks have derivative positions, we examine both the presence of derivatives of a certain type using dummy variables, as well as the magnitudes of the positions. Our proxies for overall bank risk are Volatility, Idiosyncratic Risk, the Z-Score, the estimated default frequency from Moody’s and Tail risk. We expect risk to increase as all measures other than the Z-Score increase. Risk decreases as the Z-Score increases.

<Insert Table III about here>

Univariate comparisons of investments in risky assets in Table III do not provide immediate support for the “Lehman Sisters” hypothesis. The banks with female directors have larger risky trading, derivative trading and mortgage-backed security positions, but also larger derivative hedging positions. But these differences may simply reflect differences in bank size, since women are more likely to sit on the boards of large firms (Adams and Kirchmaier, 2015b). In Table IV we regress our investment measures on bank characteristics such as the natural log of assets as a proxy for bank size, the Tier 1 capital ratio, the deposit and loan ratios and ROA. We also includeboard size and independence and the fraction of female directors. Beneath the constant, we report the coefficient on the fraction of female directors in a basic specification that only includes board size, independence and bank size. All regressions include year dummies and we cluster the standard errors at the firm level. In columns I, III, V, VI and VIII our dependent variables are dummy variables that indicate that the bank discloses the use of the corresponding derivative. In all other columns our dependent variables measure the size of the position relative to total assets.

<Insert Table IV about here>

As expected, bank size is positively and significantly correlated with the usage of all securities, as well as the deposit to loan ratio and the percentage of non-traditional income. Larger banks also have larger positions in all securities except mortgage-backed securities. In contrast, the coefficient on the fraction of women changes sign across specifications. It is negative in columns II, III and VI but positive in other columns. It is statistically significant only in columns IV and VIII. The specifications in these columns suggest that the fraction of women is positively correlated with derivative usage and the presence of mortgage-backed securities. If anything, the presence of more women seems associated with more risk-taking investments rather than fewer.

<Insert Table V about here>

We try to isolate causal relationships between diversity and bank risk using two approaches. First, we follow the approach in Cheng, Hong and Scheinkman (2015) and use origin risk as an exogenous measure of bank risk to examine whether boardroom diversity responds to changes in risk. Second, we instrument for gender diversity in our risk regressions using EBB.

In Table V, we examine the relationship between the fraction of women on the board and origin risk. Since origin risk is time-invariant, we report results for the full sample (column I) and year 2006 only (column II). We also report results for large and small banks separately (columns III and IV). We define a large bank as a bank with assets above the 75^{th} percentile. A small bank has assets below the 25^{th} percentile. In every column the coefficient on origin risk is far from being statistically significant. To the extent that origin risk reflects fundamental risk, Table V suggests that banks' risk-profiles do not affect their appointments of female directors.

In Table VI, we instrument the fraction of women using EBB in regressions of stock return volatility, idiosyncratic risk, the Z-Score, the estimated default frequency and Tail risk on the fraction of women. As controls we include bank size, Tier 1 capital ratio, ROA, loan and deposit ratios, the fraction of non-performing loans, board size, board independence and year dummies.[8] Standard errors are clustered within firm. Columns I, V and VII report the first stage regressions for the IV regressions that follow them. We report the coefficients on the fraction of women in OLS regressions with the same controls beneath the constant.

<Insert Table VI about here>

In all first stage specifications, the coefficients on the instrument are positive and statistically significant at the 1% level and the Kleibergen-Paap statistics for weak instruments (between 23.76 to 26.56) are well above the Staiger Stock 10% critical value of 16.38. Although the coefficients on the fraction of women are positive (or negative for the Z-Score) in the second stage regressions, they are all insignificant. They are also insignificant in all but one OLS specification. Thus it would be difficult to conclude that women are associated with more risk. But it seems uncontroversial to conclude that women are not associated with less risk.

5. Does boardroom gender diversity matter for banks?

One explanation for the lack of a correlation between the fraction of female directors and measures of risky investments and risk is that boardroom gender diversity does not matter at all. Thus we examine the relationship between the fraction of female directors and our three performance measures: the natural log of Tobin's Q, ROA and the fraction of non-performing loans. We use similar specifications as in Table VI, except that we also add

[8] We also examined specification in which we explicitly control for the investment behaviour we examine in Table IV by including dummies for derivative trading, risky trading, hedging and mortgage-backed securities, as well as the percentage of non-traditional income. The results were similar, yet took up much more space, which is why we do not report them.

volatility and the fraction of nonperforming loans to the Tobin's Q and ROA regressions and we exclude ROA (the fraction of non-performing loans) from the ROA (non-performing loan) regressions. In Table VII, we report the results of IV regressions with EBB as our instrument. Columns I, III and V report the first-stage regressions for the IV regressions that follow them. We report the coefficients on the fraction of women in OLS regressions with the same controls beneath the constant.

<Insert Table VII about here>

The coefficients on the fraction of female directors in columns II and IV are positive and negative in column VI. The coefficients in both columns II and VI are statistically significant at greater than the 10% level. The results suggest that banks with more women have higher Tobin's Q and a lower fraction of non-performing loans. A one standard deviation increase in boardroom diversity is associated with a 1.186% increase in Tobin's Q and a 0.736% decrease in the fraction of bad loans. In comparison, a one standard deviation increase in the fraction of real estate loans is associated with a 0.972% decrease in Tobin's Q. Thus, these effects can be considered economically meaningful.

The results from Table VIII suggest that boardroom gender diversity matters for banks. At first glance the positive relationship appears surprising since neither Adams and Ferreira (2009), Ahern and Dittmar (2012)nor Matsa and Miller (2013) find a positive relationship between board diversity and performance. However, it is possible that boards behave differently during a crisis. Lorsch and MacIver (1995) quote one director as saying (p. 97): "Directors are like firemen. They sit around doing very little until there's a fire alarm and then they spring into action." If the board is more important during the crisis, the role of diversity may also be more important. In a crisis, corporate performance may depend more critically on obtaining the different viewpoints that directors with different backgrounds may bring to the table.

Some evidence that the effect of diversity may be different during a crisis comes from Adams and Ferreira (2009). They find that CEO turnover-arguably a firm-level crisis event-is more sensitive to performance when there are more women on the board. Similarly, Matsa and Miller (2013) find evidence that boards with more women exhibited different "styles" around the financial crisis in Norway. Lins, Servaes and Tamayo (2015) argue that firms with more CSR investments did better during the financial crisis because they did not lose the trust of their key stakeholders. Since there is evidence that female directors are particularly stakeholder-oriented (Adams, Licht and Sagiv, 2011; Matsa and Miller, 2014), it is plausible that more gender diverse boards perform better in a crisis involving a breakdown of trust.

A potentially complementary explanation is that selection also affects bank performance. In Section 3.2, we document that it appears to be harder for women to get on the boards of banks than it is to get on the boards of non-financial firms. If so, it is possible that the quality differences between female and male directors in banking are higher than in other industries.

It is difficult to measure director quality. But one observable and relatively standard measure of qualifications is education. We code the highest educational qualification attained by a director using data in BoardEx. A bachelor's degree is coded as 1, a master's degree as 2 and a PhD as 3. Table II shows the summary statistics for education by gender. While the coverage of education is incomplete in BoardEx, we have data for only 8,947 out of 14,824 directors, the summary statistics are consistent with the idea that female directors have to be more qualified than male directors. Female directors have an average education of 1.753, while male directors have an average education of 1.604.

In Table VIII, we re-examine our strongest performance results from Table VII after controlling for the average education of female directors for firms with female directors. Since we lose firms with no women and with missing education data, we first replicate our performance results from Table VII in the restricted sample for which we can calculate the average education of female directors. We then control for education. In column I, we replicate the OLS results for Tobin's Q. In column II, we replicate the first stage for Tobin's Q and in column III we replicate the second stage Tobin's Q results. In columns IV, V and VI we add average female education to the specifications in columns I, II and III. Columns VII-XII repeats this pattern for the fraction of non-performing loans. We omit coefficients on control variables for the sake of brevity.

While controlling for education does not have a big effect on the magnitude of the coefficients on the fraction of women, it has the effect of weakening the performance-diversity relationship across all specifications. Thus we view this evidence as suggestive that part of the channel through which diversity can lead to better performance in banks is selection.

To ensure our results are not driven by outliers in bank size or the fraction of women, in Table X we re-examine our risk and performance results from Tables VI and VII in subsamples of banks with below and above median assets and below and above median fraction of women. There is no systematic relationship between the fraction of women and risk across the different subsamples. But the relation between the fraction of women and performance is generally consistent with our previous results. The fraction of women seems to have a stronger relation with Tobin's Q in larger banks but a stronger relation with non-performing loans in smaller banks. Thus, our results do not seem to be driven by outliers.

<Insert Table VIII about here>

6. Do male and female director behave differently?

To provide additional evidence that boards with more gender diversity may behave differently in ways that may be associated with better performance during the crisis, we examine data on director-level behaviour. In Table IX, we examine whether male directors have better attendance behaviour when there are more women on the board as in Adams and Ferreira (2009). We restrict the sample of director-level data to male directors and regress a measure of attendance problems (a dummy indicating that the bank's proxy named the director as attending fewer than 75% of the meetings he was supposed to attend) on the fraction of women on the board and individual director characteristics (such as the number of directorships, age and tenure), board characteristics (such as the number of board meetings, board size and independence) and bank characteristics. We include year and firm fixed-effects and correct the standard errors at the director-firm level. The coefficient on the fraction of female directors is negative and significant at the 1% level in column I, which suggests that male directors have better attendance behaviour when there are more women on the board.

<Insert Table IX about here>

An alternate measure of director behaviour that may be particularly relevant in the crisis is director departure. In column II we restrict our sample to banks that experienced so many difficulties that they eventually delisted. Our dependent variable is a dummy which is one if the director's name does not appear in the following year's proxy statement (for years prior to delisting). While it is not statistically significant, the negative coefficient on the female dummy suggests that for problem banks, female directors may have been less likely to depart from the board. This may be a valuable quality for troubled banks.

In column III our dependent variable is a dummy indicating whether or not a director sits on board committees. In columns III and IV, our dependent variables measures whether a director sits on "monitoring" committees, such as the audit or compensation committee, or the risk committee. As in Adams and Ferreira (2009), we find that women are more likely to serve as committee members and more likely to sit on monitoring committees than male directors. Perhaps surprisingly, but consistent with the idea that female directors need not be more risk averse than male directors, female directors are not more likely to sit on the risk committee.

6. **Conclusion**

Women are not all the same. Because of selection, generalizing from gender differences in the population to subpopulations of women, such as executives or women in finance, may be stereotyping. We document that women who enter into a finance career can be significantly different in their risk aversion levels than women who do not enter into the finance profession. As a result, women in finance may have similar levels of risk aversion as men in finance. We also show that banks with more female directors did not undertake fewer risky activities or exhibit less risk during the crisis. But this does not mean that gender diversity does not matter at all. Banks with more women performed better than other banks; their female directors performed different committee duties than male directors and their male directors had fewer attendance problems.

Our results highlight that we do not yet have a complete understanding of how and why gender diversity matters for corporate outcomes. We also do not know when diversity matters. Much more research remains to be done to fully understand the role of gender in corporate management. As such, the consequences of policies targeting boardroom gender policies are unclear. But we doubt that simply adding more women to bank boards will prevent future crises-as some policy-makers would have us believe.

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Appendix I: Definition of Variables

Our sample consists of listed Bank holding companies and Commercial Banks. In this appendix, we only report the mnemonics and item numbers for bank holding companies. Item numbers for commercial banks are identical, but the mnemonics can either be RCFD, RIAD or RCON. Financial data are sourced from COMPUSTAT and the Federal Reserve Bank of Chicago's Financial Institution Reports dataset (FR Y-9C Call Reports). Stock price data is from CRSP. Board characteristics such as Board Size, Number of Independent directors, Number of Female Directors, Committees and Committee Assignments are hand-collected from the firm's proxy filing (form DEF 14A) filed with the SEC and obtained through EDGAR. We use BoardEx data to define directors' networks and to measure relationship lengths to connected individuals.

Financial Variables:

Age: Difference between sample year and the first year the stock appears in CRSP (only for banks that did not enter CRSP in 1972-the date CRSP started covering NASDAQ)

Assets (Total): BHCK2170

Bad Loans: Bad or Non-performing loans is the sum of loans that are past due 90 days (BHCK5525) and loans that have nonaccrual status (BHCK5526)

Bank Size: Natural log of Total Assets (BHCK2170)

Deposit Ratio: Total Deposits/Total Assets

Trading (Derivative) Sum (BHCKA126, BHCKA127, BHCK8723 and BHCK8724)

Hedging (Derivative): Sum (BHCK8725, BHCK8726, BHCK8727 and BHCK8728)

Fraction of Bad Loans, Fr(Bad Loans): Bad Loans/Loans

Fr(Agricultural Loans): Agricultural Loans (BHCK1590)/Loans

Fr(Commercial & Industrial Loans): Commercial & Industrial Loans (BHDM1766)/Loans

Fr(Real Estate Loans): Real Estate Loans (BHCK1410)/Loans

Risky Trading/TA: Risky Trading Assets/Total Assets

Derivative Trading/TA: Derivative Trading/Total Assets

Hedging/TA: Derivative Hedging/Total Assets

Hedging: 1 if Derivative Hedging is non-zero and zero otherwise

Loans: BHCK2122

Loan Ratio: Loans/Total Assets (set equal to missing if loans are 0)

% NonTrad Income (Percentage Non-Traditional Income): Non-Traditional Income/Total Income

MBS (Mortgage-backed Securities): Sum of (BHCK1709, BHCK 1733, BHCK 1713, BHCK 1736 and BHCK 3536)

MBS*d*: A dummy variable that is 1 if MBS is non-zero; zero otherwise. All missing values are coded as missing.

Repaid Tarp: 1 if the bank mentions in 10-K that it had repaid the TARP funding and zero otherwise.

Risky Trading Assets: BHCK3545 - BHCK3531 - BHCK3532 - BHCK3533 - (BHCK3534 + BHCK3535)

Risky Trading*t*: The amount of risky assets in the bank's trading book is a threshold variable and is reported in Schedule HC-K conditional on a bank holding company having BHCK3401 (HC-K item 4a) greater than $2 million or more in any of the preceding four quarters. If this variable is missing, we assume it is below the threshold and code all missing values as zero.

Risky Trading*d*: A dummy variable that is 1 if Risky Trading Assets is non-zero; zero otherwise. All missing values are coded as missing.

ROA (Return on Assets): Net Income (BHCK4340)/Total Assets

Tier 1 Capital Ratio: Tier 1 Capital (BHCK8274)/Total Assets

Tobin's Q (TQ): (Total Assets – Book value of Equity + Market Value of Equity)/Total Assets

Total Deposits: Sum of (BHDM6631, BHDM6636, BHFN6631 and BHFN6636)

Total Income: Sum of Interest Income (BHCK4107) and Non-Interest Income (BHCK4079)

Non-Traditional Income: Sum (BHCKA220, BHCKC888, BHCKC386, BHCKB491, BHCKB493)

Trading: 1 if Derivative Trading is non-zero and zero otherwise

Measures of Risk:

EDF (Moody's Analytics): Expected Default Frequency

Idiosyncratic Risk: Annualized standard deviation of the residuals from a market model regression estimated using daily returns over the fiscal year.

Origin Risk (following Cheng, Hong and Scheinkman, 2014): Annualized standard deviation of daily stocks returns estimated over the first year following the year the bank's stock first appeared in CRSP (only for banks that did not enter CRSP in 1972-the date CRSP started covering NASDAQ)

Tail Risk (Acharya, et al., 2010): Negative of the average bank's stock return estimated over the 5% worst days for the S&P500 in a given year.

Volatility: Standard deviation of excess weekly returns, estimated relative to the value-weighted market index for the 52 weeks preceding the fiscal year end date

Z-Score: (Mean ROA + Capital Asset Ratio)/Standard Deviation (ROA)) where Mean ROA and Standard Deviation of ROA are estimated for each fiscal year using quarterly ROA data.

Board and Director Characteristics:

Board Meetings: Number of board meetings from the proxy

Board Size: Natural log of the Number of Directors. Since the proxy lists the names of directors standing for election in the upcoming annual meeting, we calculate board size as the number of nominees minus the number of directors newly nominated plus the number of directors that were described as having left the board during the previous fiscal year or who were not standing for re-election.

EBB Index (Executive Balance Using Blau): board-level mean of director-level EBB, b_i, where

$$b_i = 1 - \left(\frac{\text{Number of years connected to executive women}}{\text{Number of years connected to executive women and men}}\right)^2 - \left(\frac{\text{Number of years connected to executive men}}{\text{Number of years connected to executive women and men}}\right)^2 \quad ,$$

for each director i. We describe how we calculate b_i in more detail in Appendix II.

Education: Director's educational qualifications are from BoardEx. Our measure captures the highest educational qualification attained by a director. A bachelor's degree is coded as 1, a master's degree as 2 and a PhD as 3.

Female Education is the average education of women at the board level. If no women sit on the board, it is missing.

Fr(Women): No. of female directors/Board Size

Independence: No. of independent directors/Board Size. An independent director is one who is characterized as such in the bank's proxy statement.

Missed Meetings: 1 if the proxy mentions that a director has attended fewer than 75% of meetings that he or she was supposed to attend; 0 otherwise.

Monitoring Committee: 1 if a director on any of the following committees – audit, compensation, governance, nominating, proxy, stock option, human resource, risk, loan, regulation, succession, trust, director search, and subsidiary; and 0 otherwise.

Number of Directorships (Public Companies): The total number of directorships (including the bank board seat) in publicly listed firms according to BoardEx

Relationship Length: The difference between the sample (fiscal) year and the start year of a relationship for executives connected to sample directors in BoardEx. A relevant connection is a connection external to the sample bank that does not end prior to 2003 for which the following holds: the connection is established through a private or listed company (i.e. we rule out non-profits) and one individual (at least) has to hold a board seat and the other one has to be at least a top executive. For each person in the director's network, we use census data to identify gender based on the first name. For ethnic or epicene names, we identify gender by searching the full name using google.

Risk Committee: If a director sits on the risk or loan committee, it is coded as 1; 0 otherwise.

Appendix II: Construction of "Executive Balance Using Blau" (EBB)

We describe our procedure for calculating our instrument EBB in more detail here. For each director we obtain the set of individuals connected to the director from Boardex. We then narrow down the subset of connections as follows:

1. To ensure we consider only connections that are not created by sitting on the same bank board, we eliminate all connections in which the bank in which the director holds a board seat is the connecting organization.
2. Because Boardex coverage is poor prior to 2003, we drop connections with an ending date prior to 2003. This ensures that directors in firms that were covered earlier in Boardex do not appear artificially more connected than other directors.
3. To ensure connected individuals actually know each other, we consider only connections established through working relationships. We drop connections to individuals who are connected only because they attended the same university. We also eliminate connections through non-profits. Non-profits, such as the Business Roundtable, State Law Societies or charities, are often national or regional, so being connected through the same non-profit does not ensure that connected individuals know each other. We identify non-profits based on name, e.g. "Red Cross" and keywords, such as "Organization", "Chamber", Roundtable", "Museum", "Association", "Council", "Institute", etc.
4. We restrict the remaining set of connections by requiring connected individuals to hold job titles for which it is clear that they will have personally interacted with the director. In particular, we require at least one individual to hold a board seat and the other individual to hold the title of someone whose job description would include interacting with the board, e.g. Director, CEO, CFO, Executive Vice President, etc..

For the resulting set of connections we classify the gender of connected individuals using the Census. If the first name is gender-neutral, e.g. "Pat" or "Jean", we consider the name to belong to the gender in which it is most represented. For ethnic names or names we are unable to classify, we identify gender by searching the full name using Google.

For each unique individual connected to a director i we calculate the "relationship length", the difference between the current sample year and the minimum start year of his or her connection to the director. We sum up all relationship lengths for each gender and calculate director-level EBB, b_i, as follows

$$b_i = 1 - \left(\frac{\text{Number of years connected to executive women}}{\text{Number of years connected to executive women and men}}\right)^2 - \left(\frac{\text{Number of years connected to executive men}}{\text{Number of years connected to executive women and men}}\right)^2 ,$$

for each director i. Board-level EBB is simply the board-level average of b_i.

Appendix III: Additional Tables

Table A.I: Gender Variation in Risk Aversion and Testosterone

This table presents descriptive statistics stratified by gender and career choice for data we obtain from Sapienza, Zingales and Maestripieri (2009). The sample consists of data on the cohort of 2008 MBA students at the University of Chicago. The data includes gender, levels of risk-aversion (the premium paid to avoid a lottery), salivary and pre-natal testosterone (the Average Digit Ratio and Simon Baron-Cohen's "*Reading the Mind in the Eyes*" test) and career choice after graduating (finance or non-finance). Because career choice data is only available for a restricted sample, we first report the full sample results and then the summary statistics for the restricted sample with career choice data. For each gender, we report the difference in means and the t-statistics (in brackets) for students who chose finance and those who did not to the right of the table. Underneath the table, we report the differences in means and the t-statistics (in brackets) for men and women in the full samples and for each occupational choice. We estimate the significance of the difference in means between male and female MBA students using the Welch t-test.

	Full Sample			Restricted sample with career choice data			Finance = 1			Finance = 0			
		Men			Men			Men			Men		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Diff
Risk Aversion	12.69	16.40	335	13.33	16.17	287	12.70	16.19	165	14.18	16.10	122	-1.48 (0.77)
Testosterone (pg/ml)	100.91	31.84	320	99.891	31.99	277	100.86	32.54	159	98.58	31.17	118	2.28 (0.59)
Baron-Cohen Eye Test	26.60	3.64	328	26.63	3.52	287	26.69	3.56	165	26.55	3.46	122	0.14 (0.339)
Average Digit Ratio	0.95	0.03	117	0.96	0.03	102	0.95	0.03	62	0.97	0.03	40	-0.02** (2.52)
		Women			Women			Women			Women		
Risk Aversion	20.18	18.23	140	19.47	18.35	114	12.62	14.78	42	23.47	19.04	72	-10.85*** (3.392)
Testosterone (pg/ml)	48.72	23	140	47.41	23.46	111	51.74	20.57	40	44.96	24.60	71	6.78 (1.550)
Baron-Cohen Eye Test	27.31	3.28	140	27.48	3.26	114	26.81	3.12	42	27.88	3.28	72	-1.07* (1.727)
Average Digit Ratio	0.97	0.03	64	0.96	0.04	53	0.96	0.02	15	0.98	0.04	38	-0.03*** (3.147)
	Diff			Diff			Diff			Diff			
Risk Aversion	-7.49*** (4.20)			-6.15*** (4.20)			0.08 (0.03)			-9.29*** (3.47)			
Testosterone (pg/ml)	52.19*** (19.80)			52.49*** (19.80)			49.12*** (11.83)			53.62*** (13.10)			
Baron-Cohen Eye Test	-0.70** (2.50)			-0.85** (2.05)			-0.12 (0.21)			-1.33*** (2.66)			
Average Digit Ratio	-0.02*** (4.01)			-0.02*** (4.08)			-0.004 (0.64)			0.02** (1.97)			

Table A.II: Bank Sample description

We collect board and committee information from the proxies (form DEF 14A) filed by commercial banks and bank holding companies with the SEC. We download DEF 14A URLs for all firms from the SEC's EDGAR website. We then match the CIK number with those provided in COMPUSTAT. We retain institutions with SIC codes 6000-6300. Using PERMCOs we match the banks in our sample to the regulatory entity code in the Fed's 2007 CRSP-FRB Link file. This forms the sample for each of the four years. In each step we are likely to have duplicates as some firms file multiple proxy statements.

	2006	2007	2008	2009
Number of DEF 14A filings for firms in SIC codes 6000-6300	729	720	701	655
Number of DEF 14A filings after matching to CRSP-FRB link file	367	342	336	316
Number of (Small and Large) Bank-Holding Companies with DEF 14A filings	332	309	296	281
Number of Commercial Banks with DEF 14A filings	18	16	16	15
Total Number of Financial Institutions	350	325	312	296

Figure I. The Role of Selection

This figure provides a graphic depiction of the mean levels of risk-aversion (the premium paid to avoid a lottery) from Appendix III, Table A.I. The sample consists of data on the cohort of 2008 MBA students at the University of Chicago that we obtain from Sapienza, Zingales and Maestripieri (2009). The data includes gender, levels of risk-aversion (the premium paid to avoid a lottery) and career choice after graduating (finance or non-finance). The top left graph shows mean levels of risk-aversion by gender in the full sample. The top right graph shows mean levels of risk-aversion for men by career choice. The bottom right graph shows mean levels of risk-aversion for women by career choice. The bottom left graph shows mean levels of risk-aversion in finance by gender. Details on sample sizes and test statistics for differences in means and the corresponding significance levels are in Table A.I.

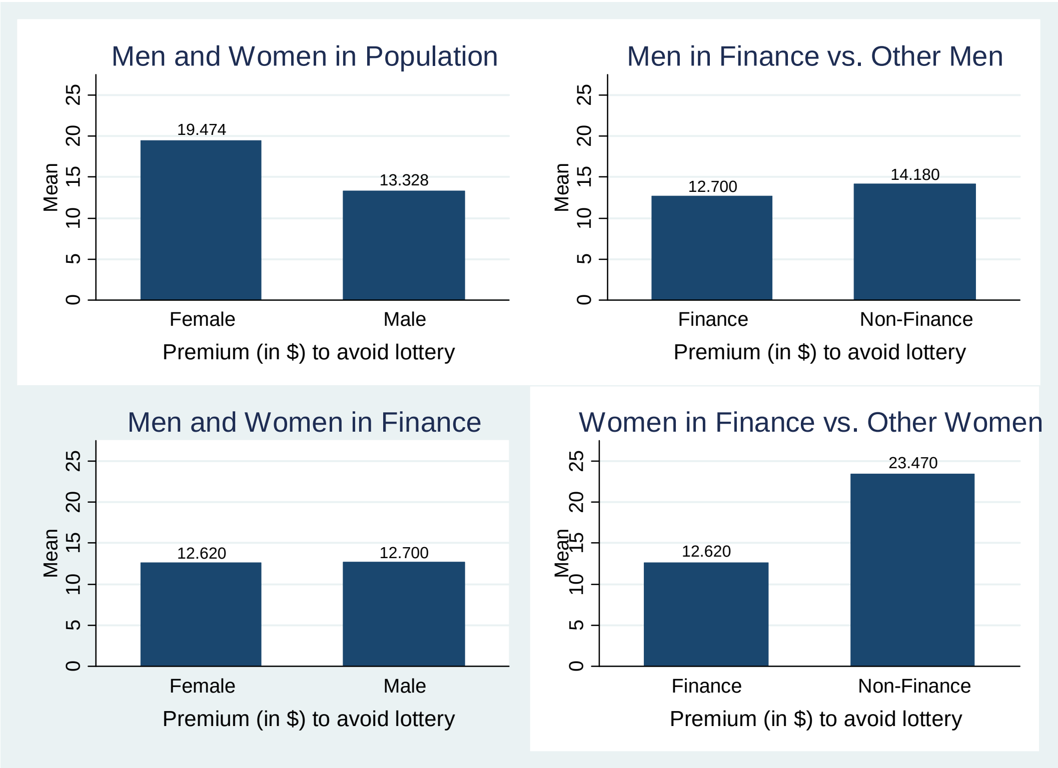

Figure II. Trends in the Average Proportion of Women on Boards for Banks and Matched Samples of Non-financial Firms

This figure shows the average proportion of women on boards for banks and size-matched samples of non-financial firms. We use two different samples. The first dataset consists of the intersection of our sample with Boardex and size-matched industrial firms in Boardex from 2003-2010. The second dataset consists of all banks in Riskmetrics and size-matched industrial firms from 1996-2010. Banks in Riskmetrics are firms with SIC codes 6000-6300. In both datasets, the industrial sample excludes banks and utilities (SIC 4900-4949). We match banks to industrial firms on the book value of assets (from Compustat) with replacement. We require that the control firm's assets are within 30% of the bank's assets and retain only the best match. We plot the average proportion of women only for the 321 banks in Boardex and the 192 banks in Riskmetrics who have at least 4 years of data and their corresponding matches. In the legend below, RM stands for Riskmetrics and BX stands for Boardex.

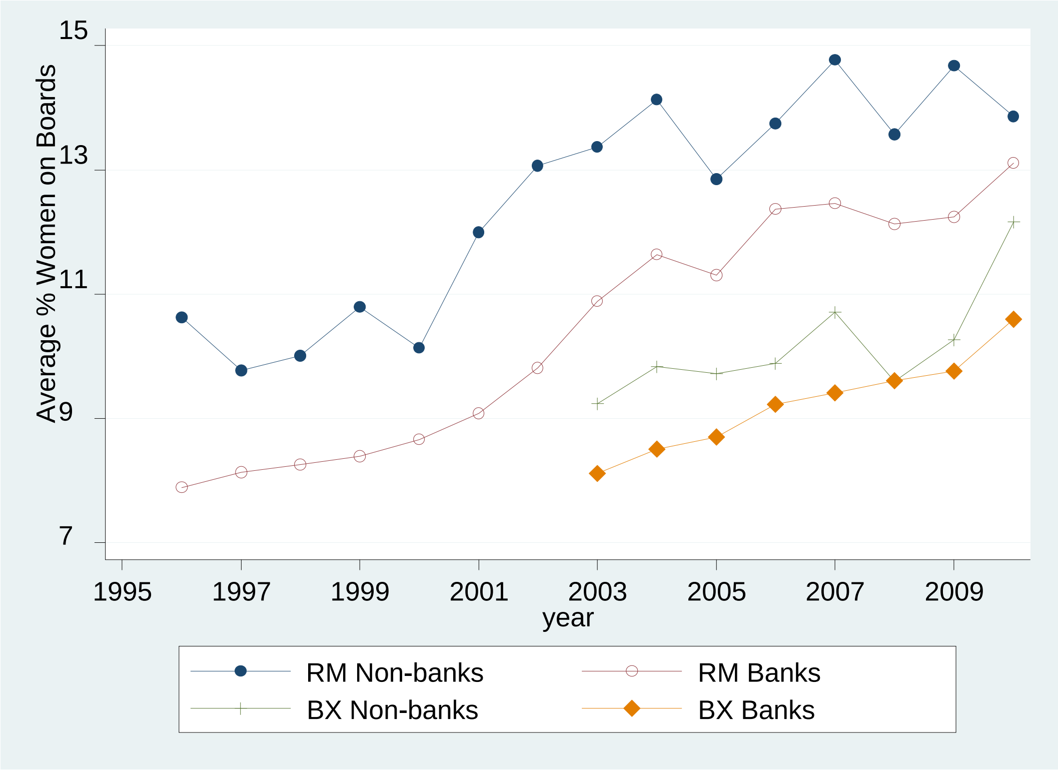

Figure III. Boxplots of Changes and Averages of Boardroom Diversity for Banks and Non-financial Firms in Riskmetrics

This figure shows boxplots of changes and averages of boardroom diversity for banks and non-financial firms in Riskmetrics 1996-2010. We identify banks and industrial firms as for Figure II. We restrict the sample to firms that have at least 4 years of data over this time period. There are 194 banks in the sample with 1,698 observations and 1,865 industrial firms with 17,789 observations. We calculate year-to-year changes in diversity as the absolute value of the difference in the percentage of women on the board minus the percentage of women on the board the previous year. We also calculate firm-level averages of the percentage of women over all years the firm is in the sample. We display boxplots of changes and firm-level averages. The lower/upper edges of the box denote the 25th/75th percentiles. The line intersecting the box denotes the median. The whiskers are set at the most extreme observed data value within 1.5 times the interquartile range from the edges of the box.

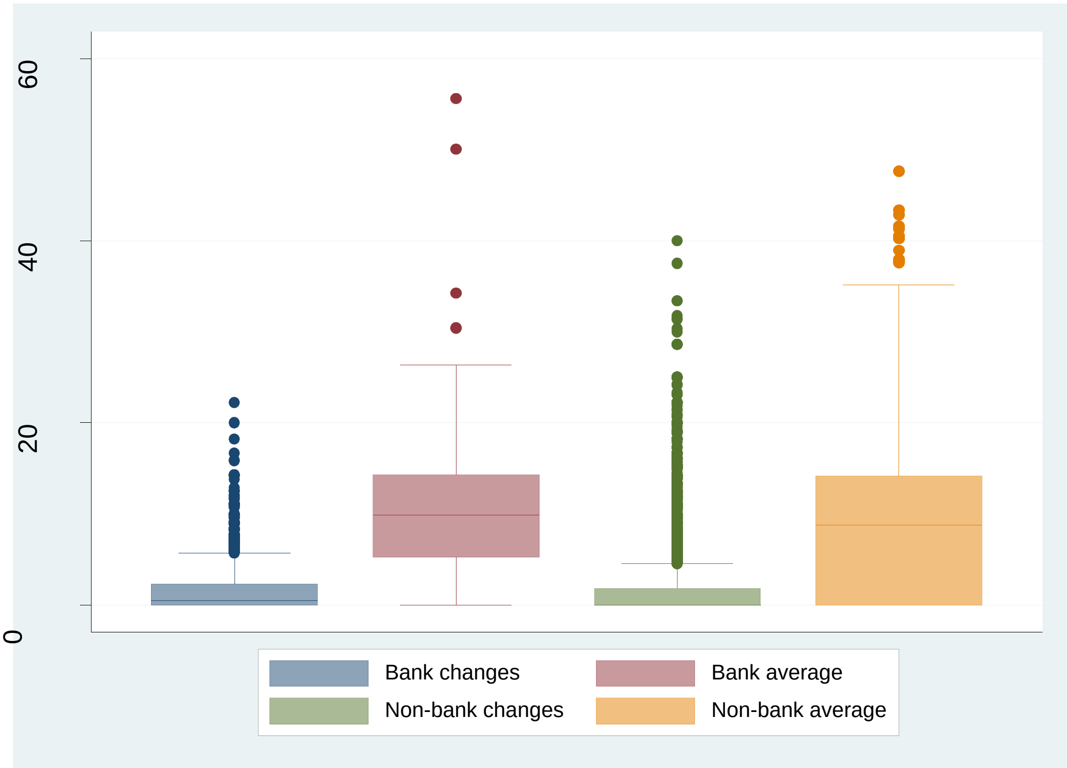

Figure IV. Changes in Boardroom Diversity for Banks and Non-financial Firms in Riskmetrics for Firms with Women on their Boards

Figure IV replicates the changes in the percentages of women on boards shown in Figure III for firm-years observations for which the percentage of women on the board of the firm in the previous year was non-zero.

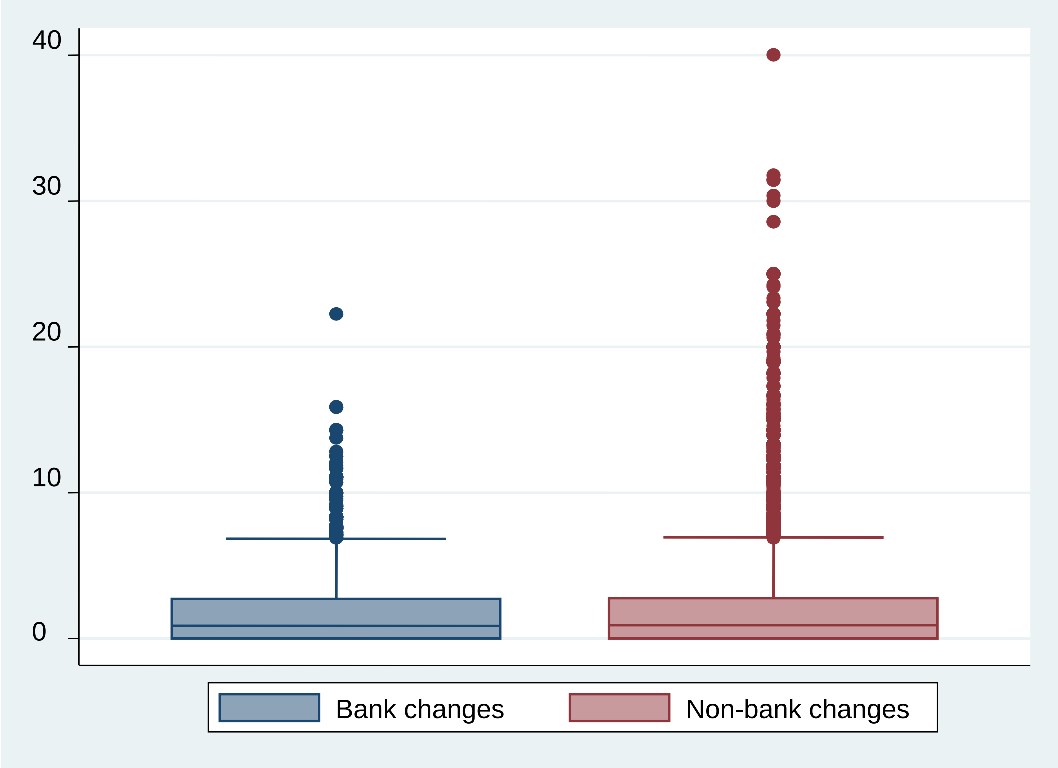

Table I: Sample Characteristics

This table presents summary statistics of financial characteristics for an unbalanced panel of 365 bank holding companies (BHCs) and commercial banks for fiscal years 2006-2009. Financial variables are sourced from COMPUSTAT and the Federal Reserve Bank of Chicago's Financial Institution Reports dataset (FR Y-9C Call Reports). Board characteristics such as Board Size, Number of Female Directors and Independence are hand-collected from the firm's proxy filing (form DEF 14A) filed with the SEC and obtained through EDGAR. Gender of directors is manually assigned based on director names. We present definitions for all variables in the Appendix.

Panel A: Financial Characteristics

	Obs.	Mean	Std. Dev.	Min	Median	Max
Bank Characteristics						
Deposits/Loans	1,158	1.116	0.521	0.507	1.051	12.289
Deposit Ratio	1,158	0.743	0.099	0.056	0.757	0.923
First year in CRSP	323	1994	7.17	1960	1996	2004
Fr(Agricultural Loans)	1,158	0.008	0.017	0	0.001	0.132
Fr(Bad Loans)	1,158	0.021	0.028	0	0.012	0.500
Fr(Commercial & Industrial Loans)	1,158	0.158	0.099	0	0.139	0.741
Fr(Real Estate Loans)	1,158	0.739	0.154	0	0.769	1.007
Loan Ratio	1,259	0.694	0.138	0.001	0.713	0.948
ROA	1,261	0.003	0.016	-0.162	0.007	0.037
Tier One Capital Ratio	1,260	11.404	2.709	0.220	11.040	23.200
Tobin's Q	1,221	1.035	0.106	0.899	1.023	3.115
Total Assets ($ billions)	1,280	31,708.99	191,795.5	163.241	1,907.09	2,223,299
Measures of Risky Activity						
Derivative Trading/TA	1,158	0.357	2.996	0	0	49.178
Derivative Hedging/TA	1,158	0.041	0.103	0	0.004	1.586
MBS/TA	1,158	0.009	0.021	0	0	0.286
MBS *d*	1,158	0.536	0.499	0	1	1
Non-Traditional Income (%)	1,158	0.002	0.029	0	0	0.654
Risky Trading/TA	364	0.011	0.031	0	$2.62*10^{-3}$	0.234
Risky Trading *d*	364	0.566	0.496	0	1	1
Risky Trading *t*	1,283	0.161	0.367	0	0	1
Measures of Bank Risk						
EDF (%)	1,282	1.90	4.051	0.01	0.322	28.906
Idiosyncratic Risk	1,283	0.030	0.021	0.006	0.022	0.153
Origin Risk	323	0.389	0.183	0.052	0.378	1.669
Tail Risk	1,283	0.039	0.044	-0.154	0.027	0.224
Volatility (weekly)	1,283	0.057	0.037	0.012	0.045	0.279
Z-Score	1,174	3.318	1.151	-3.594	3.508	7.013

Table I: Sample Characteristics, continued

Panel B: Board Characteristics						
	Obs.	Mean	Std. Dev.	Min	Median	Max
Board Meetings	1,283	10.871	6.912	1	11	153
Board Size (Ln(No. of Directors)	1,283	2.411	0.273	1.098	2.398	3.135
Female Education	651	1.737	0.560	1	2	3
Fr(Women)	1,283	0.095	0.083	0	0.091	0.444
No. of Directors	1,283	11.554	3.121	3	11	23
No. of Female Directors	1,283	1.142	1.017	0	1	5

Table II: Bank Director Characteristics

This table presents summary statistics of director characteristics for 365 bank holding companies (BHCs) and commercial banks for fiscal years 2006-2009. Variable definitions are in Appendix I. Board characteristics such as Board Size, Number of Independent directors, Number of Female Directors and Number of Committee Assignments are hand-collected from the firm's proxy filing (form DEF 14A) filed with the SEC and obtained through EDGAR. The total number of director firm year observations is 14,824. Director Age, Tenure in the sample firm; the Number of directorships in public firms; and Education is the highest educational qualification attained by a director. A bachelor's degree is coded as 1, master's degree as 2 and a PhD as a 3. All director level variables are from BoardEx. We also obtain the list of all people in the director's network from BoardEx. We indicate significant differences between mean characteristics of male and female directors using asterisks (with *** denoting 0.01, ** denoting 0.05 and * denoting 0.10 significance levels). We estimate the significance of the difference in means between male and female directors using the Welch t-test.

		Obs.	Mean	Std. Dev.	Min	Median	Max
Panel A: Director Characteristics							
Committee Assignments:	Monitoring Committee	14,824	0.718	0.450	0	1	1
	Risk Committee	14,824	0.114	0.318	0	0	1
Director Age: All Directors		14,025	60.627	8.598	27	61	95
	Male Directors	12,632	60.922	8.580	27	61	95
	Female Directors	1,393	57.953***	8.299	34	58	87
Education		8,947	1.620	0.639	1	2	3
	Male Directors	7,978	1.604	0.636	1	2	3
	Female Directors	969	1.753***	0.644	1	2	3
Female Director Dummy		14,824	0.099	0.299	0	0	1
Missed Meetings: All Directors		14,824	0.016	0.125	0	0	1
	Male Directors	13,356	0.016	0.124	0	0	1
	Female Directors	1,468	0.018	0.134	0	0	1
Number of Committee Assignments: All Directors		14,824	0.796	0.403	0	1	1
	Male Directors	13,356	0.791	0.407	0	1	1
	Female Directors	1,468	0.841***	0.366	0	1	1
Number of Directorships (Public Companies): All Directors		13,999	1.226	0.643	1	1	7
	Male Directors	12,607	1.221	0.637	1	1	7
	Female Directors	1,392	1.274***	0.696	1	1	6
Tenure: All Directors		14,623	8.997	7.527	0	7	52
	Male Directors	13,174	9.227	7.668	0	7	52
	Female Directors	1,449	6.899***	5.690	0	5	30
Panel B: Network and Instrument Characteristics							
Average Network Size		10,922	18.921	18.792	1	14	194
Female Director Network Size		1,028	22.388	22.594	1	15	172
Male Director Network Size		9,894	18.561	18.316	1	14	194
Relationship Length (female directors)		1,028	5.700	3.468	0	5.36	27
Relationship Length (male directors)		9894	6.559	3.871	0	6.23	43
Relationship Length (with females in network)		7,908	5.572	4.142	0	5	29
Relationship Length (with males in network)		10,888	6.591	3.954	0	6.20	43
Director-level EBB		10,922	0.167	0.196	0	0.138	1
EBB		1,248	0.164	0.128	0	0.157	1

Table III: Bank Characteristics (With and Without Women)

This table documents differences in mean bank characteristics across bank years with and without female directors. The total number of observations is 1,283. In 388 bank years, banks had no female directors. All variables are as defined in Appendix I. Absolute values of t-statistics are in parentheses. We indicate significant differences between mean characteristics of banks with and without female directors using asterisks (with *** denoting 0.01, ** denoting 0.05 and * denoting 0.10 significance levels).

	Mean-With Women Directors	Mean-No Women Directors	Diff (t-stat)
Bank Characteristics			
Fr(Bad Loans)	0.021	0.022	-0.001 (0.76)
ROA	0.0029	0.0027	0.0002 (0.224)
Total Assets ($ billions)	44400.78	2314.007	42086.77*** (3.62)
Tobin's Q	1.039	1.026	0.013* (1.95)
Tier One Capital Ratio	11.301	11.640	-0.003** (2.04)
Measures of Risky Activity Derivative Trading/TA	0.496	0.003	0.493*** (2.56)
Derivative Hedging/TA	0.048	0.021	0.027*** (4.17)
MBS/TA	0.009	0.006	0.0035** (2.52)
Non-Traditional Income (%)	$1.32e^{-04}$	0.003	0.003 (1.37)
Risky Trading/TA	0.013	0.001	0.012*** (2.91)
Measures of Bank Risk EDF (%)	1.774	2.188	-0.414* (1.68)
Tail Risk	-0.043	-0.030	-0.012*** (4.59)
Volatility (weekly returns)	0.056	0.058	-0.002 (0.86)
Z-Score	3.304	3.164	0.139* (1.87)

Table IV: Female Directors and Risky Activities

This table shows OLS regressions of various measures of trading and risky activities undertaken by banks on the fraction of women directors on the board, Fr(Women), and firm controls. The dependent variables in columns I, III, V, VI and VIII are dummy variables that indicate whether or not the bank undertook the corresponding risky activity. $Fr(Women)_{basic}$ is the coefficient in the OLS regression that only includes Independence, Board size and Bank Size. All variables are as defined in Appendix I. All regressions include year dummies. All standard errors are clustered at the firm level. Absolute values of heteroskedasticity robust t-statistics are reported in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Hedging	$Ln\left(\frac{Hedging}{TA}\right)$	*Derivative Trading*	$Ln\left(\frac{Derivative\ Trading}{TA}\right)$	*Risky Tradingd*	*Risky Tradingt*	$Ln\left(\frac{RiskyTrading}{TA}\right)$	*MBSd*	$Ln\left(\frac{MBS}{TA}\right)$	$\frac{Deposits}{Loans}$	*%NonTradIncome*
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Fr(Women)	0.252	-0.035	-0.064	4.449*	0.109	-0.070	4.121	0.674**	0.579	0.120	$3.65e^{-05}$
	[0.88]	[0.03]	[0.35]	[1.80]	[0.31]	[0.41]	[1.43]	[2.42]	[0.40]	[0.60]	[0.06]
Independence	-0.017	2.088**	-0.112	0.665	-0.139	0.130	2.149	-0.027	2.658	0.224	0.001***
	[0.09]	[2.40]	[0.77]	[0.28]	[0.55]	[0.93]	[0.68]	[0.14]	[1.65]	[1.21]	[2.76]
Board Size	0.068	-0.581	0.074	1.204	-0.139	-0.050	0.448	0.070	0.405	-0.024	$-2.75e^{-06}$
	[0.80]	[1.39]	[1.29]	[1.15]	[1.05]	[0.97]	[0.43]	[0.79]	[0.72]	[-1.05]	[0.02]
Bank Size	0.107***	0.419***	0.161***	0.637***	0.152***	0.159***	0.385**	0.050***	-0.049	0.021*	0.0004***
	[6.45]	[5.86]	[13.02]	[4.88]	[7.71]	[13.35]	[2.47]	[2.90]	[0.57]	[1.75]	[5.48]
Tier 1 Capital Ratio	-0.770	-1.257	0.290	-14.135	-0.108	-0.485	-15.467	-0.909	-9.673*	0.009	-0.001
	[0.85]	[0.31]	[0.61]	[1.66]	[0.09]	[0.99]	[1.62]	[1.05]	[1.92]	[0.03]	[0.14]
Deposit Ratio	-0.169	-2.937***	0.151	-5.793**	0.210	0.112	-2.014	-0.980***	-2.331	1.790***	-0.001
	[0.56]	[2.75]	[0.69]	[2.57]	[0.59]	[0.53]	[0.65]	[3.52]	[1.65]	[10.19]	[0.73]
Loan Ratio	-0.300	2.590***	-0.011	-2.736*	0.126	-0.168	-1.871*	-0.520**	-5.247***	-2.681***	-0.002*
	[1.40]	[3.06]	[0.08]	[1.93]	[0.63]	[1.23]	[1.71]	[2.32]	[4.78]	[4.66]	[1.86]
ROA	-0.910	-5.165	1.310*	-5.770	0.720	0.290	1.233	-1.004	-6.157	-0.783	0.003
	[0.77]	[1.03]	[1.74]	[0.60]	[0.50]	[0.35]	[0.10]	[0.86]	[1.06]	[0.95]	[0.76]
Constant	-0.026	-6.806***	-1.343***	-6.329	-0.585	-1.006***	-9.245	1.089***	-1.841	1.369***	-0.001
	[0.06]	[3.70]	[4.44]	[1.37]	[1.20]	[3.55]	[1.66]	[2.64]	[0.72]	[8.02]	[1.36]
$Fr(Women)_{basic}$	0.283	0.294	-0.090	4.129	0.146	0.010	5.086*	0.755***	0.863	0.014	0.012
	[1.00]	[0.25]	[0.49]	[1.60]	[0.41]	[0.07]	[1.68]	[2.60]	[0.57]	[0.05]	[0.97]
N	1,135	677	1,135	218	347	1,135	191	1,135	603	1,135	1,135
Adjusted R^2	0.160	0.204	0.385	0.527	0.422	0.408	0.281	0.159	0.100	0.539	0.222

Table V: Diversity and Origin Risk

This table reports firm-level OLS regressions of the fraction of women on a board to the bank's origin Risk. Origin Risk is the annualized standard deviation of stock returns estimated in the first year the bank appears in CRSP.. All control variables are as defined in Appendix I. In column I we report results for the full sample. In column II, we restrict the sample to the year 2006. In columns III and IV, we restrict the full sample to large banks and small banks, respectively. We define Large (Small) banks to be banks with assets in excess of (less than) the 75th (25th) percentile firm. Regressions in columns I, III and IV include year dummies. Standard errors are clustered at the firm level in columns I, III and IV. Absolute values of heteroskedasticity robust t-statistics are in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Dependent Variable: Fr(Women)			
	I	II	III	IV
Origin Risk	-0.001	-0.0004	0.018	0.022
	[0.04]	[0.02]	[0.67]	[0.21]
Board size	0.021	0.040**	-0.042	0.045
	[1.34]	[2.47]	[1.37]	[1.11]
Independence	0.246***	0.283***	0.277***	0.114
	[7.86]	[7.32]	[11.12]	[0.74]
Bank Size	0.009***	0.005	0.010**	-0.019
	[2.69]	[1.27]	[2.38]	[0.45]
ROA	0.231	0.757***	0.229	0.974
	[1.38]	[2.76]	[0.97]	[2.05]
Constant	-0.238***	-0.291***	-0.130	0.005
	[5.44]	[6.08]	[1.33]	[0.02]
N	1,147	308	326	190
Adjusted R^2	0.173	0.307	0.390	0.037
Sample	Full	2006	Large Banks	Small Banks

Table VI: Instrumental Variable Regressions for Risk

This table reports IV regressions relating boardroom gender diversity to measures of bank risk. The instrument is EBB Index. We describe how we construct it in Appendix II. Volatility is the standard deviation of weekly stock returns. Idiosyncratic risk is the standard deviation of the residuals of a regression of excess bank stock returns on (excess) returns on the S&P 500. Z-Score and EDF, the estimated default frequency, are measures of default risk. Tail Risk, which captures the higher probability of big losses, is based on the worst performing days of the S&P 500. Fr(Commercial & Industrial Loans), Fr(Agricultural Loans) and Fr(Real Estate Loans) are estimated relative to total loans. Fr(women) is the number of female directors relative to board size. All other control variables are as defined in Appendix I. All regressions include year dummies. All standard errors are clustered at the firm level. Absolute values of heteroskedasticity robust t-statistics or z-statistics are in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Fr(Women)	Volatility	Idiosyncratic Risk	Tail Risk	Fr(Women)	Z-Score	Fr(Women)	EDF
	I	II	III	IV	V	VI	VII	VIII
Fr(Women)		0.020	0.004	0.078		-2.043		3.604
		[0.75]	[0.29]	[1.48]		[1.49]		[0.97]
Independence	0.033	0.006	0.003	-0.003	0.034	0.602**	0.033	-1.475
	[0.87]	[1.09]	[1.25]	[0.26]	[0.87]	[2.03]	[0.86]	[1.58]
Board Size	0.026*	-0.006**	-0.002*	-0.003	0.030*	0.275**	0.026*	-0.367
	[1.71]	[2.54]	[1.81]	[0.54]	[1.92]	[2.25]	[1.72]	[0.94]
Bank Size	0.008**	0.001	-0.002***	-0.016***	0.009***	0.031	0.007**	-0.405***
	[2.29]	[0.98]	[4.33]	[13.51]	[2.61]	[1.12]	[2.27]	[5.09]
Tier 1 Capital Ratio	-0.116	-0.013	-0.055***	-0.231***	-0.067	8.554***	-0.123	-42.530***
	[0.90]	[0.36]	[3.12]	[3.85]	[0.53]	[5.42]	[0.96]	[6.56]
Deposit Ratio	-0.115**	0.022**	0.006	-0.038**	-0.103*	-1.656***	-0.115**	2.987**
	[2.04]	[2.32]	[1.18]	[2.18]	[1.83]	[3.87]	[2.04]	[2.07]
Fr(Bad Loans)	-0.008	0.248**	0.129***	-0.214***	-0.055	-12.500***	0.004	71.783***
	[0.07]	[2.35]	[2.78]	[3.21]	[0.54]	[4.93]	[0.03]	[4.54]
Fr(Commercial & Industrial Loans)	-0.04	0.013	-0.004	-0.032**	-0.049	1.077***	-0.04	-0.54
	[0.67]	[1.36]	[1.08]	[2.09]	[0.77]	[2.59]	[0.67]	[0.43]
Fr(Agricultural Loans)	-0.277	-0.080**	-0.075***	0.030	-0.29	-0.347	-0.278	-7.171
	[1.27]	[2.02]	[3.62]	[0.40]	[1.30]	[0.22]	[1.27]	[1.14]
Fr(Real Estate Loans)	-0.049	0.016**	-0.002	-0.009	-0.048	0.597*	-0.048	0.51
	[1.00]	[2.30]	[0.45]	[0.73]	[0.94]	[1.65]	[0.99]	[0.49]
ROA	-0.048	-0.760***	-0.372***	0.273**				
	[0.24]	[6.14]	[5.68]	[2.01]				
EBB Index	0.158***				0.149***		0.158***	
	[5.15]				[4.87]		[5.15]	
Constant	0.059	0.008	0.037***	0.181***	0.027	2.019***	6.960***	6.960***
	[0.68]	[0.51]	[4.74]	[6.64]	[0.31]	[2.64]	[2.78]	[2.78]
$Fr(women)_{OLS}$		0.005	-0.002			-0.829**	0.865	-0.004
		[0.67]	[0.48]			[2.44]	[0.72]	[0.30]
N	1,104	1,104	1,104	1,104	1,052	1,052	1,103	1,103
Adjusted R^2	0.169	0.709	0.735	0.481	0.169	0.195	0.168	0.542
Kleibergen-Paap *rk* statistic		26.54				23.76		26.56
[Stock-Yogo 10%]		[16.38]				[16.38]		[16.38]
Hausman		0.316	0.194	2.843		0.840		0.637
[p value]		[0.57]	[0.66]	[0.09]		[0.36]		[0.42]

Table VII: Instrumental Variable Regressions for Bank Performance

This table reports IV regressions of measures of bank performance on boardroom gender diversity. Columns I, III and V report the first stage regressions corresponding to columns II, IV and VI, respectively. The instrument is EBB Index. We describe how we construct it in Appendix II. This is averaged across all directors in the bank. ROA is the bank's Return on Assets; TQ is the natural log of Tobin's Q; Fr(Bad Loans) is the natural log of the fraction of bad loans. $Fr(women)_{OLS}$ is the coefficient on the Fr(women) in the corresponding OLS regression. All control variables are as defined in Appendix I. All regressions include year dummies. All standard errors are clustered at the firm level. Absolute values of heteroskedasticity robust t-statistics or z-statistics are in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Fr(Women)	TQ	Fr(Women)	ROA	Fr(Women)	Fr(Bad Loans)
	I	II	III	IV	V	VI
Fr(Women)		0.138*		0.019		-4.225**
		[1.67]		[1.13]		[2.32]
Independence	0.033	-0.022	0.032	0.004	0.032	0.201
	[0.85]	[1.29]	[0.85]	[1.03]	[0.86]	[0.48]
Board Size	0.025	-0.010	0.027*	-0.003*	0.027*	-0.099
	[1.62]	[1.43]	[1.74]	[1.73]	[1.76]	[0.57]
Bank Size	0.009***	0.005**	0.008**	0.001**	0.008**	0.139***
	[2.64]	[2.51]	[2.27]	[2.09]	[2.27]	[3.27]
Tier 1 Capital Ratio	-0.141	0.029	-0.115	0.106***	-0.113	-3.208
	[1.08]	[0.41]	[0.89]	[5.31]	[0.88]	[1.49]
Volatility	0.055	-0.335***	0.068	-0.265***	0.063	8.560***
	[0.44]	[3.90]	[0.59]	[8.84]	[0.54]	[5.21]
Deposit Ratio	-0.130**	0.125***	-0.116**	0.002	-0.117**	-0.331
	[2.21]	[4.23]	[2.07]	[0.36]	[2.08]	[0.44]
Fr(Bad Loans)	-0.019	-0.185*	-0.026	-0.132***		
	[0.16]	[1.71]	[0.23]	[3.56]		
Fr(Commercial & Industrial Loans)	-0.046	-0.185	-0.041	0.003	-0.041	0.273
	[0.72]	[1.05]	[0.68]	[0.65]	[0.68]	[0.45]
Fr(Agricultural Loans)	-0.301	0.142	-0.271	0.005	-0.273	3.988
	[1.36]	[1.02]	[1.24]	[0.25]	[1.25]	[1.31]
Fr(Real Estate Loans)	-0.064	-0.061***	-0.049	-0.001	-0.050	0.308
	[1.30]	[3.15]	[1.03]	[0.17]	[1.03]	[0.55]
ROA	0.024	0.518**			0.015	-10.693***
	[0.12]	[2.39]			[0.08]	[2.97]
EBB Index	0.162***		0.158***		0.158***	
	[5.19]		[5.16]		[5.16]	
Constant	0.077	0.026	0.059	0.002	0.059	-5.994
	[0.86]	[0.60]	[0.7]	[0.16]	[0.67]	[5.40]
$Fr(women)_{OLS}$		0.063**		0.002		-0.836*
		[2.29]		[0.34]		[1.80]
N	1,052	1,052	1,104	1,104	1,104	1,104
Adjusted R^2	0.178	0.512	0.169	0.522	0.169	0.441
Kleibergen-Paap *rk* statistic		26.96		26.63		26.64
[Stock-Yogo 10%]		[16.38]		[16.38]		[16.38]
Hausman		1.265		1.202		4.080
[p value]		[0.26]		[0.27]		[0.04]

Table VIII: Education and Performance

This table presents evidence on the role of female directors' education in performance regressions. We use the same specifications as in Table VII. Female Education is the board-level average of female directors' education. For each director, we code the highest educational qualification they attain as follows: a bachelor's degree is coded as 1, a master's degree as 2 and a PhD as 3. Specifications (1) and (3) present the base case performance regressions for the sub-sample of firms with information on the average level of female education. All specifications include year dummies. All control variables are as defined in Appendix I. All standard errors are corrected for group correlation at the firm level. Absolute values of heteroskedasticity robust t-statistics are reported in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	TQ	Fr(Women)	TQ	TQ	Fr(Women)	TQ	Fr(Bad Loans)	Fr(Women)	Fr(Bad Loans)	Fr(Bad Loans)	Fr(Women)	Fr(Bad Loans)
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Fr(Women)	0.082*		0.493***	0.082*		0.483***	-0.238		-6.197*	-0.231		-6.176*
	[1.67]		[2.67]	[1.67]		[2.71]	[0.28]		[1.85]	[0.28]		[1.87]
Female Education				0.001	-0.007	0.003				0.019	-0.007	-0.007
				[0.37]	[0.95]	[0.57]				[0.20]	[1.02]	[0.07]
EBB Index		0.146***			0.149***			0.140***			0.143***	
		[3.83]			[3.89]			[3.75]			[3.82]	
N	554	551	551	554	551	551	596	593	593	596	593	593
Adjusted R^2	0.566	0.189	0.362	0.566	0.192	0.372	0.525	0.164	0.443	0.524	0.168	0.443
Kleibergen-Paap *rk* statistic		14.64				15.131			14.35		14.57	
		[16.38]				[16.38]			[16.38]		[16.38]	
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Method	OLS	First stage IV	IV	OLS	First stage IV	IV	OLS	First stage IV	IV	OLS	First stage IV	IV

Table IX: Robustness: Risk and Performance

This table reports the coefficient on the Fraction of women, Fr(Women), in Risk and Performance instrumental variable regressions in different subsamples. For each dependent variable, we use the same specifications as in Tables VI and VII. Above (Below) Median Assets banks assets have assets in excess of (less than) the median of 1,907.09. Above (Below) Median Women firms have a fraction of women larger (lower) than the median of 0.091. All control variables are as defined in Appendix I. The reported number of observations is based on the number of observations of the dependent variable in each category. All standard errors are corrected for group correlation at the firm level. Absolute values of heteroskedasticity robust t-statistics are reported in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Below Median Assets		Above Median Assets		Below Median Women		Above Median Women	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Risk								
Volatility	0.002	0.007	0.003	0.025	0.001	0.077	0.015	0.023
	[0.19]	[0.20]	[0.26]	[0.61]	[0.04]	[0.53]	[0.95]	[0.41]
N	637		640		687		590	
Idiosyncratic Risk	-0.002	-0.006	0.001	0.004	-0.008	-0.011	0.001	0.021
	[0.25]	[0.27]	[0.33]	[0.20]	[0.60]	[0.14]	[0.08]	[0.61]
N	637		640		687		590	
Tail Risk	0.009	0.061	0.009	0.056	-0.008	0.261	-0.037	0.163
	[0.49]	[0.93]	[0.76]	[1.01]	[0.19]	[0.95]	[1.39]	[1.04]
N	637		640		687		590	
Z-Score	-1.149**	-1.642	-0.790	-4.549*	-0.543	-7.961	-0.486	-1.547
	[2.20]	[0.92]	[1.58]	[1.70]	[0.47]	[0.91]	[0.68]	[0.55]
N	599		587		637		549	
EDF	1.710	-0.194	0.013	13.484*	-1.433	8.414	-0.471	5.096
	[1.04]	[-0.04]	[0.01]	[1.95]	[0.43]	[0.44]	[0.17]	[0.54]
N	636		640		686		590	
Performance								
TQ	0.050	0.137	0.083**	0.263**	0.094	0.065	0.113**	0.379*
	[1.63]	[1.34]	[2.31]	[2.14]	[1.47]	[0.18]	[2.01]	[1.76]
N	633		582		662		553	
ROA	0.005	0.014	0.0005	0.020	-1.487*	0.069	0.009	0.032
	[0.77]	[0.62]	[0.07]	[0.77]	[1.66]	[0.64]	[1.04]	[1.04]
N	637		619		681		575	
Fr(Bad Loans)	-1.450*	-7.307**	-0.680	-1.388	-3.473**	-12.897	-1.487*	-9.585*
	[1.72]	[2.32]	[1.32]	[0.75]	[2.34]	[1.52]	[1.66]	[1.85]
N	534		618		618		534	

Table X: Gender and Director Behavior

This table reports director-level regressions relating gender to director behaviour and committee activity. Missed Meetings is a dummy variable that is equal to one if the director was named in the proxy as having attended less than 75% of meetings they were supposed to attend during the fiscal year. Director Resignations takes the value of one if a director resigned in the sample year and zero otherwise. Committee Member is an indicator variable that takes the value one if a director sits on a committee. Monitoring (Risk) Committee is one if a director sits on a monitoring (risk) committee. Female is a dummy variable that is one if a director is a woman, zero otherwise. Fr(women) is the number of female directors relative to board size. Number of Directorships is the number of directorships held by a director in listed firms. All other control variables are as defined in Appendix I. All columns report firm fixed effects estimates. All regressions include year dummies. All standard errors are corrected for group correlation at the director-firm level. Absolute values of heteroskedasticity robust t-statistics are reported in parentheses. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

	Missed Meetings	Director Resignations	Committee Member	Monitoring Committee	Risk Committee
	I	II	III	IV	V
Fr(Women)	-0.136**				
	[2.12]				
Female		-0.006	0.037**	0.092***	-0.002
		[1.52]	[2.22]	[4.85]	[0.14]
Number of Directorships	0.009**	0.010	0.034***	0.040***	-0.008
	[2.39]	[1.17]	[4.21]	[3.76]	[0.78]
Board size	0.032**	0.016	-0.175***	-0.205***	-0.060*
	[1.97]	[1.01]	[4.77]	[5.17]	[1.93]
Independence	-0.011	-0.036	0.151**	0.269***	0.081*
	[0.34]	[1.40]	[2.54]	[4.07]	[1.67]
Tenure	0.0002	0.0002	-0.002**	-0.007***	0.001
	[0.83]	[0.91]	[2.33]	[6.30]	[0.84]
Age	$1.99e^{-05}$	$9.06e^{-06}$	0.004***	0.008***	0.001
	[0.09]	[0.12]	[5.46]	[8.23]	[1.47]
Bank Size	-0.013	0.048	0.011	0.037	0.053**
	[1.37]	[1.55]	[0.57]	[1.51]	[1.99]
Lag (ROA)	0.249**	-0.299	-0.584**	-0.315	-1.039***
	[1.98]	[0.76]	[2.27]	[0.91]	[3.03]
Volatility	-0.048	-0.129*	-0.080	0.123	0.114
	[0.73]	[1.71]	[0.89]	[1.17]	[1.13]
Deposit Ratio	0.021	0.182*	-0.018	-0.079	0.010
	[0.52]	[1.81]	[0.25]	[1.02]	[0.16]
Loan Ratio	-0.015	-0.019	0.003	-0.116	0.014
	[0.36]	[0.67]	[0.04]	[1.58]	[0.21]
Tier 1 Capital Ratio	0.081	0.231	0.273*	0.311*	0.717***
	[1.11]	[129]	[1.93]	[1.90]	[4.35]
Board Meetings	-0.0001	0.002*			
	[0.29]	[1.89]			
Committee Member	-0.021**				
	[2.39]				
Constant	0.047	-0.571*	0.748***	0.378	-0.355
	[0.48]	[1.74]	[3.62]	[1.41]	[1.27]
N	8,439	1,319	12,588	12,588	12,588
Adjusted R^2	0.055	0.024	0.129	0.101	0.344
Sample	Men	Delisted Firms	Full	Full	Full