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Owen, Ann L. and Temesvary, Judit

Hamilton College, Federal Reserve Board of Governors

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The Performance Effects of Gender Diversity on Bank Boards

Ann L. Owen

Hamilton College; 198 College Hill Road, Clinton, NY 13323.

aowen@hamilton.edu; 315-859-4419.

Judit Temesvary¹

Federal Reserve Board; 1801 K Street, Washington, DC 20006

judit.temesvary@frb.gov; 202-452-3759.

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Abstract:

Previous literature has shown mixed results on the role of female participation on bank boards and bank performance: some find that more women on boards enhance financial performance, while others find negative or no effects. Applying Instrumental Variables methods to data on approximately 90 US bank holding companies over the 1999-2015 period, we argue that these inconclusive results are due to the fact that there is a non-linear, U-shaped relationship between gender diversity on boards and various measures of bank performance: female participation has a positive effect once a threshold level of gender diversity is achieved. Furthermore, this positive effect is only observed in better capitalized banks. Our results suggest that continuing the voluntary expansion of gender diversity on bank boards will be value-enhancing, provided that they are well capitalized.

Keywords: Bank performance; Gender Diversity; Instrumental Variables Estimation

JEL Codes: G21; G34; J16

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1. Introduction

Women are heavily underrepresented in leadership positions in financial services, where they generally remain in lower-paying first or mid-level positions. While women made up 54.3 percent of the workforce at S&P 500 finance companies in 2014, only 18.7 percent of S&P 500 finance company boards and only 2.1 percent of CEOs were women (Catalyst, 2015). Many papers have studied the impact of boards' gender composition on firm performance and a few have studied it in the banking industry specifically (Adams and Mehran, 2012; Garcia-Meca et al, 2015; Berger et al, 2014; Pathan and Faff, 2013), showing mixed results. We study this issue using a newly compiled annual dataset on the leadership and financial performance of approximately 90 U.S. banks over the 1999-2015 period. We propose the resolution to these conflicting findings is that the impact of greater gender diversity depends on bank and board characteristics. We find significant non-linearities in the relationship between bank performance and board gender composition. Our findings suggests that the impact of gender diversity changes as it increases and is dependent on the quality of bank management.

Specifically, we identify a "threshold" effect, which indicates that gender diversity on bank boards must reach a certain level before its performance benefits accrue. Furthermore, we find that the impact of greater gender diversity on boards varies, depending on what measure of performance is used. These findings have important policy implications, suggesting that banks' continued voluntary expansion of board gender diversity is likely to bring overall performance benefits, provided that the banks are well managed (capitalized).

Our data and methods also allow us to advance the current literature on this topic. We conduct our analysis on a newly compiled dataset on approximately 90 U.S. bank holding companies boards' gender composition, and these banks' financial performance and balance sheet characteristics over the 1999-2015 period. We constructed this dataset from Boardex, Compustat/CRSP and Bankscope. This dataset provides a broader cross-section and longer time-series than most related papers. We address the potential endogeneity of gender diversity by employing an Instrumental Variables estimation method. We also include broad sets of fixed effects (Adams and Ferreira, 2009; Adams and Mehran, 2012). Finally, by

focusing our analysis on institutions that share many similarities, the largest U.S. banks, we are able to mitigate concern about omitted variables that could generate variation in performance in a more diverse group of firms. Overall, we find that banks with more females on their board perform better once they reach a critical level of gender diversity, corresponding to a female share of around 13-17 percent on the board. Given the size and composition of most boards, this result essentially means that adding more women to the board improves overall performance if there is already at least one woman on the board; adding the first woman to the board does not have this positive effect. This implies that currently about half of the banks in our sample enjoy the performance-enhancing effects of gender diversity on their boards.

We find that greater gender diversity of well-capitalized banks also increases the risk on their books. Specifically, greater gender diversity corresponds to a higher share of nonperforming assets once the female share of board reaches around 7-8 percent, (corresponding to three-quarters of the banks in our sample). This finding is consistent with the previous literature (Berger et al, 2014; Wang and Hsu, 2013). A potential explanation is that board (gender) heterogeneity leads to increased communication costs, which interfere with the board's monitoring function (Wang and Hsu, 2013).

Our analysis makes several important contributions to the existing literature on board diversity. First, our findings help to reconcile the mixed evidence obtained to date. Generally, the results on the impact of gender diversity on firm performance run the gamut, from those that find a positive impact on performance (Gul et al., 2011; Campbell and Minguez-Vera, 2008; Noland et al., 2016; Kang et al., 2009; Schmid and Urban, 2016) to those that find a negative impact (Ahern and Dittmar, 2012; Adams and Ferreira, 2009), to those that find little or no impact (Farrell and Hersch, 2004; Ferrari et al., 2016). While some previous papers documented evidence of non-linearities regarding some performance measures (de Andres and Vallelado, 2008), our study is first in providing comprehensive evidence that the impact of board gender diversity on performance depends on how much diversity the board has already achieved and on how well-managed the institution is overall. Our "threshold" result, which shows that the direction of the relationship between bank performance and gender diversity flips signs as the share of females on the board increases, helps to reconcile the very mixed findings of previous papers.

Of course, all of the previous literature studies firm performance in a specific context. Our “threshold” results indicate that this diversity of findings may be due to the particular sample and period under study – that is, whether the authors’ samples showed female participation above or below the critical “threshold”. Furthermore, our study is the first to provide empirical evidence that better managed institutions are better able to reap the benefits of diverse perspectives, perhaps by reducing the communication costs of board heterogeneity. For example, we find that an increase in gender diversity increases return on assets at well-capitalized banks, but decreases it at low-capitalized banks. Previous studies that do not condition on the quality of management found mixed results in this literature.

In what follows, we describe our methods and contribution in greater detail. Section 2 describes the data and Section 3 presents the estimation methodology. Section 4 discusses the estimation results. Section 5 summarizes and concludes the paper.

2. Data Description

We collect data on bank boards from Boardex. Our data covers the 1999-2015 period, with annual frequency. Boardex provides coverage of a total of 168 U.S. banks for the 17 years in our sample. Our unbalanced panel consists of just above 1,600 bank-year observations on board composition. We collect balance sheet data for the banks in our sample from Bankscope, Compustat and CRSP. We match the Boardex data to the balance sheet characteristics using banks’ ISIN identifier. Although we start with a sample of 168 banks, we note that in our main estimations, data availability limits our sample to 87 banks.

In this section, we describe our data in three categories: overall bank performance measures and bank behavior, board characteristics and bank characteristics. Summary statistics for all of the data described in this section appear in Table 1.

2.1 Overall Bank Performance Measures and Bank Behavior

We focus on two measures of overall bank performance and two measures of more specific bank behavior. The first measure of overall performance, *Revenue to Expense Ratio*, is defined as the ratio of banks’

operating revenue to operating expenses and is our measure of the efficiency of a banks' operations.² The second overall performance measure, *Return on Assets*, is defined as net income divided by total assets and is included as a measure of banks' profitability. We also examine risk-taking behavior by using the *Share of Nonperforming Assets* as an indicator of risk – it measures the buildup of risk on balance sheets.³ Lastly, we examine practices related to pay equity by looking at the dispersion of compensation within banks with the *Ratio of CEO to Average Staff Pay*. This measure is the ratio of the CEO's direct and equity-based compensation to average staff compensation (including stocks, wages & salaries and benefits).⁴

2.2 Board Characteristics

Our main measure of gender diversity on boards is the *Blau Index* (Blau, 1977; Bear et al., 2010), defined as follows:

$$B = \left[1 - \sum_{g=1}^G P_g^2 \right] \times 100$$

In this expression, P is the fraction of women and men on bank boards, and g indexes gender. By construction, this measure has a maximum value of 50 at gender equality on boards, i.e. if both men and women have 50 percent representation. Lower values of the *Blau Index* indicate greater gender inequality.

In auxiliary regressions, we use the *Female Share of Board* as our dependent variable. By definition, this measure is the number of female board members, divided by the total number of board members, times 100. As Table 1A shows, our two measures of gender diversity are highly correlated for values up to a female board share of 50 percent, and strongly negatively correlated at higher female shares. Table 1 reveals that in our sample, the *Female Share of Board* variable is consistently below 50 percent. Therefore, our sample shows a very high positive correlation between the *Female Share of Board* and the *Blau Index* (Table 1A).

² This measure is therefore the inverse of the “efficiency ratio” – a common measure of performance in banking.

³ Note that year fixed effects should control for changes in systemic risk.

⁴ The lowest ratios for CEO to staff pay occurred in 2008 and 2009, suggesting that some bank CEOs temporarily experienced large reductions in compensation as a result of the financial crisis.

The average *Female Share of Board* is around 12.5 percent, corresponding to one out of eight board members being female. This is also the median female share. The median size of a board is 13 board members so this means that the typical bank board will have one or two women on it. However, the distribution has a long right tail – while the maximum female share is high at 42.8 percent, three-quarters of the boards in our sample have less than 16.8 percent female share. Similarly, the *Blau Index* distribution is concentrated at low values (implying low gender diversity). That said, gender diversity as measured by either the *Blau Index* or the *Female Share of Board* has increased over time, with the median *Blau Index* across all banks in a given year increasing from 16% to 25% over the sample period, corresponding to an uptick in median *Female Share of Board* from 8% to 15% (Figure 1). We include two measures to capture the average demographic characteristics of the board. First, *Average Wealth of Board Members* is the natural logarithm of the average value (across all board members) of cumulative holdings over time of stocks and options. Second, *Average Age of Board Members* is the natural logarithm of the board members' average age.

Our board experience measures capture the level and dispersion of board members' expertise. *Average Bank Board Tenure* captures the (logarithm of) the average number of years that board members have spent on bank boards, to date. Across banks and over time, average board experience ranges from 3 to 12 years, with a mean of around 6 years. Our second experience measure, *Average Board Experience* is the (logarithm of) the average number of company boards (private, quoted or other) that board members have served on over their careers, to date. While the average number of boards that board members have served on is 5, this measure is as high as 11 for some banks. Lastly, *Overall Board Tenure* is the (logarithm of) the average number of years board members have sat on a board of a publicly listed company, to date. The average board experience is around 9 years – but is as high as 22 years for some bank boards.⁵ We also include the *spreads* of all three experience measures, to capture the dispersion of board members' expertise.

⁵ We include the logarithms of these measures in our regressions – therefore, the numbers in the descriptive Table 1 are the logs of the numbers presented here in the text.

For each variable, the *spread* is defined as the logarithm of the difference between the average and median board experience measure, divided by the median value.

2.3 Bank Characteristics

Our estimations also include bank balance sheet characteristics as controls for non-board related developments that may affect bank performance. The *Loan to Deposit Ratio* is our measure of bank liquidity conditions. Almost all banks in our sample hold less loans than their deposits, with their ratio averaging 0.9. The *Acquisition* dummy is included to capture the performance impact of bank M&A activity. With a mean of 0.4, we see a significant amount of M&A activity in our sample – consistent with the rapid consolidation of the commercial banking industry during the 2000s. *Risk-weighted Capital Ratio* is our measure of a bank’s overall “quality of management”, as suggested by the work of Mehran and Thakor (2011) and Bhat and Desai (2016). The banks in our sample are quite well capitalized, with mean and median capital ratios between 13 and 14 percent. However, we see a substantial spread in these ratios – with some banks very poorly capitalized at 3 to 4 percent, while others extremely well capitalized. We explore this variation in the capital ratio in our estimations, as we examine how this variable impacts the role of board gender diversity in bank performance. Lastly, we also include *Board Size* as a control for the scale of the board. *Board Size* ranges from 6 to 32 members, with an average *Board Size* of 13 members in our estimation sample

3. Estimation methodology

In our main empirical specifications, we estimate the first-differenced form of the following equation:

$$(1) \quad Y_t^b = \alpha_0 + \alpha_1 X_{t-1}^b + \alpha_2 (X_{t-1}^b)^2 + C_{t-1}^b \times [\alpha_3 X_{t-1}^b + \alpha_4 (X_{t-1}^b)^2] \\ + \alpha_5 Z_{t-1}^b + \alpha_6 S_{t-1}^b + \alpha_7 T_t + \alpha_8 B_b + \varepsilon_t^b$$

In Equation 1, Y_t^b denotes the measure of bank performance and bank behavior under study, which is one of: *Revenue to Expense Ratio*, *Return on Assets*, *Share of Nonperforming Assets*, and *Ratio of CEO to Average Staff Pay*. X_{t-1}^b is the (one-year) lagged value of the *Blau Index*, which is our main gender diversity

measure.⁶ We also include the square of this measure, $(X_{t-1}^b)^2$, to capture non-linearities in the relationship between bank performance and gender diversity. We interact both the *Blau Index* and its square with the *Risk-weighted Capital Ratio* C_{t-1}^b , to examine how the role of gender diversity varies with the quality of management. Z_{t-1}^b is the vector of (lagged) board characteristics⁷, which include: *Average Wealth of Board Members*, *Average Age of Board Members*, *Average Bank Board Tenure* and its *Spread*; *Average Board Experience* and its *Spread*, *Average Overall Board Tenure* and its *Spread*, and *Board Size*. The vector of (lagged) bank balance sheet characteristics included in S_{t-1}^b are: *Loan to Deposit Ratio*, *Acquisition* dummy, and the *Risk-Weighted Capital Ratio*. Furthermore, B_b and T_t are the sets of bank and year fixed effects.

Banks with more women on their boards might be fundamentally different from other banks, in ways that are not directly observable. We address this issue in Equation 1 in several ways. First, we include numerous bank balance sheet characteristics as controls, which capture differences in performance and management style. We also include bank and year fixed effects to control for unobservable time-invariant bank traits and time-varying shocks common to all banks, respectively.

We are also concerned about the potential endogeneity of gender diversity because the composition of the board may change in response to shocks to bank performance (Fich, 2005; Mateos de Cabo et al., 2012). For instance, bad returns may result in a “shake-up” of the board, yielding changes in its composition as well. We address this issue with two overall strategies. First, we use a lagged value of gender diversity to predict subsequent bank performance to mitigate the impact of the concern that poor performance in one year would cause a change in board composition in the following year. Second, we employ IV specifications throughout.

We use two different types of instruments. The first is the *Share of Independent Directors*, defined as the share of those board members in the total board whose roles are classified as “independent directors”

⁶ In auxiliary regressions, we use *Female Share of Board* as our diversity measure and reach the same qualitative conclusions.

⁷ We include lagged values of bank characteristics to mitigate the possibility of reverse causality.

in the Boardex database. The *Share of Independent Directors* is an appropriate instrument because it may be associated with more women on the board if it is indicative of banks' boards being selected from a larger pool of qualified professionals rather than a smaller, internally-generated pool.⁸ Indeed, the data in our sample shows that this measure is highly and significantly correlated with the *Blau Index* and the *Female Share of Board* (as shown in Table 1A in the Appendix).⁹ However, it shows no additional direct relationship with measures of bank performance, as also confirmed by the majority of the previous literature (Pi and Timme, 1993; de Andres and Vallelado, 2008; Muller-Kahle and Lewellyn, 2011; Aebi et al, 2012; Adams and Mehran, 2012).¹⁰ As an additional check, we address the possibility that banks' reported *Share of Independent Directors* may be subject to managerial manipulation in response to regulations. For instance, Bowen (2017) casts doubt on whether or not directors classified as independent are truly independent by documenting that in about 13 percent of the firms in his sample, firms reclassified the same individuals, switching them from a non-independent to independent directors from one year to the next. However, in the sample of bank holding companies that we examine, we find that this behavior is not common. For the entire sample period, we see only 12 instances of reclassification of directors, less than one percent of the sample; this broader trend is not evident in our data.

The second type of instrument that we use follows the strategy of Ahern and Dittmar (2012). Specifically, we use the initial *Blau Index* (measured in 1999) times year fixed effects. As we discuss further below, Sargan tests support the validity of our instruments.

As a result of this multiple instrument strategy, the first stage of the IV estimations takes the following form:

$$(2) \quad X_t^b = \beta_0 + \beta_1 I_t^b + \beta_2 (X_{1999}^b \times T_t) + \beta_3 Z_{t-1}^b + \beta_4 S_{t-1}^b + \beta_5 T_t + \beta_6 B_b + v_t^b$$

⁸ On average, three-quarters of bank boards are made up of independent directors in our sample – but there are a few banks with independent director shares of less than one-eighth of the board.

⁹ Notably, previous literature has used the *Board Size* as an instrument for gender diversity (Ferris et al., 2003). We choose not to do so, since Vallelado (2008), Faley and Krishnan (2010), Adams and Mehran (2012) and de Andres, and Fernandes and Fich (2016) show that *Board Size* is significantly related to bank performance. Therefore, we include board size as a separate covariate, rather than an instrument for gender diversity.

¹⁰ While Faley and Krishnan (2010) and Fernandes and Fich (2016) do find a significant relationship, Berger et al (2016) conclude that no consistent pattern exists.

In Equation 2, I_t^b denotes the *Share of Independent Directors*. The first stage also includes Z_{t-1}^b (the set of bank characteristics from Equation 1), bank and year fixed effects, and year fixed effects times the initial *Blau Index* (measured in 1999) as instruments.

Finally, insofar as board experience is correlated with gender diversity (Kim and Starks, 2016), multicollinearity of the explanatory variables might also pose a problem. While our IV specifications and lagging of the explanatory variables by one year (as described above) tackles this issue, we take a further step to eliminate multicollinearity by using first-differenced panel estimations (Bear, Rahman and Popst, 2010).

4. Estimation Results

4.1 Bank Performance and Board Gender Diversity

We first present results for a broad measure of bank performance, the *Revenue to Expense Ratio*, in Table 2. All estimations reported in Table 2 include the *Blau Index* for gender diversity as well as three interaction terms that allow for the impact of gender diversity to vary with bank and board characteristics: the *Blau Index* times the *Risk-weighted Capital Ratio*, the *Blau Index* squared, and the *Blau Index* squared times the *Risk-weighted Capital Ratio*. All estimations also include bank characteristics that vary over time, as well as bank and year fixed effects. In the various specifications of Table 2, we vary the board characteristics across estimations. We also include controls for average age and wealth of board members, and alternate controls for experience and variety of experience of board members. Specifically, in estimations in Columns 3 and 4, to characterize the experience of the board, we use average number of years serving on a bank board and the spread between the median and mean years of bank board experience. In Columns 5 and 6, we measure experience using the average number and spread of boards of all publicly traded companies, and in Columns 7 and 8, we use the average number of years and the spread of years on boards of all publicly traded companies.

Each column in Table 2 presents the results of the second stage of an instrumental variables (IV) estimation. First stage results, in which we use the *Share of Independent Directors* and year fixed effects

times the initial *Blau Index* (measured in 1999) as instruments, appear in Appendix Table 2A.¹¹ As expected, in the first stage regressions the *Share of Independent Directors* is positively related to the *Blau Index* of gender diversity. The R^2 of these regressions ranges from 0.41 to 0.45 and a Sargan test of over-identifying restrictions cannot reject the validity of the instruments at the 5 percent level in five of the eight specifications and at the 10 percent level in all remaining specifications.

Turning back to the main results in Table 2, we see that the *Blau Index* enters significantly and positively in all specifications. Importantly, the interaction terms are also statistically significant, some with positive coefficients and some with negative coefficients, in all specifications. This indicates that the impact of gender diversity of the board on bank performance is more complicated than a simple “level” effect suggests. Specifically, the marginal effect of additional gender diversity depends on its existing level and on the *Risk-weighted Capital Ratio*. At the bottom of Table 2, we take all these effects into account and calculate the marginal effects of a one standard deviation increase in the *Blau Index* for well-capitalized banks with low (10th percentile) and high (90th percentile) existing gender diversity. What these results show is that for well-capitalized (managed) banks with a low level of gender diversity on the board, a small increase in gender diversity has a negative effect on bank performance. However, we show that as the gender diversity of the board increases, the evidence of a negative effect disappears. Bank efficiency (as measured by the *Revenue to Expense Ratio*) no longer decreases with gender diversity once the share of women on the board reaches around 17 percent at well-capitalized banks (paralleling a *Blau Index* of around 27). This corresponds to around the top 25 percent of banks in our sample.

Interestingly, the results in Table 2 also provide evidence that experience on boards matters. The results for *Bank Board Tenure* (Columns 3 and 4) and *Overall Board Tenure* (Column 7 and 8) are similar. The negative and significant coefficients for the *Spread* of both *Bank* and *Overall Board Tenure* imply that the *Revenue to Expense Ratio* decreases when the distribution of board experience is skewed in either

¹¹ Note that because the *Blau Index* appears in the second stage interacted with other variables several times, the full set of first stage regressions also includes first stage regressions for all the interaction terms. Those results as are available from the authors upon request.

direction. We do not find evidence, however, that the average years of experience on either bank boards or boards of publicly traded companies has an effect on bank performance. This suggests that board members from different “vintages”, that is, with different years of experience may not work as well together in providing effective guidance to senior management. However, in line with the findings of Fernandes and Fich (2016) and Cunat and Garicano (2010), bank boards that have directors with experience on multiple boards correspond to better bank performance, as suggested by the positive coefficient on *Average Board Experience* in Columns 5 and 6. Furthermore, dispersion in this measure (as indicated by the *Spread of Board Experience*) is associated with increases in the *Revenue to Expense Ratio*. It is possible that there is some reverse causality in this measure—if better board members are asked to be on more boards—but, it does suggest that banks might benefit from a board that is populated with individuals with broad experience. In sum, these results imply that the type of experience that improves bank performance is board experience with different firms, not necessarily more years of experience with the same firm or with banks specifically. To the extent that men and women may also have different experience or perspective, this experience diversity result complements our investigation of the impact of gender diversity.

Finally, we note some expected results when we examine the impact of bank characteristics on the *Revenue to Expense Ratio*. Banks that have a higher *Loan to Deposit Ratio* and which have made an *Acquisition* in the current year have a lower *Revenue to Expense Ratio*. Banks with a higher *Risk-weighted Capital Ratio* experience a higher *Revenue to Expense Ratio*, which supports our interpretation of this measure as a proxy of the quality of bank management.

We examine another broad measure of bank performance, *Return on Assets*, in Table 3. Similar to the results in Table 2, we find again that the *Blau Index* enters positively and significantly in all estimations. The results for the interactions of the *Blau Index* are also all statistically significant with mixed signs on the coefficients. This time, however, when we calculate the marginal effect of an increase in the gender diversity of the board for well-capitalized banks, we obtain statistically significant effects for banks with both low and high existing gender diversity of boards. Specifically, when a well-capitalized bank has low gender diversity, a one standard deviation increase in the *Blau Index* reduces *Return on Assets* by about one

percentage point. However, when a well-capitalized bank has higher existing gender diversity on its board, a comparable increase in gender diversity *raises* its *Return on Assets* by around 0.6 percentage points. This result is consistent with the idea that board room dynamics are influenced by the number of women in the room. When there is a threshold share of women on the board and the bank is well managed (as proxied for by the *Risk-weighted Capital Ratio*), more gender diversity makes a positive contribution to bank performance. We find that the impact of increased diversity is significant and positive on *Return on Assets* at well-capitalized banks once the share of females on the board reaches around 13 percent (corresponding to a *Blau Index* of around 22). As the median *Blau Index* of gender diversity in our sample is 22, this implies that around 50 percent of well-capitalized banks in our sample enjoy the performance-enhancing effects of gender diversity.

As was the case with our initial results, the positive and significant coefficients on *Spread of Board Experience* (Columns 5 and 6 of Table 3) indicate that banks with boards that show a broad range of experience in terms of the number of boards its members sit on, perform better. However, variance in the number of years of experience of board members reduces bank performance. The effects of balance sheet characteristics on *Return on Assets* point in a similar direction as in Table 2.

4.2 Portfolio Risk and Board Gender Diversity

Next, we examine the relationship between the portfolio risk of a bank, and its board's gender diversity. Specifically, in Table 4 we examine (accumulated) bank portfolio risk, as represented by the *Share of Nonperforming Assets* (NPA). Although some risks that banks take will pay off in the form of higher income, a higher share of nonperforming assets is an indicator of the part of a bank's risk-taking that has "gone bad". In their review of the literature, Croson and Gneezy (2009) conclude that experimental evidence supports the view that women are more risk-averse than men. However, in the context of banks, Berger et al. (2014) and Wang and Hsu (2013) document a positive relationship between risk-taking and gender diversity. This may be in part because gender diversity proxies for board strength, and stronger boards take more risks (Pathan 2009). Our results also show that greater gender diversity increases the

Share of Nonperforming Assets, suggesting that more gender diversity is associated with greater portfolio risk once the share of women on the board reaches around 7-8 percent. Once mid-capitalized banks reach a *Blau Index* of around 8 (or a female share of 4 to 5 percent) on their boards, greater gender diversity maps into higher NPA shares. For well-capitalized (better managed) banks, this threshold increases to a *Blau Index* of around 14 (or a female share of around 7-8 percent, corresponding to 75 percent of banks in our sample).

4.3 CEO Pay and Gender Diversity

As a final measure of bank behavior, we also examine the *Ratio of CEO to Average Staff Pay*. A higher ratio indicates greater pay inequality within the bank. The simple correlations reported in Table 1A indicate that firms with greater gender diversity do have higher pay inequality, with a positive correlation coefficient of 0.25. The results in Table 5 confirm that this general conclusion holds up to a host of conditioning variables as well as bank and year fixed effects. The first four rows of Table 5 show that the *Blau Index* of gender diversity enters positively and significantly in all specifications. As was the case with the other measures of bank performance, the coefficients on the interactions of the *Blau Index* with itself and the *Risk-weighted Capital Ratio* are also all statistically significant.

The last two rows of Table 5 take all the interaction terms into account and show the marginal effect of a one standard deviation increase in the *Blau Index* for well-capitalized banks at low and high levels of gender diversity. These marginal effects indicate that when gender diversity is low, the marginal effect of greater gender diversity is negative on within-bank pay inequality. But, when gender diversity is high, the marginal effect is positive. For well-capitalized banks, this relationship turns positive once the *Blau Index* reaches around 20, corresponding to a board female share of around 12 percent (the median value for banks in our sample). The magnitudes of the estimated marginal effects are notable. The results in the last row of Table 5 indicate that a one standard deviation increase in the *Blau Index* at a well-capitalized bank in the 90th percentile of gender diversity would result in close to a one standard deviation increase in the *Ratio of CEO to Average Staff Pay*.

Our result is in line with anecdotal evidence that greater gender diversity on boards correspond to higher CEO pay (New York Times, May 27th, 2016). However, our result seems in contrast to the results of experimental studies described in Croson and Gneezy (2009) in which they review several studies that find women to be more inequality-averse than men.¹² However, these studies also indicate that women's revealed preferences for equal outcomes are more context-specific. It is possible that in the context of the board room in which social connections also play a role (Agarwal et al, 2016; Kramarz and Thesmar, 2013), these preferences for equality do not manifest themselves.

We find that greater *Overall Board Tenure* (a measure of board experience) corresponds to greater *Ratio of CEO to Average Staff Pay*. This result is in line with Conyon (2014)'s finding that greater experience corresponds to higher CEO pay. Interestingly, we find that banks with higher *Risk-weighted Capital Ratios* (a proxy for the quality of management) have significantly greater gaps between the compensation of the CEO and their average non-executive worker. This result can be justified insofar as higher *Risk-weighted Capital Ratios* indicate better quality bank management (Mehran and Thakor, 2011; Bhat and Desai, 2016).

While more research is needed to understand the relationship pay inequality and board gender diversity, we should point out that our estimation strategy allows us to rule out a number of possible theories. Specifically, because we control for bank characteristics such as *Board Size* and *Risk-weighted Capital Ratio*, we cannot attribute this result to larger boards being both more gender diverse and also compensating CEOs relatively more.¹³ Furthermore, our inclusion of bank fixed effects also rule out the hypothesis that there is some unobserved fixed characteristic of the bank that is associated both with gender

¹² The gender of the CEO may also play a role in pay inequality: Kulich et al. (2011) find that in the UK, male executives earn higher and more performance sensitive bonuses than their female counterparts.

¹³ Ayadi and Boujelbene (2013) find that larger boards are associated with higher CEO compensation at European banks.

diversity and CEO compensation. Similarly, year fixed effects rule out the possibility that the positive correlation can be attributed to an omitted variable associated with a specific time period.¹⁴

4.4 Discussion

Overall, we find that the impact of increasing gender diversity on bank boards is context dependent. It depends on both the existing level of gender diversity as well as the quality of bank management (as proxied for by the risk-weighted capital ratio). The result that the impact of increasing gender diversity on overall bank performance only turns positive when there is already more than one woman in the boardroom is consistent with research by political scientists who have studied the impact of the gender composition of legislators. For example, Karpowitz and Mendelberg (2014) find that group composition affects the authority of women in a variety of decision-making situations. Specifically, they document that women speak more frequently when the percentage of women in the group increases. Thus, our result that the positive impact of increasing gender diversity only occurs after a threshold level of women is on the board is consistent with the benefits of diverse viewpoints not being fully realized unless those viewpoints can be expressed with authority.

More generally, our results support the literature that studies the economic impact of diversity and finds that it is context-dependent. For example, Alesina and LaFerrara (2005) examine the impact of ethnic diversity on economic growth and find that it has a positive impact in high income countries and democracies that have the institutional capacity to mitigate the conflict that often accompanies greater diversity. Several studies have shown that diverse groups are more innovative (Chattopadhyay and Duflo, 2004; Phillips et al., 2006; Freeman and Huang, 2015). Again, our result that the quality of management of the bank helps to maximize the benefits of diverse and potentially more innovative view points while minimizing the communication costs and potential conflict are consistent with these findings.

¹⁴ We observe a substantial drop in the *Ratio of CEO to Average Staff Pay* during the 2008-2009 period, due to the effect of the financial crisis. As we point out, our inclusion of the year fixed effects eliminates concerns about this period-specific decline.

5. Conclusion

Using a sample of large US banks over the 1999-2016 period, we study the relationship between various measures of bank performance and gender diversity on bank boards. We find that the impact of board gender diversity on bank performance is highly non-linear. We identify “threshold” results, which indicate that the relationship between bank performance and board gender diversity changes directions once banks increase gender diversity on their boards from low to higher levels. Our non-linearity results help shed light on the very wide-ranging findings of previous papers on the role of board gender diversity in bank (and in general, firm) performance. Our findings suggest that banks’ continued voluntary expansion of board gender diversity is likely to bring overall performance benefits for well-capitalized (well-managed) banks.

More research is needed on understanding the relationship between gender diversity on executive boards, and risk-taking and pay inequality within banks. By identifying our “threshold” results, we hope that our work facilitates further analysis on these issues.

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Table 1: Variable Descriptions and Summary Statistics

| VARIABLENAME | UNIT | DEFINITION | MEAN | SD | MIN | P25 | P50 | P75 | MAX | N |
|-----------------------------------|-------------------|--|--|-------|-------|--------|--------|--------|--------|-----|
| <i>Dependent Variables</i> | | | | | | | | | | |
| <i>Bank Performance Measures</i> | | | | | | | | | | |
| Return on Assets | % | Net Income divided by Average Total Assets, from Bankscope | 0.96 | 1.32 | -5.84 | 0.74 | 1.10 | 1.41 | 10.00 | 647 |
| Revenue to Expense Ratio | % | Total current operation revenue divided by total current operating expenses, multiplied by 100, from CRSP/Compustat | 129.40 | 23.58 | 46.56 | 119.10 | 130.90 | 141.40 | 212.10 | 730 |
| Share of Nonperforming Assets | % | Nonperforming assets divided by total assets, multiplied by 100, from CRSP/Compustat | 1.45 | 4.52 | 0.00 | 0.29 | 0.56 | 1.46 | 78.79 | 632 |
| Ratio of CEO to Average Staff Pay | Ratio | Chief Operating Officer compensation (defined as Total direct compensation plus total equity linked compensation, from Boardex) divided by average staff compensation (defined as the sum of stock compensation, wages&salaries and staff benefits, from CRSP/Compustat) | 65.67 | 91.50 | 1.37 | 17.34 | 35.55 | 75.98 | 875.50 | 626 |
| <i>Explanatory Variables</i> | | | | | | | | | | |
| <i>Board Characteristics</i> | | | | | | | | | | |
| | | | $B = \left[1 - \sum_{g=1}^G P_g^2 \right] \times 100$ | | | | | | | |
| Blau Index | Index | where P is the fraction of men and women on bank boards, and g indexes gender. Based on Blau (1977), calculated from Boardex | 20.55 | 11.94 | 0.00 | 14.20 | 21.88 | 27.78 | 48.98 | 730 |
| Female Share of Board | % | Percent share of board that is comprised on women, from Boardex | 12.55 | 8.35 | 0.00 | 7.69 | 12.50 | 16.67 | 42.86 | 730 |
| Average Wealth of Board Members | Natural Logarithm | Natural logarithm of average value (across all board members) of cumulative holdings over time of stock, options, and LTIPs, in 1000 USD, from Boardex | 8.27 | 1.13 | 3.53 | 7.59 | 8.23 | 8.94 | 12.13 | 676 |
| Average Age of Board Members | Natural Logarithm | Average of board members' age in the given year, from Boardex | 4.13 | 0.05 | 3.93 | 4.09 | 4.13 | 4.16 | 4.30 | 730 |

Table 1 continued: Variable Descriptions and Summary Statistics

| VARIABLE NAME | UNIT | DEFINITION | MEAN | SD | MIN | P25 | P50 | P75 | MAX | N |
|---|-------------------|--|-------|-------|-------|-------|-------|-------|-------|-----|
| <i>Explanatory Variables</i> | | | | | | | | | | |
| <i>Board Characteristics continued</i> | | | | | | | | | | |
| Average Bank Board Tenure | Natural Logarithm | Natural logarithm of average number of years that board members have spent on bank boards, to date, from Boardex | 1.85 | 0.30 | 1.15 | 1.61 | 1.88 | 2.09 | 2.58 | 730 |
| Spread of Bank Board Tenure | Natural Logarithm | Natural logarithm of the difference between the average and median bank board tenure to date, divided by the median, from Boardex | -0.09 | 0.16 | -0.31 | -0.18 | -0.11 | -0.04 | 1.46 | 730 |
| Average Board Experience | Natural Logarithm | Natural Logarithm of average number of company boards (private, quoted or other) that board members have served on over their careers, to date, from Boardex | 1.73 | 0.34 | 0.96 | 1.48 | 1.72 | 1.99 | 2.47 | 730 |
| Spread of Board Experience | Natural Logarithm | Natural logarithm of the difference between the average and median board experience to date, divided by the median, from Boardex | 0.16 | 0.23 | -0.25 | -0.01 | 0.11 | 0.26 | 1.31 | 730 |
| Average Overall Board Tenure | Natural Logarithm | Average number of years board members have sat on a board of a publicly listed company, to date, from Boardex | 2.30 | 0.33 | 1.00 | 2.10 | 2.32 | 2.53 | 3.12 | 730 |
| Spread of Overall Board Tenure | Natural Logarithm | Natural logarithm of the difference between the average and median overall board tenure to date, divided by the median, from Boardex | 0.19 | 0.41 | -0.38 | -0.05 | 0.10 | 0.27 | 5.02 | 730 |
| Size of Board | Natural Logarithm | Total number of board members | 13.10 | 3.67 | 6.00 | 11.00 | 13.00 | 15.00 | 32.00 | 730 |
| Share of Independent Directors on Board | % | Used as instrument for Gender Diversity, defined as the Percent share of board members who are categorized as "Independent Directors", from Boardex | 72.75 | 11.31 | 22.22 | 65.00 | 73.33 | 81.82 | 93.75 | 730 |
| <i>Bank Balance Sheet Characteristics</i> | | | | | | | | | | |
| Loan to Deposit Ratio | Ratio | Total Loans divided by Total Deposits, from CRSP/Compustat | 0.91 | 0.22 | 0.06 | 0.81 | 0.92 | 1.02 | 2.24 | 730 |
| Acquisition Dummy | 0/1 | Dummy variable that takes on a value of 1 if the bank experienced an acquisition in the given year, 0 otherwise, from CRSP/Compustat | 0.39 | 0.49 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 730 |
| Risk-Weighted Capital Ratio | % | Risk-weighted capital to asset ratio, from CRSP/Compustat | 13.72 | 2.97 | 4.53 | 11.79 | 13.13 | 14.78 | 48.20 | 720 |

Table 2: The Role of Gender Diversity, Board Experience and Balance Sheet Traits in Determining US Banks' Revenue to Expense Ratio 1999 - 2015

| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|---|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| <i>Gender Diversity</i> | | | | | | | | |
| Blau Index {t-1} | 3.790** [1.672] | 3.715** [1.724] | 3.489** [1.661] | 3.383** [1.712] | 3.152* [1.675] | 3.013* [1.728] | 3.506** [1.652] | 3.211* [1.701] |
| Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | -0.327*** [0.119] | -0.325*** [0.123] | -0.300** [0.118] | -0.296** [0.122] | -0.276** [0.119] | -0.269** [0.123] | -0.306*** [0.118] | -0.290** [0.122] |
| Blau Index {t-1} * Blau Index {t-1} | -0.0752** [0.0351] | -0.0744** [0.0357] | -0.0665* [0.0349] | -0.0652* [0.0355] | -0.0597* [0.0353] | -0.0576 [0.0360] | -0.0692** [0.0346] | -0.0645* [0.0352] |
| Blau Index {t-1} * Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | 0.00639** [0.00250] | 0.00635** [0.00255] | 0.00561** [0.00249] | 0.00555** [0.00254] | 0.00523** [0.00252] | 0.00511** [0.00257] | 0.00594** [0.00247] | 0.00563** [0.00252] |
| <i>Board Characteristics</i> | | | | | | | | |
| Average Wealth of Board Members {t-1} | | -0.158 [1.016] | | -0.318 [1.015] | | 0.11 [1.007] | | -0.269 [1.016] |
| Average Age of Board Members {t-1} | | -3.638 [26.14] | | 10.11 [28.34] | | -7.631 [25.89] | | -6.227 [31.10] |
| Average Bank Board Tenure {t-1} | | | -3.84 [8.276] | -4.982 [9.041] | | | | |
| Spread of Bank Board Tenure {t-1} | | | -15.30*** [4.573] | -15.51*** [4.610] | | | | |
| Average Board Experience {t-1} | | | | | 13.77* [7.458] | 13.87* [7.488] | | |
| Spread of Board Experience {t-1} | | | | | 10.54*** [3.292] | 10.63*** [3.306] | | |
| Average Overall Board Tenure {t-1} | | | | | | | -1.417 [4.182] | -0.612 [5.003] |
| Spread of Overall Board Tenure {t-1} | | | | | | | -3.672** [1.557] | -3.647** [1.561] |
| <i>Bank Characteristics</i> | | | | | | | | |
| Acquisition Dummy {t-1} | -3.034** [1.214] | -2.916** [1.215] | -3.195*** [1.208] | -3.123*** [1.209] | -3.008** [1.203] | -2.904** [1.204] | -2.900** [1.210] | -2.804** [1.211] |
| Loan to Deposit Ratio {t-1} | -19.27*** [6.615] | -19.02*** [6.624] | -18.36*** [6.576] | -17.94*** [6.585] | -18.73*** [6.542] | -18.51*** [6.550] | -19.62*** [6.597] | -19.32*** [6.604] |
| Board Size {t-1} | -0.205 [0.321] | -0.197 [0.323] | -0.36 [0.337] | -0.388 [0.347] | -0.312 [0.322] | -0.299 [0.324] | -0.186 [0.323] | -0.171 [0.329] |
| Risk-Weighted Capital Ratio {t-1} | 3.109** [1.215] | 3.119** [1.286] | 2.928** [1.207] | 2.902** [1.277] | 2.717** [1.212] | 2.683** [1.283] | 2.901** [1.209] | 2.771** [1.280] |
| Constant | -0.408 [0.848] | -0.362 [0.858] | 0.213 [1.454] | 0.374 [1.511] | -0.723 [0.849] | -0.657 [0.857] | -0.31 [0.851] | -0.264 [0.857] |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 730 | 729 | 730 | 729 | 730 | 729 | 729 | 728 |
| Number of Banks | 87 | 87 | 87 | 87 | 87 | 87 | 87 | 87 |
| R-squared - within | 0.53 | 0.53 | 0.54 | 0.54 | 0.53 | 0.54 | 0.53 | 0.53 |
| R-squared - between | 0.33 | 0.03 | 0.03 | 0.78 | 0.7 | 0.01 | 0.12 | 0.55 |
| R-squared - overall | 0.24 | 0.24 | 0.26 | 0.26 | 0.22 | 0.22 | 0.25 | 0.24 |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with low Blau index (at the 10th percentile):</i> | | | | | | | | |
| | -22.10 [7.2]*** | -22.50 [7.3]*** | -20.10 [7.15]*** | -20.50 [7.3]*** | -19.10 [7.2]*** | -19.40 [7.4]*** | -21.10 [7.2]*** | -21.20 [7.4]*** |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with high Blau index (at the 90th percentile):</i> | | | | | | | | |
| | 7.80 [5.1] | 7.60 [5.1] | 5.80 [5.1] | 5.60 [5.1] | 7.00 [5.0] | 6.70 [5.1] | 7.40 [5.0] | 6.70 [5.1] |

Notes: This table shows the results of Instrumental Variables regressions. The dependent variable is banks' Revenue to Expense Ratio. The explanatory variables are as described in Table 1. The coefficients describe the impact of a one-unit increase in the explanatory variable on percentage points changes in banks' Revenue to Expense Ratio. All regressions contain bank and year fixed effects. The instrumented variable is the Blau Index measure of gender diversity. The set of instruments consists of: the share of independent directors, bank and year fixed effects, and the 1999 (beginning of sample) value of the Blau Index interacted with the year dummies. *** p<0.01, ** p<0.05, * p<0.1

Table 3: The Role of Gender Diversity, Board Experience and Balance Sheet Traits in Determining US Banks' Return on Assets 1999 - 2015

| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|---|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| <i>Gender Diversity</i> | | | | | | | | |
| Blau Index {t-1} | 0.289*** [0.106] | 0.276** [0.110] | 0.285*** [0.106] | 0.270** [0.110] | 0.273** [0.107] | 0.257** [0.111] | 0.285*** [0.104] | 0.272** [0.108] |
| Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | -0.0215*** [0.00751] | -0.0207*** [0.00783] | -0.0213*** [0.00753] | -0.0204*** [0.00784] | -0.0200*** [0.00760] | -0.0190** [0.00792] | -0.0210*** [0.00745] | -0.0202*** [0.00778] |
| Blau Index {t-1} * Blau Index {t-1} | -0.00619*** [0.00221] | -0.00598*** [0.00226] | -0.00603*** [0.00222] | -0.00581** [0.00227] | -0.00593*** [0.00224] | -0.00567** [0.00229] | -0.00612*** [0.00218] | -0.00591*** [0.00223] |
| Blau Index {t-1} * Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | 0.000467*** [0.000158] | 0.000453*** [0.000162] | 0.000455*** [0.000158] | 0.000442*** [0.000162] | 0.000441*** [0.000160] | 0.000424*** [0.000164] | 0.000457*** [0.000156] | 0.000444*** [0.000160] |
| <i>Board Characteristics</i> | | | | | | | | |
| Average Wealth of Board Members {t-1} | | -0.0114 [0.0769] | | -0.0116 [0.0777] | | -0.000966 [0.0767] | | -0.0129 [0.0768] |
| Average Age of Board Members {t-1} | | -0.439 [1.697] | | -0.106 [1.854] | | -0.356 [1.696] | | 0.558 [2.012] |
| Average Bank Board Tenure {t-1} | | | -0.185 [0.542] | -0.144 [0.593] | | | | |
| Spread of Bank Board Tenure {t-1} | | | -0.408 [0.310] | -0.4 [0.313] | | | | |
| Average Board Experience {t-1} | | | | | -0.233 [0.498] | -0.232 [0.499] | | |
| Spread of Board Experience {t-1} | | | | | 0.458** [0.218] | 0.465** [0.218] | | |
| Average Overall Board Tenure {t-1} | | | | | | | -0.366 [0.272] | -0.393 [0.325] |
| Spread of Overall Board Tenure {t-1} | | | | | | | -0.298*** [0.101] | -0.297*** [0.101] |
| <i>Bank Characteristics</i> | | | | | | | | |
| Acquisition Dummy {t-1} | -0.149* [0.0796] | -0.136* [0.0795] | -0.153* [0.0797] | -0.141* [0.0796] | -0.138* [0.0795] | -0.126 [0.0794] | -0.136* [0.0792] | -0.126 [0.0792] |
| Loan to Deposit Ratio {t-1} | -0.814* [0.438] | -0.793* [0.438] | -0.793* [0.438] | -0.767* [0.438] | -0.829* [0.436] | -0.809* [0.436] | -0.848* [0.436] | -0.820* [0.435] |
| Board Size {t-1} | 0.0047 [0.0221] | 0.00626 [0.0223] | -0.00112 [0.0233] | 0.000448 [0.0243] | -0.00299 [0.0223] | -0.00169 [0.0226] | 0.00374 [0.0221] | 0.00329 [0.0226] |
| Risk-Weighted Capital Ratio {t-1} | 0.183** [0.0760] | 0.178** [0.0811] | 0.183** [0.0760] | 0.178** [0.0812] | 0.169** [0.0763] | 0.163** [0.0815] | 0.176** [0.0757] | 0.170** [0.0810] |
| Constant | -0.0879 [0.0549] | -0.0843 [0.0554] | -0.058 [0.0939] | -0.0609 [0.0981] | -0.0884 [0.0552] | -0.0847 [0.0557] | -0.0734 [0.0549] | -0.0733 [0.0552] |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 632 | 631 | 632 | 631 | 632 | 631 | 631 | 630 |
| Number of Banks | 82 | 81 | 82 | 81 | 82 | 81 | 82 | 81 |
| R-squared - within | 0.35 | 0.35 | 0.37 | 0.37 | 0.36 | 0.36 | 0.35 | 0.35 |
| R-squared - between | 0.07 | 0.08 | 0.05 | 0.02 | 0.03 | 0.14 | 0.02 | 0.1 |
| R-squared - overall | 0.11 | 0.11 | 0.12 | 0.12 | 0.09 | 0.09 | 0.12 | 0.12 |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with low Blau index (at the 10th percentile):</i> | | | | | | | | |
| | -0.97 [0.46]** | -0.96 [0.47]** | -0.98 [0.46]** | -0.98 [0.47]** | -0.85 [0.46]* | -0.84 [0.47]* | -0.91 [0.46]** | -0.9 [0.47]* |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with high Blau index (at the 90th percentile):</i> | | | | | | | | |
| | 0.62 [0.32]* | 0.6 [0.32]* | 0.58 [0.33]* | 0.56 [0.33]** | 0.59 [0.32]* | 0.56 [0.32]* | 0.6 [0.32]** | 0.6 [0.32]** |

Notes: This table shows the results of Instrumental Variables regressions. The dependent variable is banks' Return on Assets. The explanatory variables are as described in Table 1. The coefficients describe the impact of a one-unit increase in the explanatory variable on percentage points changes in banks' Return on Assets. All regressions contain bank and year fixed effects. The instrumented variable is the Blau Index measure of gender diversity. The set of instruments consists of: the share of independent directors, bank and year fixed effects, and the 1999 (beginning of sample) value of the Blau Index interacted with the year dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: The Role of Gender Diversity, Board Experience and Balance Sheet Traits in Determining US Banks' Share of Nonperforming Assets 1999 - 2015

| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|---|------------|------------|------------|------------|------------|------------|------------|------------|
| <i>Gender Diversity</i> | | | | | | | | |
| Blau Index {t-1} | -0.354* | -0.366* | -0.356* | -0.374* | -0.338* | -0.342* | -0.345* | -0.337* |
| | [0.193] | [0.201] | [0.193] | [0.201] | [0.196] | [0.204] | [0.192] | [0.201] |
| Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | 0.0182 | 0.0197 | 0.0186 | 0.0207 | 0.017 | 0.018 | 0.0176 | 0.0178 |
| | [0.0137] | [0.0144] | [0.0137] | [0.0144] | [0.0140] | [0.0146] | [0.0137] | [0.0144] |
| Blau Index {t-1} * Blau Index {t-1} | 0.00898** | 0.00930** | 0.00919** | 0.00967** | 0.00863** | 0.00879** | 0.00881** | 0.00874** |
| | [0.00403] | [0.00413] | [0.00403] | [0.00413] | [0.00410] | [0.00421] | [0.00401] | [0.00412] |
| Blau Index {t-1} * Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | -0.000372 | -0.000395 | -0.000391 | -0.00043 | -0.000349 | -0.000362 | -0.00036 | -0.000358 |
| | [0.000286] | [0.000295] | [0.000287] | [0.000295] | [0.000291] | [0.000300] | [0.000285] | [0.000294] |
| <i>Board Characteristics</i> | | | | | | | | |
| Average Wealth of Board Members {t-1} | | -0.0496 | | -0.0559 | | -0.0552 | | -0.0522 |
| | | [0.141] | | [0.142] | | [0.141] | | [0.142] |
| Average Age of Board Members {t-1} | | 6.187** | | 6.627* | | 6.268** | | 6.071 |
| | | [3.099] | | [3.391] | | [3.106] | | [3.730] |
| Average Bank Board Tenure {t-1} | | | 0.948 | 0.0533 | | | | |
| | | | [1.063] | [1.166] | | | | |
| Spread of Bank Board Tenure {t-1} | | | -0.833 | -0.949 | | | | |
| | | | [0.632] | [0.636] | | | | |
| Average Board Experience {t-1} | | | | | -0.173 | -0.319 | | |
| | | | | | [0.915] | [0.919] | | |
| Spread of Board Experience {t-1} | | | | | -0.174 | -0.181 | | |
| | | | | | [0.398] | [0.400] | | |
| Average Overall Board Tenure {t-1} | | | | | | | 0.614 | 0.0629 |
| | | | | | | | [0.512] | [0.618] |
| Spread of Overall Board Tenure {t-1} | | | | | | | -0.0402 | -0.0496 |
| | | | | | | | [0.185] | [0.186] |
| <i>Bank Characteristics</i> | | | | | | | | |
| Acquisition Dummy {t-1} | 0.147 | 0.124 | 0.153 | 0.125 | 0.145 | 0.125 | 0.15 | 0.127 |
| | [0.145] | [0.146] | [0.145] | [0.146] | [0.146] | [0.146] | [0.146] | [0.146] |
| Loan to Deposit Ratio {t-1} | -0.285 | -0.252 | -0.233 | -0.212 | -0.29 | -0.262 | -0.27 | -0.267 |
| | [0.794] | [0.796] | [0.794] | [0.795] | [0.795] | [0.796] | [0.796] | [0.798] |
| Board Size {t-1} | -0.028 | -0.0403 | -0.0216 | -0.0473 | -0.0265 | -0.0397 | -0.0243 | -0.0403 |
| | [0.0401] | [0.0406] | [0.0425] | [0.0444] | [0.0408] | [0.0413] | [0.0405] | [0.0417] |
| Risk-Weighted Capital Ratio {t-1} | -0.177 | -0.202 | -0.177 | -0.206 | -0.166 | -0.187 | -0.171 | -0.184 |
| | [0.138] | [0.148] | [0.138] | [0.148] | [0.140] | [0.150] | [0.139] | [0.149] |
| Constant | 0.022 | -0.00767 | -0.106 | -0.0126 | 0.0283 | 0.0012 | 0.00923 | -0.01 |
| | [0.108] | [0.109] | [0.185] | [0.193] | [0.110] | [0.111] | [0.109] | [0.110] |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 615 | 614 | 615 | 614 | 615 | 614 | 614 | 613 |
| Number of Banks | 82 | 81 | 82 | 81 | 82 | 81 | 82 | 81 |
| R-squared - within | 0.32 | 0.33 | 0.36 | 0.34 | 0.31 | 0.33 | 0.33 | 0.34 |
| R-squared - between | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| R-squared - overall | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with low Blau index (at the 10th percentile):</i> | | | | | | | | |
| | -0.48 | -0.32 | -0.42 | -0.21 | -0.53 | -0.38 | -0.50 | -0.35 |
| | [0.83] | [0.86] | [0.84] | [0.86] | [0.84] | [0.87] | [0.84] | [0.87] |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with high Blau index (at the 90th percentile):</i> | | | | | | | | |
| | 1.70 | 1.80 | 1.70 | 1.70 | 1.70 | 1.80 | 1.70 | 1.90 |
| | [0.59]*** | [0.60]*** | [0.60]*** | [0.60]*** | [0.59]*** | [0.60]*** | [0.59]*** | [0.60]*** |

Notes: This table shows the results of Instrumental Variables regressions. The dependent variable is banks' Share of Nonperforming Assets. The explanatory variables are as described in Table 1. The coefficients describe the impact of a one-unit increase in the explanatory variable on percentage points changes in banks' Share of Nonperforming Assets. All regressions contain bank and year fixed effects. The instrumented variable is the Blau Index measure of gender diversity. The set of instruments consists of: the share of independent directors, bank and year fixed effects, and the 1999 (beginning of sample) value of the Blau Index interacted with the year dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: The Role of Gender Diversity, Board Experience and Balance Sheet Traits in Determining US Banks' Ratio of CEO To Average Staff Pay 1999 - 2015

| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <i>Gender Diversity</i> | | | | | | | | |
| Blau Index {t-1} | 33.05*** [9.001] | 32.67*** [9.017] | 32.82*** [9.000] | 32.39*** [9.006] | 33.45*** [9.162] | 33.29*** [9.183] | 31.34*** [8.915] | 28.67*** [8.831] |
| Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | -2.400*** [0.665] | -2.366*** [0.667] | -2.387*** [0.665] | -2.350*** [0.666] | -2.425*** [0.678] | -2.405*** [0.680] | -2.273*** [0.660] | -2.091*** [0.656] |
| Blau Index {t-1} * Blau Index {t-1} | -0.714*** [0.197] | -0.706*** [0.197] | -0.712*** [0.197] | -0.703*** [0.197] | -0.737*** [0.202] | -0.732*** [0.202] | -0.669*** [0.195] | -0.619*** [0.193] |
| Blau Index {t-1} * Blau Index {t-1} * Risk-Weighted Capital Ratio {t-1} | 0.0534*** [0.0143] | 0.0526*** [0.0143] | 0.0533*** [0.0144] | 0.0525*** [0.0144] | 0.0546*** [0.0147] | 0.0541*** [0.0147] | 0.0501*** [0.0142] | 0.0462*** [0.0141] |
| <i>Board Characteristics</i> | | | | | | | | |
| Average Wealth of Board Members {t-1} | | -5.923 [5.791] | | -5.944 [5.835] | | -6.359 [5.806] | | -6.85 [5.760] |
| Average Age of Board Members {t-1} | | -22.73 [150.8] | | -33.24 [164.7] | | -12.43 [151.1] | | -268.6 [182.5] |
| Average Bank Board Tenure {t-1} | | | -1.473 [51.24] | 6.393 [55.50] | | | | |
| Spread of Bank Board Tenure {t-1} | | | 3.024 [27.83] | 1.351 [28.06] | | | | |
| Average Board Experience {t-1} | | | | | -57.63 [43.15] | -58.77 [43.23] | | |
| Spread of Board Experience {t-1} | | | | | -6.499 [19.10] | -8.026 [19.15] | | |
| Average Overall Board Tenure {t-1} | | | | | | | 44.14* [24.21] | 69.26** [29.33] |
| Spread of Overall Board Tenure {t-1} | | | | | | | 0.305 [8.664] | -0.375 [8.624] |
| <i>Bank Characteristics</i> | | | | | | | | |
| Acquisition Dummy {t-1} | 8.296 [7.208] | 8.042 [7.212] | 8.3 [7.231] | 8.115 [7.241] | 8.81 [7.213] | 8.529 [7.221] | 8.82 [7.197] | 9.087 [7.158] |
| Loan to Deposit Ratio {t-1} | 0.962 [40.18] | 0.708 [40.17] | 0.918 [40.29] | 0.558 [40.31] | -0.802 [40.17] | -1.041 [40.17] | -3.132 [40.13] | -5.802 [39.88] |
| Board Size {t-1} | 1.772 [1.800] | 1.679 [1.820] | 1.776 [1.902] | 1.779 [1.974] | 1.774 [1.825] | 1.678 [1.844] | 1.945 [1.808] | 2.381 [1.838] |
| Risk-Weighted Capital Ratio {t-1} | 21.84*** [6.987] | 21.55*** [6.997] | 21.65*** [6.977] | 21.33*** [6.982] | 21.82*** [7.043] | 21.65*** [7.055] | 20.85*** [6.964] | 19.30*** [6.914] |
| Constant | -9.192* [5.126] | -9.294* [5.166] | -8.972 [9.009] | -10.16 [9.307] | -8.393 [5.157] | -8.527 [5.193] | -9.998* [5.134] | -9.455* [5.121] |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 609 | 609 | 609 | 609 | 609 | 609 | 608 | 608 |
| Number of Banks | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| R-squared - within | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| R-squared - between | 0.13 | 0.12 | 0.13 | 0.12 | 0.08 | 0.03 | 0.12 | 0.13 |
| R-squared - overall | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with low Blau index (at the 10th percentile):</i> | | | | | | | | |
| | -99.10 [44.4]** | -99.66 [44.4]** | -99.20 [44.2]** | -96.80 [44.2]** | -99.50 [44.9]** | -97.40 [44.8]** | -93.50 [44.3]** | -87.80 [44.1]** |
| <i>Marginal effect of a one standard deviation increase in the Blau index, for well-capitalized banks (at the 90th percentile) with high Blau index (at the 90th percentile):</i> | | | | | | | | |
| | 77.70 [29.8]** | 75.90 [29.7]*** | 77.90 [30.1]*** | 75.30 [29.9]*** | 76.30 [29.9]*** | 75.00 [29.9]*** | 73.90 [29.7]** | 64.50 [29.5]** |

Notes: This table shows the results of Instrumental Variables regressions. The dependent variable is banks' Ratio of CEO To Average Staff Pay. The explanatory variables are as described in Table 1. The coefficients describe the impact of a one-unit increase in the explanatory variable on percentage points changes in banks' Ratio of CEO To Average Staff Pay. All regressions contain bank and year fixed effects. The instrumented variable is the Blau Index measure of gender diversity. The set of instruments consists of: the share of independent directors, bank and year fixed effects, and the 1999 (beginning of sample) value of Blau Index interacted with the year dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1A: Correlation Matrix

| VARIABLES | Return on Average Assets | Revenue to Expense Ratio | Share of Nonperforming Assets | Ratio of CEO to Average Staff Pay | Female Share of Board | Blau Index | Average Wealth of Board Members | Average Age of Board Members | Average Bank Board Tenure | Average Board Experience | Average Overall Board Tenure | Spread of Bank Board Tenure | Spread of Board Experience | Spread of Overall Board Tenure | Size of Board | Share of Independent Directors on Board | Loan to Deposit Ratio | Acquisition Dummy | Total Assets | Risk-Weighted Capital Ratio |
|---|--------------------------|--------------------------|-------------------------------|-----------------------------------|-----------------------|------------|---------------------------------|------------------------------|---------------------------|--------------------------|------------------------------|-----------------------------|----------------------------|--------------------------------|---------------|---|-----------------------|-------------------|--------------|-----------------------------|
| Return on Average Assets | 1 | | | | | | | | | | | | | | | | | | | |
| Revenue to Expense Ratio | 0.69 | 1 | | | | | | | | | | | | | | | | | | |
| Share of Nonperforming Assets | -0.14 | -0.18 | 1 | | | | | | | | | | | | | | | | | |
| Ratio of CEO to Average Staff Pay | 0.39 | 0.07 | 0.24 | 1 | | | | | | | | | | | | | | | | |
| Female Share of Board | 0.14 | 0 | 0.07 | 0.27 | 1 | | | | | | | | | | | | | | | |
| Blau Index | 0.1 | -0.02 | 0.07 | 0.25 | 0.99 | 1 | | | | | | | | | | | | | | |
| Average Wealth of Board Members | 0.45 | 0.42 | -0.01 | 0.33 | 0.02 | 0.01 | 1 | | | | | | | | | | | | | |
| Average Age of Board Members | -0.01 | 0.12 | 0.06 | 0.03 | -0.17 | -0.18 | 0.09 | 1 | | | | | | | | | | | | |
| Average Bank Board Tenure | -0.26 | -0.33 | 0.14 | 0.04 | 0.13 | 0.13 | -0.07 | 0.31 | 1 | | | | | | | | | | | |
| Average Board Experience | 0.08 | -0.09 | 0.15 | 0.34 | 0.19 | 0.21 | 0.25 | -0.01 | 0.11 | 1 | | | | | | | | | | |
| Average Overall Board Tenure | -0.05 | 0.06 | -0.07 | -0.15 | -0.19 | -0.19 | 0.09 | 0.42 | 0.33 | -0.13 | 1 | | | | | | | | | |
| Spread of Bank Board Tenure | 0.04 | -0.02 | -0.03 | 0.01 | 0.06 | 0.05 | -0.04 | 0.04 | -0.1 | 0.08 | -0.19 | 1 | | | | | | | | |
| Spread of Board Experience | -0.08 | -0.04 | 0.02 | -0.06 | 0.03 | 0.06 | -0.07 | -0.09 | 0 | 0.01 | -0.11 | 0.01 | 1 | | | | | | | |
| Spread of Overall Board Tenure | -0.05 | -0.06 | 0.01 | -0.03 | 0.03 | 0.04 | -0.02 | -0.06 | -0.09 | 0.06 | -0.16 | 0.22 | -0.01 | 1 | | | | | | |
| Size of Board | 0.12 | 0 | 0.04 | 0.17 | 0.03 | 0.06 | 0.24 | 0.06 | -0.12 | 0.2 | -0.08 | 0.02 | -0.02 | 0.08 | 1 | | | | | |
| Share of Independent Directors on Board | 0.04 | -0.03 | 0.04 | 0.2 | 0.19 | 0.19 | -0.16 | -0.04 | 0.17 | 0.25 | 0 | 0.07 | 0 | 0.02 | 0.03 | 1 | | | | |
| Loan to Deposit Ratio | 0 | -0.05 | 0.01 | -0.04 | -0.08 | -0.08 | -0.04 | 0.12 | 0.05 | -0.09 | -0.05 | -0.03 | -0.02 | -0.06 | -0.08 | -0.17 | 1 | | | |
| Acquisition Dummy | 0.02 | -0.06 | 0.07 | 0.12 | 0.15 | 0.16 | 0.06 | 0.02 | 0.28 | 0.2 | -0.02 | -0.04 | 0.01 | 0.07 | 0.11 | 0.16 | -0.05 | 1 | | |
| Total Assets | 0.07 | -0.1 | -0.05 | 0.39 | 0.27 | 0.29 | 0.39 | 0.02 | 0.25 | 0.47 | -0.05 | 0.11 | 0.03 | -0.01 | 0.35 | 0.31 | -0.07 | 0.21 | 1 | |
| Risk-Weighted Capital Ratio | -0.04 | 0.06 | -0.02 | -0.05 | 0.02 | 0.03 | 0.05 | 0.19 | 0.11 | -0.03 | 0.01 | 0.08 | 0.12 | -0.01 | -0.14 | -0.03 | -0.13 | -0.15 | 0.08 | 1 |

[AO1]

Table 2A: First-stage IV Results for Revenue to Expense Ratio Regressions
The Role Board Experience and Balance Sheet Traits in Determining US Banks' Blau Index 1999 - 2015

| VARIABLES | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
|--|--------------------|------------------------|-----------------------|------------------------|---------------------|------------------------|---------------------|-----------------------|
| <i>Board Characteristics</i> | | | | | | | | |
| Average Wealth of Board Members {t-1} | | 0.367 [0.56] | | 0.473 [0.566] | | 0.4 [0.563] | | 0.324 [0.561] |
| Average Age of Board Members {t-1} | | -47.489 [12.231]*** | | -40.393 [13.414]*** | | -47.129 [12.284]*** | | -62.75 [14.202]*** |
| Average Bank Board Tenure {t-1} | | | -11.204 [4.179]*** | -6.057 [4.584] | | | | |
| Spread of Bank Board Tenure {t-1} | | | 0.364 [2.417] | 0.779 [2.404] | | | | |
| Average Board Experience {t-1} | | | | | -2.005 [3.655] | -1.016 [3.609] | | |
| Spread of Board Experience {t-1} | | | | | 1.088 [1.535] | 1.066 [1.519] | | |
| Average Overall Board Tenure {t-1} | | | | | | | -0.018 [2.018] | 5.051 [2.3]** |
| Spread of Overall Board Tenure {t-1} | | | | | | | 0.891 [0.671] | 0.965 [0.657] |
| <i>Bank Characteristics</i> | | | | | | | | |
| Acquisition Dummy {t-1} | -1.274 [0.57]** | -1.234 [0.566]** | -1.351 [0.568]** | -1.278 [0.568]** | -1.235 [0.573]** | -1.205 [0.568]** | -1.296 [0.572]** | -1.214 [0.564]** |
| Loan to Deposit Ratio {t-1} | 4.066 [3.122] | 3.642 [3.092] | 4.361 [3.129] | 3.844 [3.124] | 4.048 [3.133] | 3.689 [3.104] | 4.014 [3.129] | 3.468 [3.082] |
| Board Size {t-1} | -0.021 [0.187] | -0.004 [0.185] | -0.232 [0.202] | -0.118 [0.205] | -0.035 [0.188] | -0.017 [0.186] | -0.062 [0.192] | 0.035 [0.189] |
| Risk-Weighted Capital Ratio {t-1} | 0.108 [0.129] | 0.07 [0.129] | 0.097 [0.128] | 0.07 [0.129] | 0.108 [0.129] | 0.071 [0.129] | 0.115 [0.129] | 0.089 [0.129] |
| Share of Independent Directors {t-1} | 0.077 [0.042]* | 0.071 [0.041]* | 0.057 [0.042] | 0.063 [0.042] | 0.077 [0.042]* | 0.072 [0.041]* | 0.078 [0.042]* | 0.085 [0.042]** |
| Constant | 0.091 [1.536] | -0.234 [1.524] | 0.217 [1.573] | 0.126 [1.569] | 0.112 [1.539] | -0.221 [1.528] | -0.547 [1.545] | 0.364 [1.51] |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effects * Blau Index {1999} | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 635 | 634 | 635 | 634 | 635 | 634 | 634 | 633 |
| P-Value of Sargan Test Statistic | 0.0771 | 0.0722 | 0.0485 | 0.0402 | 0.0465 | 0.0448 | 0.0628 | 0.0567 |
| R-squared | 0.41 | 0.44 | 0.43 | 0.44 | 0.42 | 0.44 | 0.42 | 0.45 |

Notes: This table shows the results of the first stage of 2SLS Instrumental Variables regressions, corresponding to the Revenue to Assets Ratio results described in Table 2. The dependent variable is banks' Blau Index of board diversity. The explanatory variables are as described in Table 1. The coefficients describe the impact of a one-unit increase in the explanatory variable on unit changes in banks' Blau Index of board diversity. As shown, the set of instruments consists of: bank and year fixed effects, the share of independent directors, bank and year fixed effects, and the 1999 (beginning of sample) value of Blau Index interacted with the year dummies. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 1:

