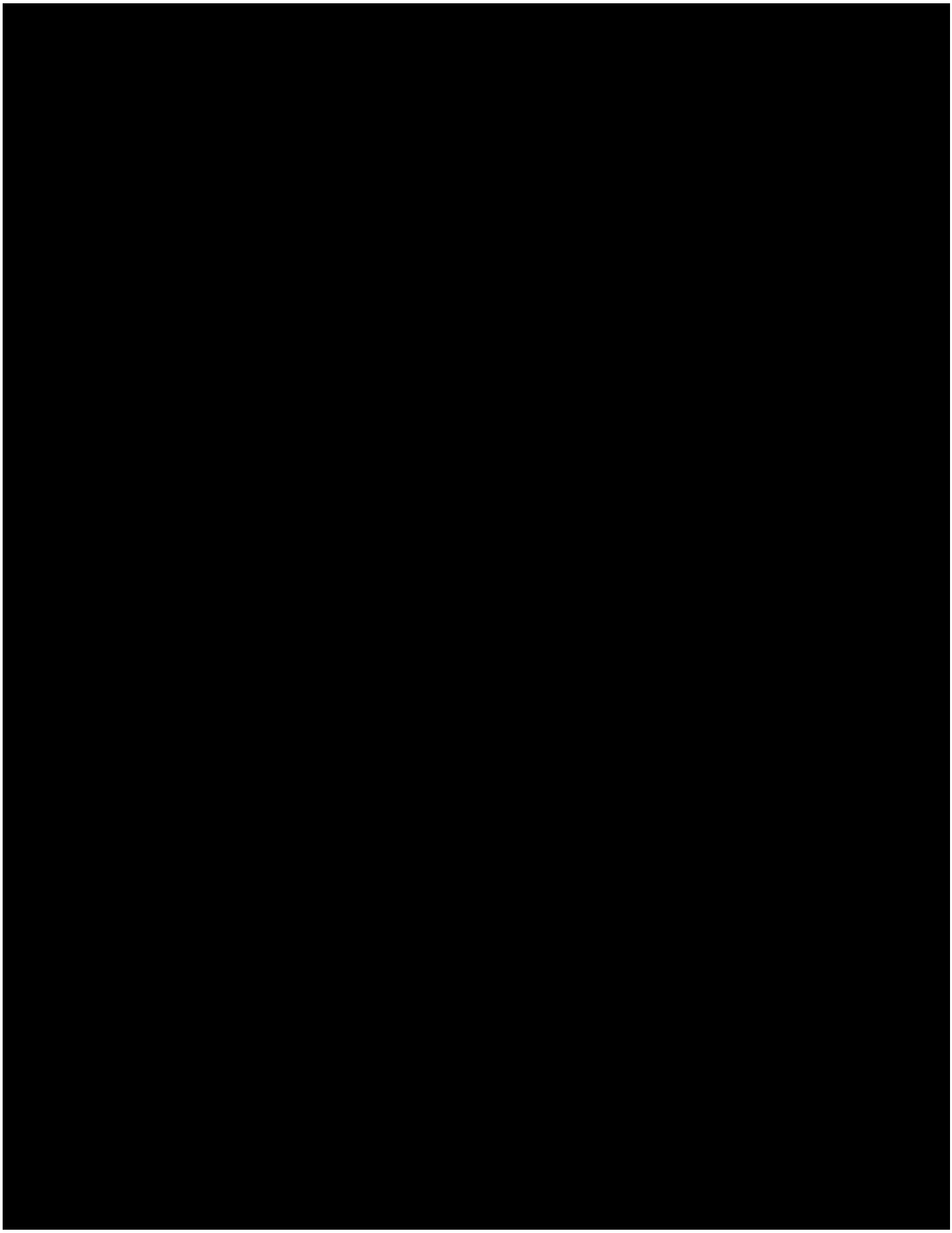

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Banking on Women Leaders: A Case for More?

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Abstract

Using a new dataset, we measure the large gap between the representation of men and women in leadership positions in banks and bank supervision agencies worldwide. Women occupied less than 2 percent of bank CEOs positions, and less than 20 percent of the board seats in more than 80 percent of the observations across banks over time. Contrary to common perceptions, many low- and middle-income countries have a higher share of women in bank boards and banking supervision agency boards compared to advanced economies. Econometric analysis suggests that, controlling for relevant bank and country-specific factors, the presence of women as well as a higher share of women on bank boards is associated with greater bank stability, as represented by higher z-scores and lower nonperforming loan ratios. We also examine the share of women on boards of banking supervision agencies by compiling a new dataset. We find that it is associated with greater bank stability. Further research is needed to identify specific mechanisms through which these stability benefits are achieved, and to understand the conditions that have facilitated entry of women into leadership roles in banks and supervision agencies.

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Contents

I. INTRODUCTION

Compared to the available talent pool, the share of women on executive boards of banks and banking supervision agencies is low. Worldwide, women hold less than 20 percent of board seats of banks and banking supervision agencies. This contrasts with the sizeable supply of women with relevant degrees. For example, in 2010–11, women represented 50 percent of graduates of business and social sciences and 30 percent of economics graduates in the United States and the United Kingdom (Credit Suisse, 2014).

There is growing evidence of the existence of a "glass ceiling" in finance, but not much of a possible impact on banking outcomes, such as stability. The existing evidence is fragmented, focusing on certain aspects of risk-taking or on specific countries. To explore the link between financial stability and gender more thoroughly, this paper puts together a comprehensive dataset on the banking sector, its characteristics and performance, as well as on the share of women on the boards of directors from several sources, covering 72 countries over 13 years. The paper also presents a new dataset on the share of women on banking supervision agency boards across 113 countries to explore a new question: is the share of women in banking supervision agency boards associated with banking outcomes, such as stability?

Our study contributes to the literature in two ways. First, we present comprehensive data that allow us to present new stylized facts on the share of women on bank boards and in management across types of banks and geographic regions. In addition to documenting women's low share on boards, the sample also shows that women represent less than 2 percent of bank chief executive officers (CEOs). The share of women is relatively higher in savings banks, and lower in investment banks, bank holding companies, and securities firms. Contrary to common perceptions, our sample shows that many low- and middle-income countries have a higher share of women in bank boards and banking supervision agency boards compared to advanced economies. Second, the paper finds new results that suggest that more women on bank boards may have a possible effect on bank stability, through higher capital buffers, controlling for other relevant factors. The share of women on banking supervision boards also appears to be associated with bank stability.

There are some qualifications to the scope and results presented in this paper. First, we do not explore the relationship between bank stability and women as users (rather than providers and supervisors) of finance.[2] Second, while we explored a number of possible links to understand why bank stability might improve with a higher share of women in boards of banks and banking supervision agencies, we could not identify the precise channels through which bank stability is enhanced. Third, given the nature of the data—more than 80 percent

[2] A recent IMF Staff Discussion Note (Sahay and others, 2015b) looks at women as users of finance. It finds that there are substantial benefits to growth from financial inclusion for both men and women, but financial stability risks rise when access to credit is expanded without adequate regulation and supervision. The paper also finds a positive association between income inequality and the gender gap in financial inclusion.

of observations of banks have less than 20 percent representation of women on their boards—statistical tests can provide only limited insights into a hypothetical world where women's representation is closer to men's. Thus, this paper provides an initial exploration of the observable links, given the data constraints.

The paper is organized as follows. The next section presents the existing literature on the topic. Section III discusses the possible links between the share of women in financial leadership positions and financial stability. Section IV presents the data and stylized facts. Section V provides the empirical approaches and the results. Section VI concludes. Further details of the data and econometric results are presented in Appendixes I—IV.

II. PREVIOUS LITERATURE

Numerous studies highlighted the small share of women in senior corporate management (Catalyst, 2011; Credit Suisse, 2012 and 2014; International Labor Organization, 2012; Wolfers, 2006). Female representation in senior positions in government as well as finance is low across countries and industries (Erborgh-Woytek and others, 2013).

Some studies suggest that companies with more women board members have higher profitability and better stock price performance (Credit Suisse, 2012; Catalyst Census, 2014; Christiansen and others, 2016). Performance of funds that are majority-owned by women has outpaced the financial industry as a whole since 2007, returning 6 percent in 2013 compared to a loss of 1.1 percent for the industry (Rothstein Kass Institute, 2013). Indeed, several pension funds in the United States have mandates to invest in funds run by women, motivated by diversity considerations (Catalyst Census, 2014), but there appears to be a business case as well. Using data for a commercial bank in Albania, Beck and others (2013) found that loans screened by female loan officers were less likely to turn problematic.

There have been mixed results regarding the impact of higher female participation on bank boards on risk outcomes. Some studies found that gender diversity in banks is related to more risk-taking. Examining 300 listed banks, those with more female directors did not engage in less risky activity during the global financial crisis (Adams and Ragunathan, 2013).[3] Berger and others (2014) document a similar result for a sample of German banks.

Mandating of quotas, regardless of experience, is also an important consideration in relating the share of women to financial stability. Berger and others (2014) and Wang and Hsu (2013) find that gender diversity, compared to other dimensions such as age, education, and tenure diversity, is associated with more risk-taking. The reason for this outcome appears to be that more diverse boards might be more inexperienced, especially if their diversity is achieved through forced quotas over a short period of time. Ahern and Dittmar (2012) find that firm performance is lower when boards fulfill quotas requiring greater female representation in

[3] This study covers only a third of our sample of banks and one year (2009), while our study covers 800 banks in 72 countries for the period 2001–13.

response to mandated changes on Norwegian corporate boards. Thus, any model trying to connect the share of women and stability needs to control for the professional experience of the board members.

Previous studies also suggest that female executives may be more cautious than male executives in making corporate decisions. For example, Huang and Kisgen (2013), using a U.S. corporate sample, suggest that male executives undertake more acquisitions and issue debt more often than female executives. Acquisitions and debt issues made by firms with female executives have announcement returns higher than those made by male executives. Female executives place wider bounds on earnings estimates and are more likely to exercise stock options early, which the authors interpret as suggests that men show relative overconfidence in significant corporate decision making compared with women. Other studies find that greater board diversity is associated with higher meeting attendance and better monitoring. Moreover, female board directors are found to be more diligent monitors and demand more audit efforts than male directors (Adams and Ferreira, 2009; Gul and others, 2012).

Adams and Funk (2012) argue that characteristics of female directors may vary across countries, depending on the institutional environment. If it is more difficult for women to advance to the executive level, say, in Germany, it is possible that female directors in Germany are, on average, greater risk-takers than female directors in the U.S. This could explain the different effect of gender on corporate risk measures across the two samples. While Bandiera and others (2011) provide survey-based evidence that Italian female managers are, on average, less risk tolerant than their male peers, Adams and Funk (2012) find Swedish female directors to be, on average, more risk tolerant than male directors Furthermore, studies looking at gender differences in career choices suggest that women who choose a career in finance tend to be less risk averse than men who make the same choice (Sapienza and others, 2009).

A firm that has more men on its board may take more risks for reasons that are not related to the risk appetites of men versus women. To the extent that managing high-risk firms involves longer working hours and less flexible schedules, women might disproportionately self-select into low-risk firms to be better able to fulfill the child-rearing and household responsibilities that they often disproportionately carry (Bertrand and others, 2010). Differences in the structure of compensation and incentives may also explain the documented association between gender and risk-taking of firms. In particular, low-risk firms may be more likely to offer fixed-pay contracts and may be more likely to attract female executives (Bandiera and others, 2011).

Given the variety of results on risk-taking, we caution against drawing the conclusion that a statistically significant positive association between the share of women and stability reflects differences in risk-taking between men and women. Rather, this association should lead one to investigate further the reasons why. In the following section, we describe several

hypotheses that could explain the result, noting that our current dataset does not permit ruling out any one of these.

III. Women Leaders and Bank Stability: Possible Linkages

In view of the existing literature, several possible hypotheses could be offered on how more gender-balanced boards could affect stability. These include (1) higher risk aversion in female financial executives (compared to their male peers), (2) discriminatory selection practices that result in more qualified women who make it to the board, (3) diversity in thought that might result in better financial decisions, and (4) selection bias, by which better managed—and therefore, less risky institutions—also tend to attract, select, and retain more women leaders.

The first hypothesis is that women possess innate traits more consistent with better management of risks in financial institutions. Thus, banks with a higher proportion of women will perform better. But so far, evidence is mixed. Surveys by Croson and Gneezy (2009) and Bertrand (2011) suggest that women may be more risk-averse than men. Evidence from experimental economics literature by Nelson (2015) and Niederle (2014) find varied results on whether women are more risk-averse and more cooperative and altruistic than men. On perceptions, PEW (2014) found that 29 percent of surveyed people thought that women would do a "better job" of running a large bank or financial institution, against 19 percent for men; the other half was agnostic. Hence, focusing on innate characteristics is unlikely to prove conclusive, given the evidence on risk-taking so far.

A second hypothesis is that because of a discriminatory hiring decisions, male applicants are more likely to be selected for a bank board position, controlling for qualifications. This hiring bias toward men implies that the average woman who is hired has higher qualifications than men and is of a higher average quality. Thus, those bank boards with a higher share of women will be of higher quality that, in turn, would result in better financial outcomes.

Third, there is a diversity hypothesis whereby mixed-gender boards perform better than all-male boards, because of the benefits of a multiplicity of views. Female directors could bring different perspectives and experiences into the boardroom, which help improve the quality of board decisions and enhance the legitimacy of firm practices (Hillman and others, 2007). Gender-diverse boards could also partially offset weak corporate governance (Gul and others, 2012).

Finally, selection bias can play a role, where less gender-biased hiring practices are correlated with other better management practices that contribute to stability. Here, it is not the presence of women per se that improves stability, but rather that their presence shows that the environment and decision-making process in these banks is more conducive to good practices.

A finding of a positive association between gender balance on boards in banks and banking supervision agencies and higher banking stability could be related to any of these four hypotheses. In what follows, we first explore the stylized facts and then present the evidence relating the share of women on bank and banking supervision boards to bank stability. In one of the empirical exercises, we attempt to control for selection bias, for which more detailed data is available.

IV. Share of Women on Boards: Data and Stylized Facts

Data

The dataset on bank boards builds on the data used by the IMF (2014). The underlying data are bank-by-bank board characteristics for about 800 banks in 72 countries from 2001 to 2013, downloaded from BoardEx.[4] The data are broken down by type of bank—commercial, investment, savings, cooperative, bank-holding companies, real estate and mortgage, and securities firms. Appendix 1 shows the country coverage and the total bank assets/GDP in 2013.

Slightly more than half of the banks in the sample are from the United States, more than 20 percent from Europe, and the rest from Asia, the Americas, and Africa. Although the sample of banks in BoardEx is not necessarily representative of each domestic banking system, in many instances the total bank assets cover a substantial share of GDP. For example, BoardEx includes one quarter of assets of banks in the United States (corresponding to about 95 percent of the country's GDP) and two thirds of assets of banks in Lebanon (over 120 percent of GDP), but only one fifth of Polish bank assets (some 15 percent of GDP). See Appendix I for summary statistics.

We compiled a new dataset on the share of women on banking supervision boards for 113 countries for 2011 and 2013. The dataset was constructed using public information on regulatory authorities and banking supervision agencies from central bank websites listed by the BIS and from Central Banking Publications (2011).[5] The attempt was to capture the latest year for which other relevant data were available for the countries in our sample. See Appendix II for summary statistics.

Stylized facts

Overall, the data show that the share of women on governing boards of both banks and banking supervision agencies is low. In particular:

- *Women hold less than 20 percent of bank board seats and account for less than 2 percent of bank CEOs.* Only 15 banks out of almost 800 in 72 countries in our sample had women CEOs in 2013 (Table 1). Most of the banks with women CEOs were non-systemic.

[4] In the empirical exercises, we used 2003-2013 since there were few observations for 2001 and 2002.
[5] https://www.bis.org/regauth.htm?m=2%7C269.

Moreover, 82 percent of the observations in our sample have women representing 20 percent or less of board seats (Figure 1). Only 4 percent of observations have shares greater than 30 percent.

Recalling that our bank board sample is not necessarily representative of each country, we find the following patterns and trends among the banks included:

- *The representation of women on bank boards is low across geographical regions, country income levels, and types of banks, with the exception of savings banks* (Figure 2). Based on data for 2013, the highest share in the sample is for Sub-Saharan Africa, while the lowest is for Latin America and the Caribbean, with the advanced economies between these two extremes.[6] Among types of banks, the few observations on savings banks show that women's board participation averages more than 45 percent. For securities firms and investment banks, this portion was about 15 percent.

- *Board participation of women has been growing in many regions and in various types of banks* (Figure 2). In East Asia, the average representation rose from 2 percent in 2001 to 14 percent in 2013. In Europe and Central Asia, it went up from about 4 percent to 18 percent over the same period. The share in Latin America, in contrast, has not changed significantly. Across types of banks, in savings banks, which already had a higher share of women than other types of banks in 2001, it almost doubled.

- *The share of women on banking supervision boards is also low, about 17 percent on average in 2015, with the poorest countries exhibiting the highest shares*. It is interesting that there appears to be no relationship between the share of women on banking supervision boards and the country's (or the region's) level of income (Figures 3 and 4). For instance, Swaziland's and Israel's shares are above 60 percent, while the share in the United States is at 13 percent. Averages across quartiles of GDP per capita show that the poorest of countries have the highest shares. Regionally, Latin America stands out for having no women on banking supervision boards in 2015, except in Peru. Shares are less than 15 percent in most regions (Figure 5).

- *The share of women on boards of banking supervision agencies has declined since 2011, with the exception of the low-income and developing countries*. Across countries that have data for both 2011 and 2015, a comparison of regional averages reveals that the share of women fell overall and in most regions (Figure 6).

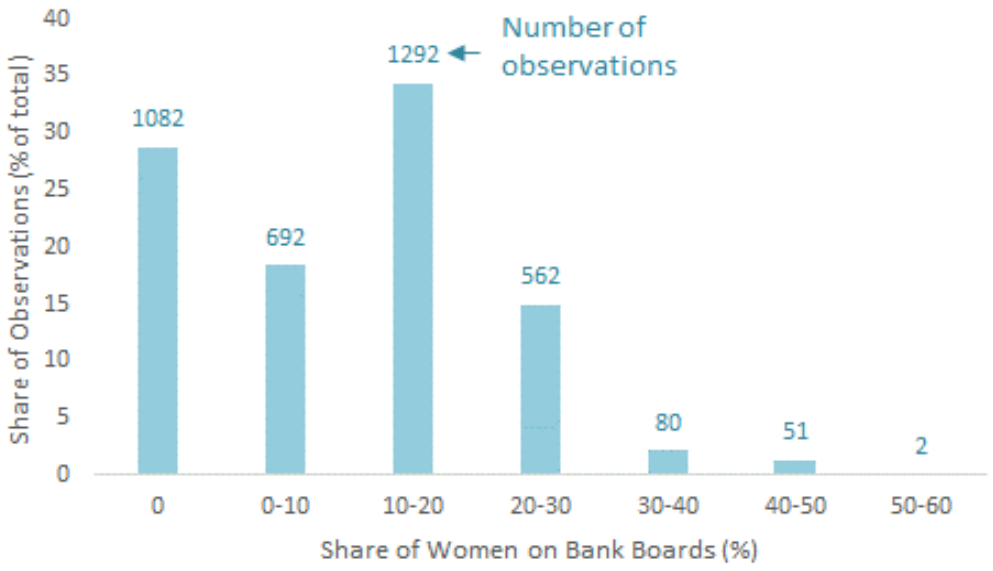
[6] Given the differences in data coverage, we would not interpret these stylized facts as fully representative of the respective regions.

Table 1. Banks with Women CEOs, 2013

Banks	Country	Total Assets/GDP
Westpac Banking Corporation	AUSTRALIA	43.08
Bank Leumi Le Israel BM	ISRAEL	37.00
Sydbank A/S	DENMARK	8.26
ICICI Bank Limited	INDIA	6.65
Bankinter SA	SPAIN	5.60
TISCO Financial Group PCL	THAILAND	2.83
Sparebank 1 Gruppen	NORWAY	1.63
KeyCorp	UNITED STATES OF AMERICA	0.55
Alliance Trust Plc	UNITED KINGDOM	0.25
Bancorp, Inc., The	UNITED STATES OF AMERICA	0.03
Community Trust Bancorp	UNITED STATES OF AMERICA	0.02
ESB Financial Corporation	UNITED STATES OF AMERICA	0.01
BankGuam Holding Company	UNITED STATES OF AMERICA	0.01
Heritage Oaks Bancorp	UNITED STATES OF AMERICA	0.01
Washington First Bank	UNITED STATES OF AMERICA	0.01

Sources: BoardEx; authors' calculations.
Note: See Appendix I for country-level statistics.

Figure 1. Share of Women on Boards of Directors of Banks: Distribution of Observations

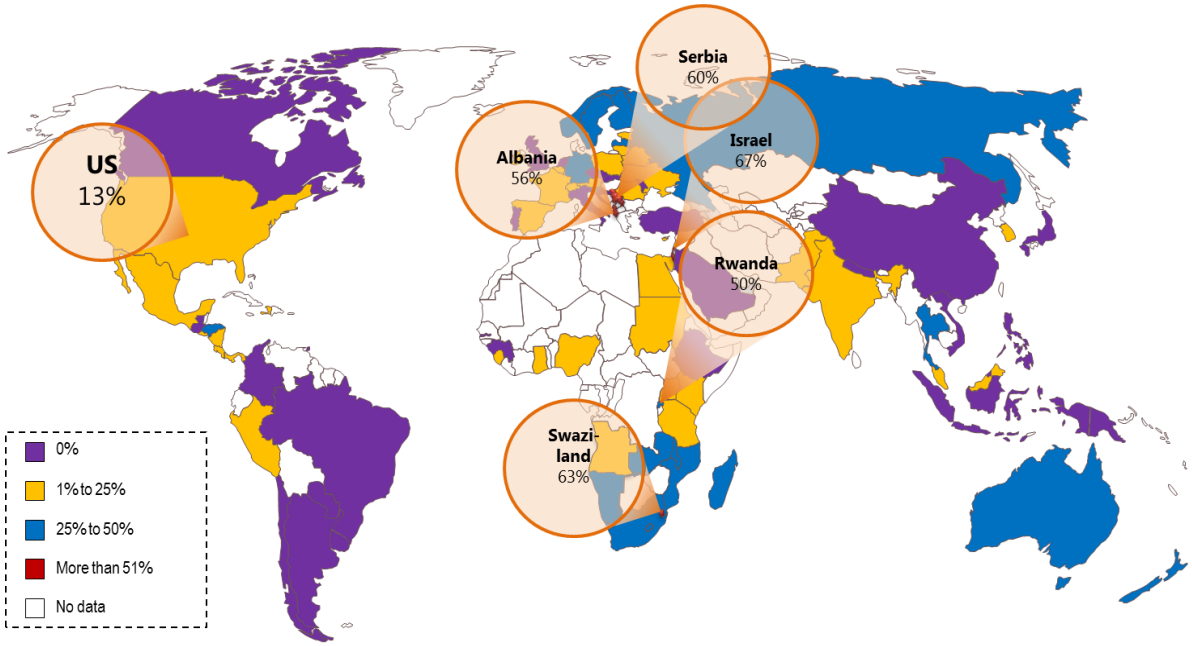


Sources: BoardEx; authors' calculations.
Note: Only observations on banks across time that also have the bank stability measure, z-score, are counted above.

Figure 2. Share of Women on Boards of Directors of Banks: By Region and Type
(in percent of total board members)

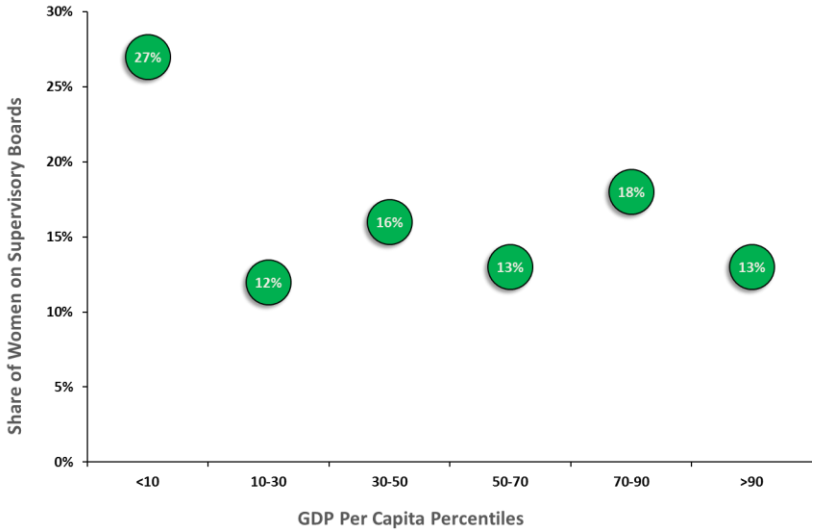
Sources: BoardEx; authors' calculations.
Note: See Appendix I and the accompanying data file for country-level statistics.

Figure 3. Share of Women in Banking Supervision Agencies, 2015 (in percent)



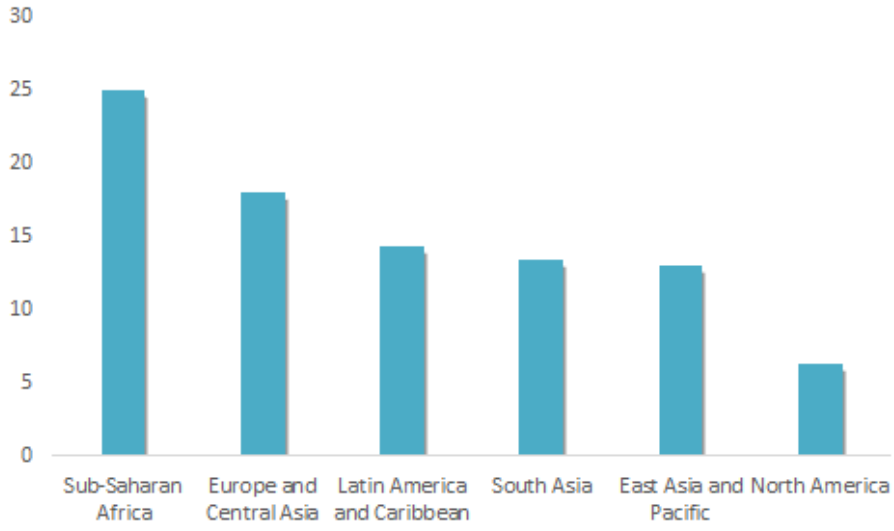
Sources: Various banking supervision agencies; authors' calculations.
Note: See Appendix II and the accompanying data file for country-level statistics.

Figure 4. Share of Women on Banking Supervision Boards—Average across Percentiles of GDP Per Capita, 2015



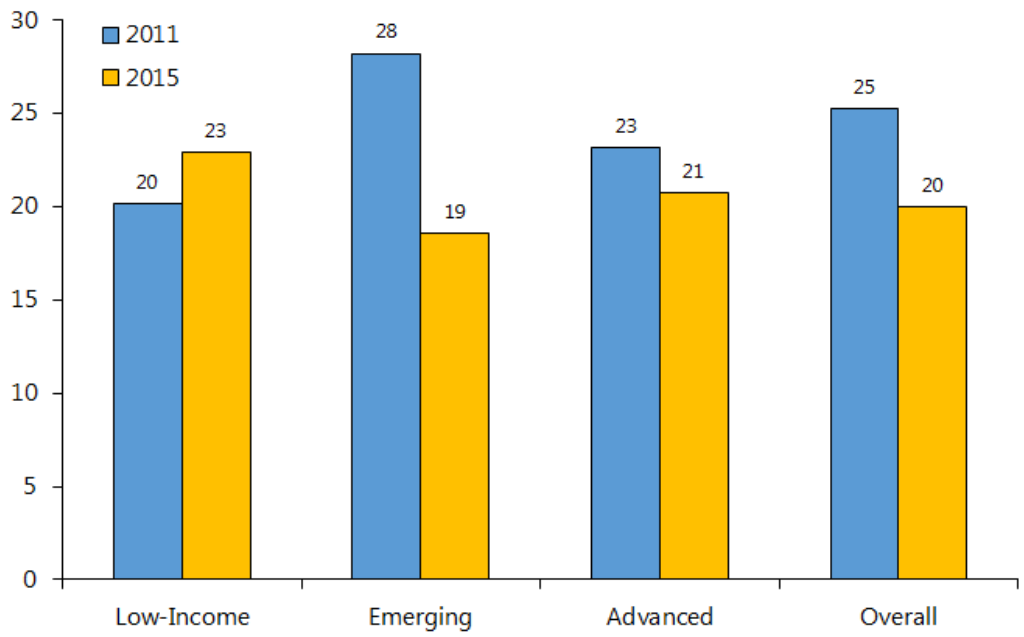
Sources: Various supervisory websites listed on https://www.bis.org/regauth.htm?m=2%7C269; International Financial Statistics, IMF; authors' calculations.
Note: See Appendix II and the accompanying data file for country-level statistics.

Figure 5. Share of Women on Banking Supervision Boards: Regional Averages, 2015
(in percent)



Sources: Various supervisory websites listed in https://www.bis.org/regauth.htm?m=2%7C269 for 2015; authors' calculations. See Appendix II and the accompanying data file for country-level statistics.

Figure 6. Share of Women on Banking Supervision Boards, Regional Averages, 2011 and 2015 (in percent)



Sources: Various supervisory websites listed on https://www.bis.org/regauth.htm?m=2%7C269 for 2015; Central Banking Publications (2011); and authors' calculations.
Note: See Appendix II and the accompanying data file for country-level statistics.

V. Econometric Methods and Results

A. Share of Women on Bank Boards and Bank Stability

To explore the relationship between the share of women on bank boards and bank stability, we estimated regressions that took the following form:

$$Z_{it} = \beta_0 + \beta_1 Share\ of\ Women_{it} + \beta_2 Controls_{it} + \varepsilon_{it} \quad (1)$$

As the dependent variable, we chose a bank stability outcome (Zit) given by the z-scores of bank i over year t. It consists of the sum of the book values of capital (capital/assets) and profit (return on assets) buffers scaled by volatility of returns (standard deviation of return on assets over the previous three years). A higher z-score implies higher buffers relative to volatility of earnings, and therefore, greater stability. The book-value z-score is calculated from balance sheet data from Bankscope. This is a standard measure used in the literature.[7] The sample is 2003–2013.

[7] See Čihák and others (2012), Demirguc-Kunt and Huizinga (2012), IMF (2014), Maechler, Mitra, and Worrell (2010), and Sahay and others (2015a) for recent examples.

There are other stability indicators that can be constructed with market-based data, such as the market value-based z-score, which other papers (IMF, 2014) have used. The market value-based z-score is the same as above, except that the value of the buffers and volatility of returns are calculated from the market price of equity. However, this would constrain our sample to the listed banks only and reduce the sample size to a third of that covered by the book value of z-scores. The exercise covering the boards of supervisory institutions (Section VI) also uses the book value of the z-scores to take advantage of its wider coverage. Therefore, we have limited the stability indicator to the book-value z-score.

Summary statistics of the z-score, shown in Table 2, provide a glimpse of its evolution over the years. The mean z-score increased through 2007 and then fell sharply during the 2008–2009 crisis, before increasing again. The mean z-score in banks with no women on the board of directors is lower than in banks with 20 percent of women on boards. Beyond a share of 20 percent, it is difficult to find a pattern, as the number of observations drops drastically. For example, only 50 banks have boards with 40–50 percent women, and only two have 50–60 percent.

TABLE 2. Z-SCORE SUMMARY STATISTICS: BY YEAR

Year	Bank stability measured by z-score	Number of observations
2003	89.5	1335
2004	89.2	1395
2005	93.5	1464
2006	98.1	1376
2007	107.2	1439
2008	78.8	1732
2009	72.5	2015
2010	73.8	2101
2011	86.4	2158
2012	96.7	2170
2013	54.2	1415

Sources: Boardex; authors' calculations.

To gain insight on the different components of the z-score, equation (1) above is re-estimated using return on assets, capital to assets, and volatility of profits as dependent variables. The impaired or the nonperforming loans (NPL) ratio is added to the list of dependent variables to find out if credit risk—considered the main risk in banking and a major component of bank health—is lower with a higher share of women on the board.

The independent variable of interest is share of women defined as a fraction of board members in the bank's board of directorsOther independent variables included are:

- Board characteristics*: board financial experience*—the effect of financial experience on stability–could go either way, but the analysis in IMF (2014) found that board members with financial experience are generally more comfortable with the bank taking more risk. This variable is measured by the average (across directors) of the fraction of individual directors' financial sector experience to their total professional experience. Other measures of board experience, such as the total time spent on the board by the directors, yielded similar results.

- Other board characteristics that were found to have a bearing on bank risk in IMF (2014) were also included: The IMF (2014) found that the independence of the board members from bank management (*board independence*) and the existence of a *risk committee* enhanced stability, whereas including the Chief Risk Officer *(CRO)* on the board and paying a higher fraction of the compensation of the board members as salary or fixed pay (in smaller banks) were seen to increase risk.

- Country- and bank-level controls*: log GDP per capita* (adjusted for purchasing power parity) to control for the level of economic development of the country; *growth in GDP* per capita to control for cyclical developments that can affect bank stability; bank size given by bank assets to GDP to control for the systemic importance of the bank in the country; the *NPL ratio* to control for the level of nonperforming loans as a share of total gross loans, which could explain differences in capital and profit buffers between banks; and *year-fixed effects* to control for common global cyclical characteristics, which could affect stability in a large number of banks. In some specifications, we added *year*country-fixed effects* to capture country time trends. See Appendix III, Table A3, for the definition of data and sources.

We tested for the relationship between the share of women and bank stability. We looked at pooled data and ran ordinary least squares (OLS) to take into account variations across observations (rather than just within banks and between banks) (Table 3). The pooled OLS controls for various bank-specific attributes, country-specific (and cyclical) characteristics, and in some specifications included year effects to control for common conditions (such as the global financial crisis) that could have affected the stability of all the banks in the sample within a year. Bank-fixed effects and year*country-fixed effects were also added in some specifications. Separate OLS regressions were estimated for 2008 and 2009 to see if banks with more women on bank boards fared differently during the crisis, controlling for other characteristics. Other regressions highlighted the differences in results for the whole sample vis-à-vis that for the 82 percent and 96 percent of the observations (Appendix III). A lagged z-score was added to take into account the persistence of this variable within a bank. All standard errors were clustered by bank.

Results

The estimation results show that boards with a higher share of women are associated with higher capital buffers (Table 3) and lower nonperforming loans (Table 4). Moreover, a greater share of women in banks was associated with higher z-scores (bank stability) in 2008. These results control for other board characteristics, bank size, country growth rates, and unobserved bank-level fixed effects.

There is a positive and statistically significant relationship between the share of women and the z-score (Table 3), which arose both when we ran pooled OLS regressions (first two columns) or included a separate intercept for each bank type (third column). The lagged dependent variable has a coefficient of around 0.7, suggesting a high level of persistence of the z-score. Part of the persistence could be due to omitted variables. With bank-fixed effects included, the coefficient representing the association between the share of women and the z-score continues to hold. Thus, there is evidence that banks with a higher share of women board members are generally more stable, and that an increase in the share of women is also associated with an increase in measured bank stability.

Among the board characteristics, a higher share of salary over total compensation and the presence of a risk committee are negatively associated with bank stability, which re-affirms the findings in IMF (2014). As expected, banks with a higher share of impaired or nonperforming loans in total loans are less stable; this finding is robust across specifications. Countries with higher growth rates tend to have to more stable banks.

With regard to the three components of the z-score—the capital-asset ratio, return on assets (ROA), and the volatility of ROA—pooled OLS regressions with separate intercepts for bank type show that the share of women on bank boards is associated with higher profitability and volatility, but not with higher capital ratios (Table 4). It seems then that higher profitability plays a key role in increasing the z-score; for a similar capital ratio and even with higher volatility, the measured buffers are greater. We also find that the share of women is negatively related to the nonperforming loan ratio, another indication that bank stability is greater. Similar results are obtained when introducing bank fixed effects.

The coefficient on the share of women can be interpreted as follows. Across the pooled OLS specifications in Table3 the coefficient remains in the 15–19 range for the first two columns. However, accounting for the lagged dependent variable, the "long-term" coefficient is around 55 [18.70/(1-0.66)] for column 1 and 46 for column 2. If the share of women were to increase by 10 percentage points (or 0.10), the z-score could improve by more than 5 standard deviations in profits, everything else being constant. To give a sense of the magnitude of improvement, it would be higher than the average yearly improvement of z-scores (4.4) before, and comparable to average improvements (8.1) since, the global financial crisis (Table 2).

Given the characteristics of our data, which contains an overwhelming majority of observations with small shares of women on bank boards, we undertook two additional exercises (robustness checks), in which we truncated the sample. In the first exercise, we took only 82 percent of the observations with, at most, 20 percent share of women. In the second exercise, we took 96 percent of the observations with, at most, 30 percent share of women (Appendix Tables A4 and A5). In the 82 percent cut of the data, the results also show that a greater share of women is positively and significantly associated with higher z-scores, after controlling for the same bank-specific and country-specific variables as in the full sample. The lagged dependent variable again has a coefficient of nearly 0.70, as shown in Table 3. Once bank-specific and country*year effects are added, the coefficient on the share of women remains positive and significant. In the 96 percent cut of the data, the coefficient remains positive, but loses significance across the same specifications. Coefficients on other variables are similar to the ones in Table 3.

Second, the above results might suggest that the presence of women on boards may be a distinguishing feature of these banks, independent of the precise share they occupy. Therefore, we also ran regressions in which the explanatory variable was a dummy variable for whether the board included at least one woman. The results also supported the positive relationship between the presence of women on boards and greater stability. All other characteristics equal, a bank with female representation on its board would have on average a greater z-score.

We also focused on the crisis years of 2008-09, in which the z-scores suffered their greatest reduction, particularly in 2008. We first ran cross-section regressions for each of the two years, and then pooled OLS over the two-year period. The cross-section regressions therefore focused on at differences between banks, and showed that banks with a greater share of women were more stable in 2008, after controlling for various bank-specific and country-specific characteristics (Table 5). The coefficient is still positive, but not statistically significant, for 2009. By taking the 2008–2009 observations together and using year-fixed effects, we show that banks with a higher share of women were more stable in 2008, a result that holds for the full sample, the U.S. banks only, and the bank holding companies only (Table 5, last three columns). This result is also maintained for specifications with the lagged-dependent variable (not shown).

Table 3. Association between the Share of Women on Bank Boards and Bank Stability
(Full Sample: 2003–2013)

	Dependent variable: bank specific z-score		
Explanatory Variables	(1)	(2)	(3)
Share of Women (lagged)	18.70***	14.87**	33.48***
	(4.222)	(4.652)	(8.883)
Board Independence (lagged)	6.022	3.221	17.64***
	(6.891)	(6.244)	(3.310)
Time in Board (lagged)	0.299***	0.224***	0.909***
	(0.0300)	(0.0399)	(0.0546)
CRO on Board (lagged)	2.367	1.537	-6.590**
	(2.923)	(2.765)	(2.319)
Risk Committee (lagged)	-4.044**	-5.044***	-17.13***
	(1.372)	(1.433)	(1.815)
Salary over Total Compensation (lagged)	-2.472	-3.798*	-22.56***
	(1.694)	(1.724)	(0.913)
Total Assets/GDP (bank-specific)	0.0507**	0.0227**	-0.0925
	(0.0179)	(0.00751)	(0.0956)
Log-Change in Real GDP per capita	145.8**	-34.15	
	(51.36)	(46.74)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.815***	-1.928***	-4.661***
	(0.408)	(0.364)	(0.0529)
Lagged Z-score	0.661***	0.679***	
	(0.0116)	(0.00830)	
Bank type fixed effects	No	No	Yes
Year fixed effects	No	Yes	No
Country * Year fixed effects	No	No	Yes
Method	Pooled OLS	Pooled OLS	Panel Fixed Effects
Standard errors	Clustered-Bank type	Clustered-Bank type	Clustered-Country
Observations	1,376	1,376	1,479
R-squared	0.512	0.542	0.193

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' estimates.

Table 4. Association between the Share of Women on Bank Boards and Bank Stability Components (Full Sample: 2003–2013)

	Return onAssets	*Volatility of Returns*	*Capital-to-Assets*	*Nonperforming Loan-to-Gross*
Explanatory Variables	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Share of Women (lagged)	0.488*** (0.0831)	0.569*** (0.0628)	1.291 (1.309)	-2.827*** (0.322)
Board Independence (lagged)	-0.470*** (0.0682)	-0.318* (0.161)	-0.469 (0.433)	-2.435*** (0.496)
Time in Board (lagged)	0.0195*** (0.00117)	0.00537*** (0.00112)	-0.0368*** (0.00779)	-0.0710*** (0.00251)
CRO on Board (lagged)	-0.111 (0.102)	0.237*** (0.0694)	0.109 (0.135)	1.081*** (0.206)
Risk Committee (lagged)	-0.0398* (0.0208)	0.0627** (0.0241)	-0.0913 (0.122)	0.0197 (0.0516)
Salary over Total Compensation (lagged)	-0.274*** (0.0659)	0.659*** (0.0318)	0.142 (0.338)	2.703*** (0.241)
Total Assets/GDP (bank-specific)	-0.00309* (0.00174)	0.00253 (0.00153)	-0.00528 (0.0117)	0.00545 (0.00532)
Log-Change in Real GDP per capita				
ImpairedLoansoverGrossLoans (bank-specific)	-0.181*** (0.0101)	0.258*** (0.0104)	-0.162*** (0.0204)	
Lagged dependent variable				
Constant				
Bank type fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No
Country * Year fixed effects	Yes	Yes	Yes	Yes
Method	Panel Fixed Effects	Panel Fixed Effects	Panel Fixed Effects	Panel Fixed Effects
Standard errors	Clustered-Country	Clustered-Country	Clustered-Country	Clustered-Country
Observations	1,479	1,448	1,367	1,479
R-squared	0.422	0.622	0.296	0.349

*** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' estimates.

Robustness

Subsamples

Tests for robustness include looking at a more homogenous sample of banks and focusing on the U.S. to reduce the possibility that results are driven by outliers. Indeed, results on the z-scores, found in Table 3, continue to hold for the set of U.S. banks (Appendix III, Table A6, column 1). Results are also similar if only the sample of commercial banks and bank holding companies are taken (Appendix III, Table A6, column 2). In both cases, while the coefficient for the share of women is similar in magnitude to that derived in Table 3 (and Appendix III, Tables A4 and A5), it is small and not significant.

Addressing selection bias

Gender balance in the boardroom could be endogenous in stability regressions for reasons noted in Section III—the same good management practices that result in better financial stability outcomes could have been responsible for better human resource management and, therefore, greater gender balance on boards. Thus, there is the possibility of selection bias.

We tried to address selection bias using "nearest neighbor matching" and "propensity score matching" methods (Abadie and Imbens, 2011). We used propensity score matching to estimate the probability of having a perfectly gender-diverse board--with 50 percent women—based on observable characteristics such as bank size and financial experience of the board. Using these probabilities, or propensity scores, we constructed a statistical control group with similar characteristics, but for a board with no women on it.

We then calculated an average treatment effect as the mean difference of the stability outcomes across the "perfectly gender balanced board" (50-50 group) with the "no female" board (0-100 group). Ideally, one would also like to compare outcomes of a 100-0 (women-only) group with 50-50 and 0-100 ones, but there are no banks in the sample with women-only boards, and only two banks with 40-60. Across the sample of banks, less than 40 banks (out of some 800 banks in our sample) are in the 50-50 group. It is important to note that this is a stylized exercise given the few observations available.

Controlling for selection bias using various metrics for matching, we found that there is some evidence showing that boards with 50 percent share of women have a higher z-score than those with 0 percent women (Appendix III, Table A7). But the size and significance of these effects change with the method and the metric used for matching observations by the chosen variables.

Table 5. Association between the Share of Women on Bank Boards and Bank Stability
(2008 and 2009)

	Dependent variable: bank specific z-score				
			Interactive effect: 2008 * Share of Women		
Explanatory Variables	2008	2009	All	US sample	Bank holding co sample
Share of Women (lagged)	73.84*** (15.91)	6.582 (22.97)	27.61** (11.71)	41.24*** (7.865)	45.32*** (2.730)
Board Independence (lagged)	19.10** (5.616)	45.89** (14.84)	18.91*** (2.647)	18.40*** (1.240)	20.85*** (2.431)
Time in Board (lagged)	0.127 (0.322)	0.256 (0.182)	0.905*** (0.0572)	0.779*** (0.0414)	0.857*** (0.0233)
CRO on Board (lagged)	-2.549 (3.392)	1.691 (5.426)	-4.570 (2.802)	-4.951*** (0.551)	-2.852 (2.582)
Risk Committee (lagged)	-7.606 (7.332)	-16.24* (6.911)	-16.30*** (2.469)	-18.26*** (1.492)	-19.42*** (0.464)
Salary over Total Compensation (lagged)	8.025 (9.107)	-28.91*** (3.314)	-21.37*** (1.461)	-25.03*** (1.037)	-24.47*** (0.898)
Total Assets/GDP (bank-specific)	-0.136*** (0.0238)	-0.00590 (0.0279)	-0.172** (0.0731)	-1.308*** (0.0154)	-0.734** (0.233)
Log-Change in Real GDP per capita	-59.45 (130.2)	102.9* (51.58)	-137.9* (76.98)	-	-405.9* (201.5)
ImpairedLoansoverGrossLoans (bank-specific)	-7.913*** (0.391)	-5.210*** (0.480)	-4.478*** (0.207)	-4.635*** (0.168)	-4.758*** (0.0478)
Year 2008			-48.23*** (3.446)	-29.45*** (0.399)	-49.29*** (9.694)
Year 2008 * Share of Women (lagged)			31.64*** (6.384)	32.59*** (6.787)	36.98*** (2.020)
Standard errors	clustered by bank type	clustered by bank type	clustered by country	clustered by bank type	clustered by country
Method	Cross-section with bank type FE	Cross-section with bank type FE	Pooled with time, country, bank type FE effects	Pooled with time and bank type FE	Pooled with time and country FE
Observations	140	181	1,531	1,275	1,308
R-squared	0.198	0.12	0.191	0.180	0.186

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's estimates.

B. Women on Supervisory Boards, Quality of Supervision, and Bank Stability

We tested whether a higher share of women on bank supervision boards is associated with a higher quality of supervision and overall banking stability. We ran two sets of OLS cross-

country regressions with robust standard errors. In the first set of regressions, we related the share of women directors on banking supervision boards to the quality of banking supervision. The second set looked at the relationship between the share of women directors and banking stability.

The first specification followed Čihák and Tieman (2008) to model cross-country variations in supervisory quality. The regressions were estimated for 2011, for which the largest number of countries could be covered with the dataset:

$$Y_{i,2011} = \beta_0 + \beta_1 ShWomen_{i,2011} + \beta_2 FIA_{i,2011} + \beta_3 KKM_{i,2011} + \beta_4 GDPPC_{i,2011} + \varepsilon_{i,2011} \qquad (2)$$

- Y_i are dependent variables capturing supervisory quality: (1) supervisory powers, *Suppow*, given to supervisors by existing laws, published for 2011 (Barth, Caprio, and Levine [BCL], 2013); (2) stringency in loan loss provisions, *prov* (BCL, 2013); (3) the quality of supervision measured by performance on Basel Core Principles (BCP); and (4) the set of BCPs related to financial inclusion, *BCP_fincl* (Sahay and others, 2015b).[8]

- The model includes as controls, *GDP per capita*, indexes for *financial institutions depth (FID)* and *financial institutions access (FIA)* to proxy for the features of development of the financial sector (Sahay and others, 2015a) being supervised, and governance indicators (*voice and accountability*, *regulatory quality*, *control of corruption*, and *rule of law*) available from the Kaufman, Kraay, and Mastruzzi (2010) database. See Appendix IV, Table 1, for details on data sources.

The estimation results of equation 2 with three different measures of supervisory quality are reported in Table 6.

In a second set of regressions we tested whether the share of women was associated with better bank stability outcomes, controlling for supervisory quality and other determinants of financial stability.

$$Z_{i,2011} = \beta_0 + \beta_1 ShWomen_{i,2011} + \beta_2 FIA_{i,2011} + \beta_3 KKM_{i,2011} + \beta_4 GDPPC_{i,2011} + \varepsilon_{i,2011} \qquad (3)$$

Z_i are country-specific bank stability outcomes given by z-scores. Here the z-score is calculated as the average for 2011–2013 to illustrate that the initial set of institutional conditions prevailing in 2011 could have a bearing on subsequent financial stability. $FIA_{i,2011}$is the Financial Institution Access for country *i* in year 2011, and $GDPPC_{i,2011}$ is

[8] According to the Basel Committee of Banking Supervision (BCBS, 2015), the core principles (CP) relevant for financial inclusion are: 1, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 18, 24, 25, and 29. The BCPs are assessed during the IMF-World Bank Financial Sector Assessment Programs (FSAPs) and have four ratings: Compliant, Partially Compliant, Materially Non-Compliant, and Non-Compliant. For the purpose of this paper, the ratings were scored as 4, 3, 2, and 1, respectively. Also see Sahay and others (2015b). Individual BCPs for various years for different countries are available on a confidential basis to IMF and World Bank staff and cannot be shared publicly with staff. Hence, only aggregate results are included in this paper.

the per capital GDP for country *i* in year 2011. To take into account cyclical conditions, the nonperforming loan ratio and the square of GDP growth are added in one of the specifications (Table 7).

Results

A higher share of women in boards of supervision agencies had no discernible impact on the quality of supervision. The coefficients on all four measures of supervisory quality (Suppow, Prov, BCP_fincl, and BCP) were not significant (Table 6).

The second set of regression results found that controlling for supervisory quality, the level of access and depth of financial institutions, and other governance indicators, a higher share of women was associated with greater banking sector stability. Moreover, adding a measure of economic stability (square of GDP growth) and the state of nonperforming loans (ratio) of the banking sector, the share of women seemed to still be positively associated with the z-score. The fit of the regressions, however, was not strong (Table 7).

In general, the data available on supervisory boards do not allow us to perform detailed analysis, as was the case for bank boards. Still, this paper has shed light on the role of women in bank regulation and supervision by providing some evidence on the relationship between the share of women on supervisory boards and banking sector stability, which needs to be further explored.

Table 6. Association between Supervisory Quality and the Share of Women on Supervisory Boards

	Dependent Variable			
	BCP	BCP_fincl	Suppow	Prov
Share of Women	1.21	0.63	1.07	0.51
GDPPC	0.00	0.00	0.00	-0.00
FIA	-0.91	-3.72	0.75	0.07
FID	-1.97	-9.82*	-0.19	-0.33
KKMvoa	0.1	0.22	0.40	-0.16
KKMreg	-1.43	-2.73	-0.01	-0.08
KKMcor	-0.45	-1.20	-0.37	0.30
KKMlaw	2.02	6.4	1.13	-0.04
KKMeff	-1.69	-5.22	-1.3*	-0.16
Constant	12.32***	40.2***	0.75	0.19
Number of Countries	57	57	45	35
R^2	0.53	0.44	0.20	0.12

Source: Authors' estimates.
Note: The table shows the results of estimations of equation 2 with four different measures of supervisory quality. See Table A8 in Appendix IV for the descriptions of the variables. "***", "**", and "*" denote statistical significance at 1, 5, and 10 percent, respectively.

Table 7. Association between the Z-Score and the Share of Women on Supervisory Boards

	Dependent Variable				
	z	z	z	z	z
Share of Women	11.8*	12.2*	14.1*	15.5*	24.5**
GDPPC		0.0001**	0.0002	0.0003***	
FIA		4.93	5.87	4.76	5.05
FID					-0.19
KKMreg		-3.71	-1.35	0.11	
KKMpol			-0.93	-1.04	
KKMcor			-0.72	-3.41	
KKMvoa			-1.78	0.29	
Supervisory quality					
BCP_fincl		-0.074	-0.69		
Suppow				7.8	
BCP					0.55
NPL ratio					-0.46
Square of GDP growth					-0.10**
Constant	13.7	12.3	10.82	-0.05	7.34
Number of Countries	58	57	57	51	46
R^2	0.04	0.09	0.11	0.18	0.18

Source: Authors' estimates.
Note: The table shows the results of estimations of equation 3 using different sets of explanatory variables. See Table A8 for explanations of the variables. "***", "**", and "*" denote statistical significance at 1, 5, and 10 percent, respectively.

VI. CONCLUSIONS

There are two main contributions of this paper. First, using new data, it documents stylized facts about the share of women leaders in finance; namely that it is low, despite some progress in the past decade. This holds for the share of women on the boards of directors of both banks and banking supervision agencies. Second, the paper provides new evidence of associations between the share of women on bank (and supervisory) boards and bank (and banking sector) stability.

The analysis found that a greater share of women on bank and banking supervision boards could be associated with greater bank stability. In particular, banks with a higher share of women were associated with higher capital buffers and lower NPL ratios. Moreover, banks

with a higher share of women were associated with higher z-scores in 2008. These results control for the size of banks, GDP per capita, experience of board members, and other board and country characteristics.

The share of women on supervisory agency boards, on the other hand, did not have a bearing on the quality of supervision. The analysis showed that, controlling for various governance indicators, levels of development of the financial sector, and GDP per capita, there was no significant relationship between the quality of supervision and the share of women on supervisory boards. Of course, in this area, the data are less detailed than that for banks. However, we did find that the share of women on supervisory boards had a positive association with overall bank z-scores, controlling for the supervisory quality, various institutional aspects, level of nonperforming loans, and economic stability. We recognize, however, that other factors may be at play. For example, it could be that a country with more women on supervisory boards might also have other well-functioning characteristics of the banking system that make them set aside larger buffers.

These analyses show that, in terms of financial stability, there are potential benefits to having more women taking leadership positions in financial governance. Further research will allow us to draw stronger causal links, discerning which of the possible hypotheses could be driving the results. One critical area would be to investigate what sets some banks or countries apart in their ability to place more women in leadership roles in finance. Greater insight in this area will help inform policies that strive to reap the potential stability benefits that this study has uncovered.

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Appendix I. Share of Women on Bank Boards: Country-Level Summary Statistics

Table A1. Total Size of Banks, Number of Banks, and the Average Share of Women on the Bank Boards, 2013 (in percent unless otherwise stated)

Country	Total Assets to GDP	Number of Banks	Share of Women (Mean)	Country	Total Assets to GDP	Number of Banks	Share of Women (Mean)
ARGENTINA	1.9	1	8.3	MEXICO	8.5	3	6.6
AUSTRALIA	204.9	10	25.3	MOROCCO	45.0	1	10.0
AUSTRIA	91.2	6	12.9	NETHERLANDS	14.4	6	16.2
BELGIUM	67.9	5	11.7	NIGERIA	33.2	9	23.0
CANADA	203.7	14	27.5	NORWAY	99.4	6	47.6
CHILE	29.9	2	0.0	OMAN	36.7	2	10.1
CHINA	30.4	6	9.1	PAKISTAN	2.4	1	0.0
COLOMBIA	17.8	1	0.0	PERU	NA	1	0.0
CYPRUS	232.1	2	8.4	PHILIPPINES	44.9	6	12.9
DENMARK	209.4	5	19.1	POLAND	12.8	2	6.7
EGYPT	9.6	2	11.3	PORTUGAL	128.7	5	7.9
FINLAND	5.9	2	46.5	QATAR	81.1	3	0.0
FRANCE	153.3	8	24.2	KOREA	47.0	3	5.6
GERMANY	83.8	7	11.7	RUSSIA	NA	3	14.8
GREECE	43.9	7	17.5	SAUDI ARABIA	9.0	2	0.0
HONG KONG	37.3	4	4.6	SINGAPORE	273.8	4	5.6
HUNGARY	36.3	1	0.0	SOUTH AFRICA	73.7	7	17.7
INDIA	15.9	15	10.6	SPAIN	209.6	6	15.8
INDONESIA	0.7	1	6.2	SRI LANKA	7.1	1	0.0
IRELAND	83.6	3	12.1	SWEDEN	347.0	5	36.8
ISRAEL	116.1	6	18.5	SWITZERLAND	376.3	11	10.4
ITALY	148.0	13	16.5	TAIWAN	231.0	15	5.5
JAPAN	59.7	23	2.7	THAILAND	58.4	4	17.8
KENYA	17.2	2	17.4	TOGO	516.8	1	16.7
LEBANON	123.4	2	14.2	TURKEY	57.1	8	12.1
LITHUANIA	4.5	1	23.1	UNITED ARAB EMIRATES	22.2	5	0.0
LUXEMBOURG	195.6	1	0.0	UNITED KINGDOM	281.5	45	18.8
MALAYSIA	36.0	5	4.2	UNITED STATES	94.6	426	12.0
MALTA	102.7	1	0.0	VIETNAM	4.6	1	10.0
MAURITIUS	31.0	1	9.1				

Sources: Boardex; authors' calculations.

Table A2. Observations by Bank Type

Types of Banks	Number of Bank-Year Observations 2001–2013
Securities Firms	80
Investment and Trusts	177
Investment Banks	280
Real Estate and Mortgage Banks	182
Cooperative Banks	85
Private Banking and Asset	48
Commercial Banks	1135
Savings Banks	39
Bank Holding Companies	4836

Sources: Boardex; authors' calculations.

Appendix II. Share of Women in Banking Supervision Agencies, 2011 and 2015

(in percent)

Country	2011	2015	Country	2011	2015
Albania	20.0	55.6	Lithuania	77.8	20.0
Angola	50.0	16.7	Luxembourg	46.2	0.0
Armenia	10.0	0.0	Madagascar	18.2	50.0
Australia	11.5	33.3	Malawi	0.0	27.3
Austria	10.0	25.0	Malaysia	50.0	25.0
Bahamas, The	25.0	20.0	Maldives	33.3	42.9
Bahrain	8.3	0.0	Malta	0.0	12.5
Belgium	10.5	12.5	Mexico	33.3	15.4
Belize	60.0	37.5	Mozambique	25.0	28.6
Botswana	50.0	28.6	Namibia	25.0	50.0
Bulgaria	20.0	28.6	Nepal	0.0	0.0
Canada	28.6	0.0	Netherlands	9.1	0.0
Colombia	33.3	0.0	New Zealand	20.0	42.9
Costa Rica	20.0	20.0	Nicaragua	33.3	22.2
Croatia	42.9	0.0	Norway	25.0	40.0
Cyprus	25.0	14.3	Pakistan	11.1	10.0
Denmark	25.0	28.6	Peru	16.7	18.8
Egypt	8.3	14.3	Philippines	37.5	0.0
El Salvador	11.1	23.1	Poland	27.3	14.3
Estonia	10.0	16.7	Portugal	33.3	0.0
Finland	62.5	40.0	Romania	11.1	11.1
France	9.1	9.1	Russian Federation	0.0	36.4
Germany	8.3	40.0	Serbia	60.0	60.0
Ghana	35.3	23.1	Sierra Leone	30.0	16.7
Guatemala	25.0	0.0	Slovak Republic	36.8	0.0
Honduras	42.9	33.3	South Africa	20.0	26.7
Hong Kong SAR	10.7	29.4	Spain	14.3	12.5
India	20.0	11.8	Sri Lanka	37.5	0.0
Indonesia	22.2	0.0	Switzerland	12.0	18.2
Ireland	9.5	18.2	Thailand	53.8	42.9
Israel	14.3	66.7	Trinidad and Tobago	44.4	0.0
Jamaica	60.0	25.0	Uganda	16.7	12.5
Kenya	0.0	15.4	Ukraine	20.0	20.0
Korea	7.7	7.7	United Kingdom	16.7	20.0
Kuwait	16.7	0.0	United States	37.5	12.5
Latvia	53.3	40.0	Uruguay	25.0	0.0
Lebanon	5.9	14.3			

Sources: Central Banking Publications, 2011; various bank supervisory agencies, 2015; authors' calculations.
Notes: The table shows the countries for which data are available for both years. The full list of countries in each year is longer and is available on request.

Appendix III. Bank Boards and Bank Stability: Data Sources and Additional Results

Table A3. Variables Used in the Empirical Analysis

Indicator Name	Description	Data Source
Dependent variables		
Balance sheet z-score[1]	Same as above, but calculated using balance sheet data. Sign switched so that higher values mean higher risk.	Bankscope
Change in NPLs	Change in nonperforming loan ratio (in percent)	Bankscope
Daily Equity return volatility	Higher values mean higher risk.	Thomson Reuters Datastream
Weekly Equity return volatility	Higher values mean higher risk.	Thomson Reuters Datastream
Explanatory variable		
Share of women	The share of women directors on bank boards	BoardEx
Controls		
Financial experience	Average of independent board members' financial experience as a share of their total professional experiences	BoardEx
Board experience	Total number of years of all the board members spent on the board	BoardEx
Board independence	Share of independent board members	BoardEx
Chief Risk Officer (CRO) on board	Dummy=1 if the CRO is a board member.	BoardEx

Table A3. Variables Used in the Empirical Analysis (continued)

Indicator Name	Description	Data Source
Risk committee	Dummy=1 if there is a board risk committee.	BoardEx
Salary	Share of salary in total CEO compensation	BoardEx
Total bank assets	Total bank assets to GDP	Bankscope; IMF World Economic Outlook (WEO) database
Log GDP per capita (adjusted for purchasing power parity)	Log GDP per capita (adjusted for purchasing power parity)	WEO database

Table A4. Association between the Share of Women on Bank Boards and Bank Stability When the Share of Women Is 20 Percent or Less
(82 percent of observations, 2003–2013)

	Dependent variable: Bank-Specific Z-score			
	Share of Women<=20%	Share of Women<=20%	Share of Women<=20%	Share of Women<=20%
Explanatory Variables	(1)	(2)	(3)	(4)
Share of Women (lagged)	29.73*	27.92*	58.00	80.33**
	(16.44)	(16.18)	(35.87)	(37.88)
Board Independence (lagged)	0.109	-2.796	41.24**	44.47**
	(6.288)	(6.045)	(20.90)	(22.06)
Time in Board (lagged)	0.405	0.351	1.014	0.914
	(0.297)	(0.291)	(1.250)	(1.298)
CRO on Board (lagged)	2.945	0.582	-3.304	-3.011
	(4.341)	(4.138)	(13.84)	(14.60)
Risk Committee (lagged)	-3.849*	-4.629**	0.169	-0.320
	(2.240)	(2.285)	(4.143)	(4.286)
Salary over Total Compensation (lagged)	0.0737	-0.836	-4.320	-5.213
	(4.117)	(4.074)	(8.034)	(8.946)
Total Assets/GDP (bank-specific)	0.0228	-0.00230	-0.406	0.280
	(0.0232)	(0.0190)	(0.379)	(0.469)
Log-Change in Real GDP per capita	134.9**	13.86	-130.0	
	(65.28)	(63.41)	(129.7)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.466***	-1.592***	-2.999***	-2.981***
	(0.374)	(0.361)	(0.726)	(0.856)
Lagged Z-score	0.650***	0.661***		
	(0.0337)	(0.0328)		
Constant	10.82*	23.23***	20.05	
	(5.557)	(7.850)	(19.83)	
Bank fixed effects	No	No	Yes	Yes
Year fixed effects	No	Yes	Yes	No
Country * Year fixed effects	No	No	No	Yes
Method	Pooled OLS	Pooled OLS	Panel Fixed Effects	Panel Fixed Effects
Standard errors	Clustered-Bank	Clustered-Bank	Clustered-Bank	Clustered-Bank
Observations	1,051	1,051	1,183	1,063
R-squared	0.511	0.533	0.162	0.597

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table A5. Association between the Share of Women on Bank Boards and Bank Stability When Share of Women Is 30 Percent or Less
(96 percent of observations, 2003–2013)

	Dependent variable: Bank-Specific Z-score			
Explanatory Variables	Share of Women<=30% (1)	Share of Women<=30% (2)	Share of Women<=30% (3)	Share of Women<=30% (4)
Share of Women (lagged)	23.93	21.45	-9.767	5.233
	(18.39)	(17.78)	(33.38)	(35.58)
Board Independence (lagged)	2.130	-0.468	12.05	15.33
	(6.397)	(5.974)	(22.69)	(24.19)
Time in Board (lagged)	0.347	0.267	0.881	1.033
	(0.269)	(0.259)	(1.203)	(1.242)
CRO on Board (lagged)	0.958	0.0806	-0.0328	-3.174
	(3.188)	(2.910)	(9.073)	(9.995)
Risk Committee (lagged)	-4.363**	-5.324**	-3.708	-3.586
	(2.112)	(2.068)	(5.063)	(5.450)
Salary over Total Compensation (lagged)	-2.871	-4.006	-10.20	-12.78
	(4.058)	(4.007)	(7.389)	(8.132)
Total Assets/GDP (bank-specific)	0.0452**	0.0194	-0.0984	0.276
	(0.0206)	(0.0184)	(0.231)	(0.411)
Log-Change in Real GDP per capita	161.4***	-5.038	-142.2	
	(59.17)	(55.60)	(103.5)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.404***	-1.531***	-2.621***	-2.648***
	(0.358)	(0.332)	(0.656)	(0.768)
Lagged Z-score	0.676***	0.691***		
	(0.0399)	(0.0408)		
Constant	9.920	23.50**	42.95**	
	(7.478)	(9.340)	(20.18)	
Bank fixed effects	No	No	Yes	Yes
Year fixed effects	No	Yes	Yes	No
Country * Year fixed effects	No	No	No	Yes
Method	Pooled OLS	Pooled OLS	Panel Fixed Effects	Panel Fixed Effects
Standard errors	Clustered-Bank	Clustered-Bank	Clustered-Bank	Clustered-Bank
Observations	1,320	1,320	1,472	1,344
R-squared	0.516	0.544	0.177	0.615

Robust standard errors in parentheses; *** p<0.01, ** p<0.05,
Source: Authors' estimates.

Table A6. Sub-Sample Robustness: U.S. and Commercial Banks

	Dependent variable: Bank-Specific Z-score			
	United States		Commercial Banks & Bank Holding	
Explanatory Variables	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects
Share of Women (lagged)	20.20	-17.73	22.54	-10.63
	(20.51)	(36.30)	(16.44)	(34.69)
Board Independence (lagged)	17.17	19.59	7.971	18.13
	(11.20)	(24.80)	(6.988)	(23.91)
Time in Board (lagged)	0.391	1.480	0.293	1.280
	(0.311)	(1.229)	(0.279)	(1.243)
CRO on Board (lagged)	5.994	-6.326	2.435	-4.606
	(4.573)	(11.20)	(3.422)	(10.71)
Risk Committee (lagged)	-5.550**	-6.494	-5.132**	-7.721
	(2.446)	(5.777)	(2.169)	(5.802)
Salary over Total Compensation (lagged)	-3.801	-10.32	-3.933	-11.66
	(4.873)	(7.881)	(4.214)	(7.902)
Total Assets/GDP (bank-specific)	-0.111	-4.513	0.0606**	0.0727
	(0.237)	(6.500)	(0.0266)	(0.485)
Log-Change in Real GDP per capita	197.6***		158.1**	
	(73.36)		(60.99)	
ImpairedLoansoverGrossLoans (bank-specific)	-2.205***	-3.512***	-1.830***	-3.665***
	(0.527)	(0.872)	(0.436)	(0.889)
Lagged Z-score	0.654***		0.656***	
	(0.0423)		(0.0409)	
Constant	1.043		8.896	
	(11.21)		(8.044)	
Bank fixed effects	No	Yes	No	Yes
Year fixed effects	No	No	No	No
Country * Year fixed effects	No	Yes	No	Yes
Standard errors	Clustered-Bank	Clustered-Bank	Clustered-Bank	Clustered-Bank
Observations	1,161	1,218	1,242	1,329
R-squared	0.514	0.602	0.528	0.606

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' estimates.

Table A7. Bank Stability in Perfectly Gender-Balanced Boards versus None: Nearest Neighbor Matching Average Treatment Effects

	(1) Z-score	(2) Z-score	(3) Z-score
Average Treatment Effect of 50 percent women boards versus 0 percent women boards	10.54	43.98**	18.07**
	(14.62)	(20.73)	(6.55)
Observations	426	426	835
Matching variables	Time in Board, Financial Experience, Nationality Mix, CRO on Board	Time in Board, Board Independence, CRO on Board, Risk Committee, Salary over Total Compensation, Asset/GDP	Time in Board, Financial Experience, Nationality Mix, Asset/GDP
Metric for matching	Propensity Scores based on Logit model	Mahalanobis distance	Mahalanobis distance

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' estimates.
Notes: Nearest neighbor matching used to find the average treatment effects. Different metrics used for matching. The logit regressions in the first stage in column (1) are based on time on board, financial experience of the board members, nationality mix, and CRO on board of the banks.

Appendix IV. Share of Women in Supervisory Agencies and Bank Stability: Data Sources

Table A8. Data and Sources

Variables			Source
Dependent variables (in logs)			
y: Quality of supervision measured by performance on overall Basel Core Principles (CP) and those relevant for financial inclusion (BCBS, 2015) (4=Compliant; 3=Partially compliant; 2=Materially non-compliant; 1=Not compliant)			Various FSAPs (Confidential information)
	CP1	Responsibilities, objectives and powers	
	CP 3	Cooperation and collaboration	
	CP4	Permissible activities	
	CP5	Licensing criteria	
	CP 8	Supervisory approach	
	CP 9	Supervisory techniques and tools	
	CP 10	Supervisory reporting	
	CP 11	Corrective and sanctioning powers of the supervisors	
	[CP 14]	Corporate governance (not included in the exercise due to lack of data)	
	CP 15	Risk management process	
	CP 16	Capital adequacy	
	CP 17	Credit risk	
	CP 18	Problem assets, provisions, and reserves	
	CP 24	Liquidity risk	
	CP 25	Operational risk	
	CP 29	Abuse of financial services	
	BCP_fincl	Aggregate scores on the 15 CPs (sum of scores)	
Quality of banking regulation, based on surveys, 2011 (0-1; 1=Best; 0=Worst)			Barth, Caprio and Levine (2013) dataset http://www.globalbanking.org/globalbanking.taf?section=data-set
	Suppow	Supervisory powers, with authority to take actions and correct problems, 2011	Scores on survey question V.I
	Prov	Stringency in loan-loss provisioning, 2011	Scores on survey question V.VIII
z	Z-score	Book value of Returns-on-Assets (ROA) + Equity/Assets)/std dev (ROA)	Global Financial Developments Database, World Bank http://data.worldbank.org/data-catalog/global-financial-development
Explanatory variable			
ShareofWomen (0-100 percent)	Share of women in supervisory agency boards, 2011		Central Banking Publications, 2011
Controls			
GDPPC	GDP per capita		GDP per capita PPP, World Development Indicators, World Bank
FIA	Financial Institution Access index (FIA), 2011		Sahay and others (2015a)
FID	Financial Institution Depth index (FID), 2011		Sahay and others (2015a)
KKMx (-2.5=weak to 2.5=strong governance performance)	Governance indicators, 2011		Kaufman, Kraay, Mastruzzi (2010) database www.govindicators.org
	Voice and Accountability (voa)		
	Political Stability and Absence of Violence/Terrorism (pol)		
	Government Effectiveness (gov)		
	Regulatory Quality (reg)		
	Rule of Law (law)		
	Control of Corruption (cor)		

Note: FSAPs refer to the Financial Sector Assessment Program, see http://www.imf.org/external/NP/fsap/fsap.aspx for more information.

Source: Authors' estimates.