

IMF STAFF DISCUSSION NOTE

# Women in Finance: A Case for Closing Gaps

Ratna Sahay, Martin Čihák, and other IMF Staff

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## Women in Finance: A Case for Closing Gaps

Monetary and Capital Markets Department  
with inputs from other departments<sup>1</sup>

Prepared by Ratna Sahay, Martin Čihák, and other IMF Staff

Authorized for distribution by Tobias Adrian

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## EXECUTIVE SUMMARY

This study analyzes the intersection of gender and finance, examining women's roles not only as users of financial services but also as leaders in financial institutions and financial supervision agencies.

Gender gaps persist in access to and the use of finance. Financial inclusion is a major challenge regardless of gender, and efforts are needed to address it for the entire population. Nonetheless, the global gender gap is very persistent, meaning that women still account for the majority of the financially excluded worldwide, and gaps remain very large in some regions. While financial inclusion is an important goal in itself, new evidence suggests that greater inclusion of women as users of financial services has generally positive macroeconomic outcomes as well. Greater access to and use of accounts for financial transactions, savings, and insurance can help increase long-term macroeconomic growth. In line with results observed for financial inclusion more broadly, the marginal benefits for economic growth wane as financial depth increases, and the evidence suggests that there are potential risks when borrowing grows without supervisory safeguards.

The paper studies the large gaps between the representation of men and women in leadership positions in banks and in banking-supervision agencies worldwide. It finds that, shockingly, women accounted for less than 2 percent of financial institutions' chief executive officers and less than 20 percent of executive board members. Contrary to common perceptions, many low- and middle-income countries have a higher share of women on bank boards and banking-supervision agency boards compared with 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 appears associated with greater financial resilience. This study also finds that a higher share of women on boards of banking-supervision agencies is associated with greater bank stability. This evidence strengthens the case for closing the gender gaps in leadership positions in finance.

Further research is needed on the causal links, to identify specific mechanisms through which these stability benefits are achieved, and to understand the conditions that have facilitated or hindered the entry of women into leadership roles in banks and supervision agencies.

This note underscores the need for better data to monitor gender gaps in finance. Improved measurement will help researchers better understand the drivers of these gaps and their effects on financial stability and other variables. It will also help in better designing policies to address those gaps.

## INTRODUCTION

**1. There are several dimensions to examining women’s roles in finance.** This note focuses on three roles—as users of financial services, as leaders in the sector providing financial services, and as financial sector regulators and supervisors. Table 1 captures the three dimensions schematically.

**Table 1. Women’s Roles in Finance**

Role	Use	Provision	Regulation
<b>Definition of inclusion?</b>	Traditional definition (“access to and use of financial services”)	Equitable access to leadership roles (board members, chief executive officers)	Equitable access to leadership roles as regulators and supervisors
<b>Gaps documented?</b>	Demand-side surveys for 2011, 2014, and 2017; first supply-side data published in 2018	Less well documented	Not well documented
<b>Effects quantified?</b>	Estimates by Sahay and others (2015) updated and expanded here	Sahay and others (2017), updated and expanded here	Sahay and others (2017), updated and expanded here

Source: Authors.

**2. Gender gaps persist in access to and in the use of financial services.** Financial inclusion is a major challenge regardless of gender, and efforts are needed to address it for the entire population. This said, sizeable gaps remain between women’s and men’s financial inclusion. For example, the latest data from the 2017 Global Findex survey (<https://globalfindex.worldbank.org/>) indicate that, of the 1.7 billion of unbanked adults globally, 56 percent are women, and in developing economies, women remain 9 percentage points more likely to be unbanked than men. Data from the IMF’s annual Financial Access Survey, discussed in more detail next section, show that the average share of female depositors and borrowers in 2016 was around 40 percent. Underlying these global numbers is a large regional variation, whereby gender gaps are small in some regions but sizeable in others.

**3. Compared with the available talent pool, women’s share in leadership positions in finance is low.** Women hold less than 20 percent of board seats of banks and banking-supervision agencies worldwide. More starkly, women represent less than 2 percent of bank chief executive officers (CEOs). This contrasts sharply with the supply of women with relevant degrees. For example, women represent about 30 percent of economics graduates and about 50 percent of graduates in business and the social sciences (Credit Suisse 2014). These shares vary across countries, but the finding that women leaders in finance account for a disproportionately low share of the available talent pool is universal.

**4. There is growing evidence of a “glass ceiling” in finance, but the impact on financial-sector performance is not well studied. The present study provides new evidence.** The existing research 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 study puts together a comprehensive data set on the banking sector, its characteristics, and its performance, as well as on the share of women on the boards of directors, covering 72 countries from 2001 to 2013. The paper also presents a new data set on the share of women on banking-supervision agency boards across 115 countries from 1999 to 2017 to explore a new question: is the share of women on banking-supervision agency boards associated with banking outcomes, such as stability?

**5. Using data that have only recently become available from the IMF’s Financial Access Survey, and compiling comprehensive data sets from new sources, this paper presents four main findings.** First, in addition to the low shares of women leaders in banking, this study finds that there is a fair degree of heterogeneity across bank types. The share of women on bank boards is relatively higher in savings banks and lower in investment banks, bank holding companies, and securities firms. Second, contrary to common perceptions, the data show that many low- and middle-income countries have a higher share of women on bank boards and banking-supervision agency boards compared with advanced economies. Third, the paper presents new results suggesting that more women on bank boards are positively linked with bank stability, through higher capital buffers, controlling for other relevant factors. Higher shares of women on banking-supervision boards also appears to be associated with higher bank stability and higher profitability. Finally, greater inclusion of women as users, providers, and supervisors of financial services would have benefits beyond addressing gender inequality. Narrowing the gender gaps would foster greater stability and resilience in the banking system, enhance economic growth, and contribute to more effective monetary and fiscal policy.

**6. These findings reinforce the need to address inclusion and stability as part of an integrated policy approach.** As pointed out by Lagarde (2016), despite evidence of benefits to individuals and society as a whole, financial inclusion often proceeds on an isolated track—more social policy than macro policy. It is critical to avoid such a “silo mentality.” Financial inclusion—including greater access to and use of financial services by women—is an integral part of inclusive growth strategies and should be closely integrated into macroeconomic and financial policies. When financial systems become more inclusive, they help broaden financial markets and can make monetary policy more effective. By bringing more sections of the population into the formal sector—such as including more women—tax and expenditure effects of fiscal policy can be broadened.

**7. There are some qualifications to the results presented in this paper.** While it explores qualitatively possible links to understand why bank stability might improve with a higher share of women on the boards of banks and banking-supervision agencies, it does not identify the precise channels through which bank stability is enhanced. In addition, given the paucity of the data on women leaders—more than 80 percent of observations of banks have less than 20 percent representation of women on their boards—statistical tests were able to provide only limited insights. Thus, this paper provides an initial exploration of the observable links, given the data constraints.

**8. The remainder of this paper is structured as follows.** The next section discusses women as users of financial services. The following section provides evidence on women as leaders in the

financial sector as bank board members and CEOs. The next section examines the role of women as financial-sector supervisors and regulators. The final section concludes the paper.

## WOMEN AS USERS OF FINANCIAL SERVICES

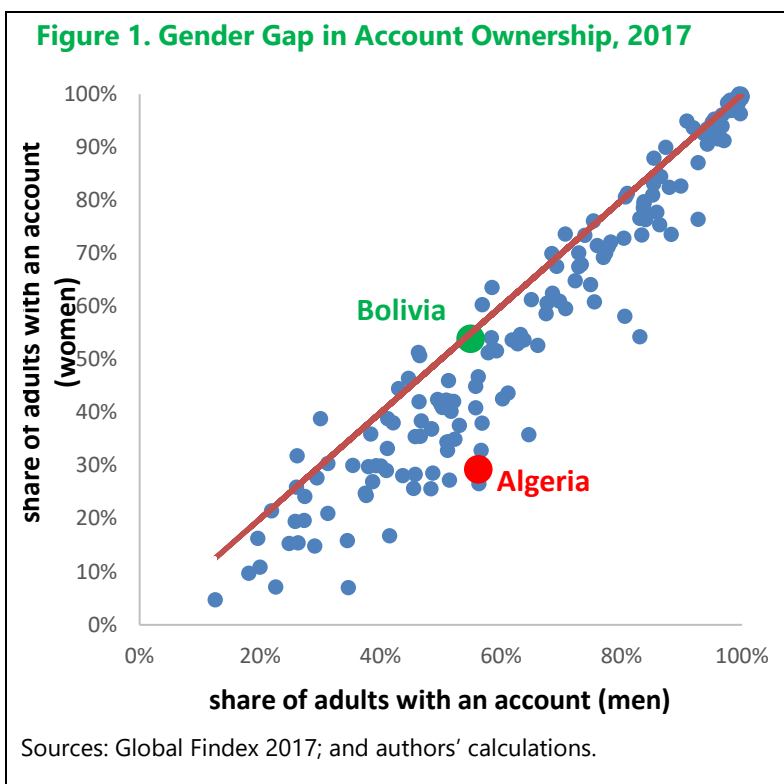
**9. Demand-side surveys suggest that, despite significant progress in some countries, global gender gaps in access to and use of financial services are closing slowly at best.** The World Bank's Global Findex survey shows that the gap in account ownership in developing economies has remained essentially unchanged at 9 percentage points from 2011 to 2017. Of the 1.7 billion unbanked adults, 56 percent are women. Within this aggregate picture, large variations occur across regions and countries. For example, the Middle East and North Africa region has the largest gender gaps: 52 percent of men in the region have an account, compared with only 35 percent of women. A comparison across countries reveals that, in

India, account ownership grew by 50 percent, and the gender gap fell from 20 percentage points to 6 percentage points in six years. Indonesia saw equitable growth in account ownership among men and women: the overall share of adults with an account grew from 20 percent in 2011 to 49 percent in 2017. But in Bangladesh, 65 percent of men have an account compared with only 36 percent of women, pulling down the overall account ownership rate to 50 percent. Similarly, in Algeria, 56 percent of men have an account but only 29 percent of women do, pulling the overall rate of account ownership down to 43 percent. In comparison, for example, Bolivia's account ownership rate is almost the same between men and women, at about 55 percent (Figure 1). And China, Colombia, India, Kenya, and Mexico show reduced gaps in the 2017 survey. For a further summary of the latest Global Findex survey results, see Demirgüç-Kunt and others (2018).

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**10. Recent studies based on the Global Findex survey shed light on the drivers of gender gaps.** In particular, Deléchat and others (2018) find that factors such as legal discrimination against women explain why women are less likely than men to have a bank account.

**11. Access to mobile phones and the internet holds promise for expanding financial inclusion, but gender gaps have remained.** According to the 2017 Gallup World Poll, 74 percent





of women in developing economies own a mobile phone, compared with 84 percent of men. Globally, 42 percent of adults (1.85 billion) have internet access, but the ratio is only 39 percent for women compared with 45 percent for men. In Bangladesh, Burkina Faso, India, Nigeria, Uzbekistan, and Zimbabwe, men are roughly twice as likely as women to have internet access. Reflecting these gaps, only 17 percent of developing economy women used a mobile phone or the internet to access an account in 2017, compared with 21 percent of men (Global Findex).

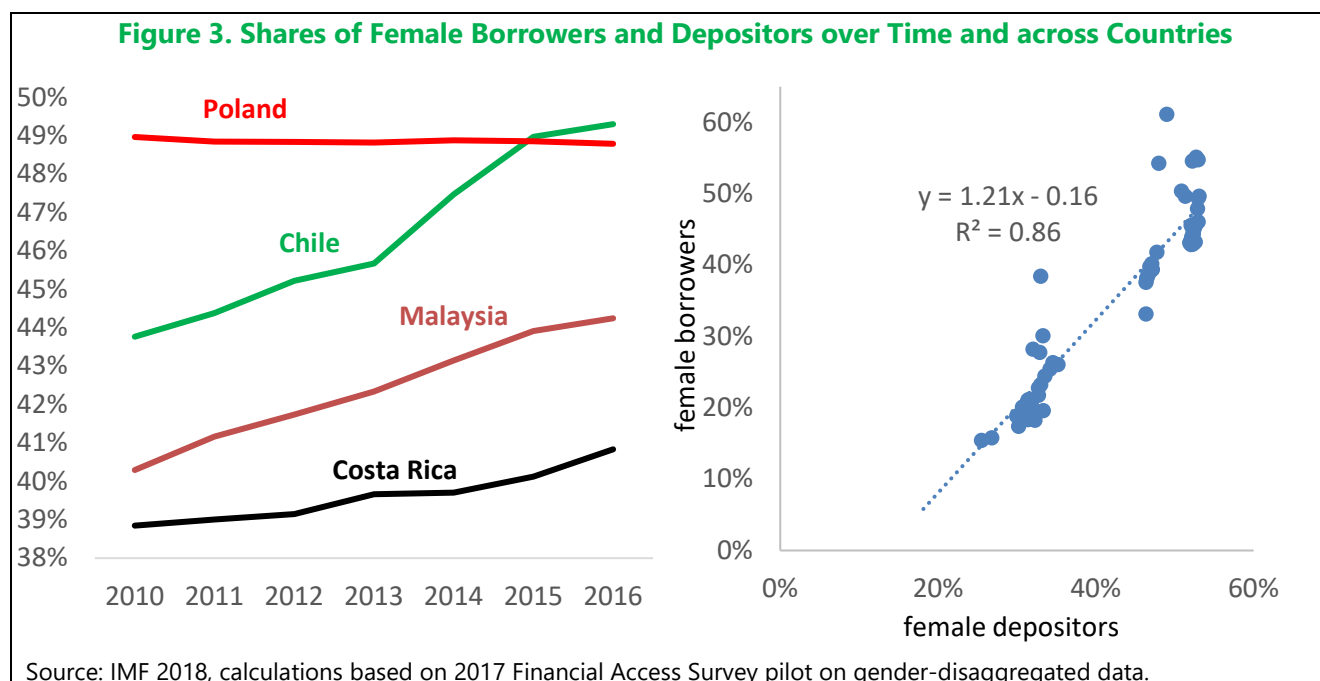
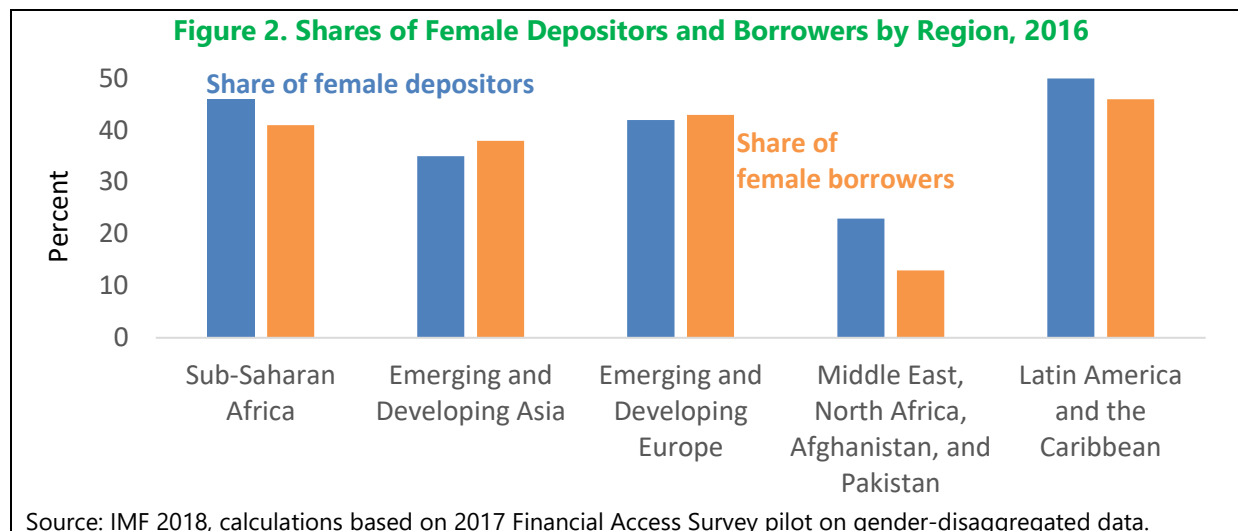
**12. The gender gap also means that accessing funds during an emergency is harder for women.** The 2017 Gallup World Poll/Global Findex show that women are 11 percentage points less likely than men to come up with emergency funds (equivalent to 1/20 of gross national per capita income).

**13. Supply-side data on women’s use of finance have become available only in 2018** (Annex I). As part of its commitment to support financial inclusion, the IMF publishes an annual Financial Access Survey, a high-quality financial inclusion database with a global reach. Unlike demand-side surveys, the data set is based on administrative sources—such as national central bank and other statistical authorities—and is derived from provider-side information. The 2016 Financial Access Survey included a pilot to capture the financial access gender data gap. The pilot, which included the participation of 28 countries, revealed that, in almost half of the participating economies, financial service providers had access to their customers’ gender information. An expanded pilot in 2017 invited *all* of the IMF’s country members to report the gender breakdown of their commercial banks’ depositors and borrowers. The results of the expanded pilot were published in March 2018 (IMF 2018). Gender disaggregated data has been mainstreamed in the Financial Access Survey in 2018, and the number of countries reporting gender disaggregated data has been rising over time.

**14. Two-thirds of the countries reporting gender-disaggregated data provided historical series, which bodes well for increasing awareness, performing analysis, and informing policymaking.** The results illustrate the increasing availability of data on gender-related financial access in the past four years. This trend may reflect awareness, in several countries, of gender inequality and the need to gather better data to inform policies that boost women’s economic participation (IMF 2018).

**15. The expanded pilot also highlighted variations in the financial access gender gap, which in turn could be useful in identifying factors for closing the gap.** While the average share of female depositors and borrowers for gender-disaggregated reporting countries in 2016 was about 40 percent, the data also revealed noticeable cross-country differences in levels (Figure 2). Differences also appear in country trends. For example, there is a steady closing of gender gaps in Chile and Malaysia from 2012 to 2016 (Figure 3, left panel). Initiatives such as Malaysia’s Women Entrepreneur Financing Program and Chile’s Simplified Deposit Accounts (requiring only a form of national identification to open an account) could explain the rapid closing of the gender gap (IMF 2018). The data also illustrate the linkages across access to different types of financial services; for example, the use of deposit accounts allows women to build a financial track record, which can

provide a helpful stepping stone in accessing other financial services, such as credit (Figure 3, right panel).



**16. Unfortunately, there are gaps between policy intentions and available data.** The survey of national financial inclusion strategies shows that as of the end of 2017, more than 60 countries have made public commitments to achieve headline financial inclusion objectives. These strategies typically encompass increasing access to and the use of financial services by women. However, authorities in less than half of the economies had collected gender-decomposed administrative data on financial services, reflecting a lack of data from financial service providers on their customers’

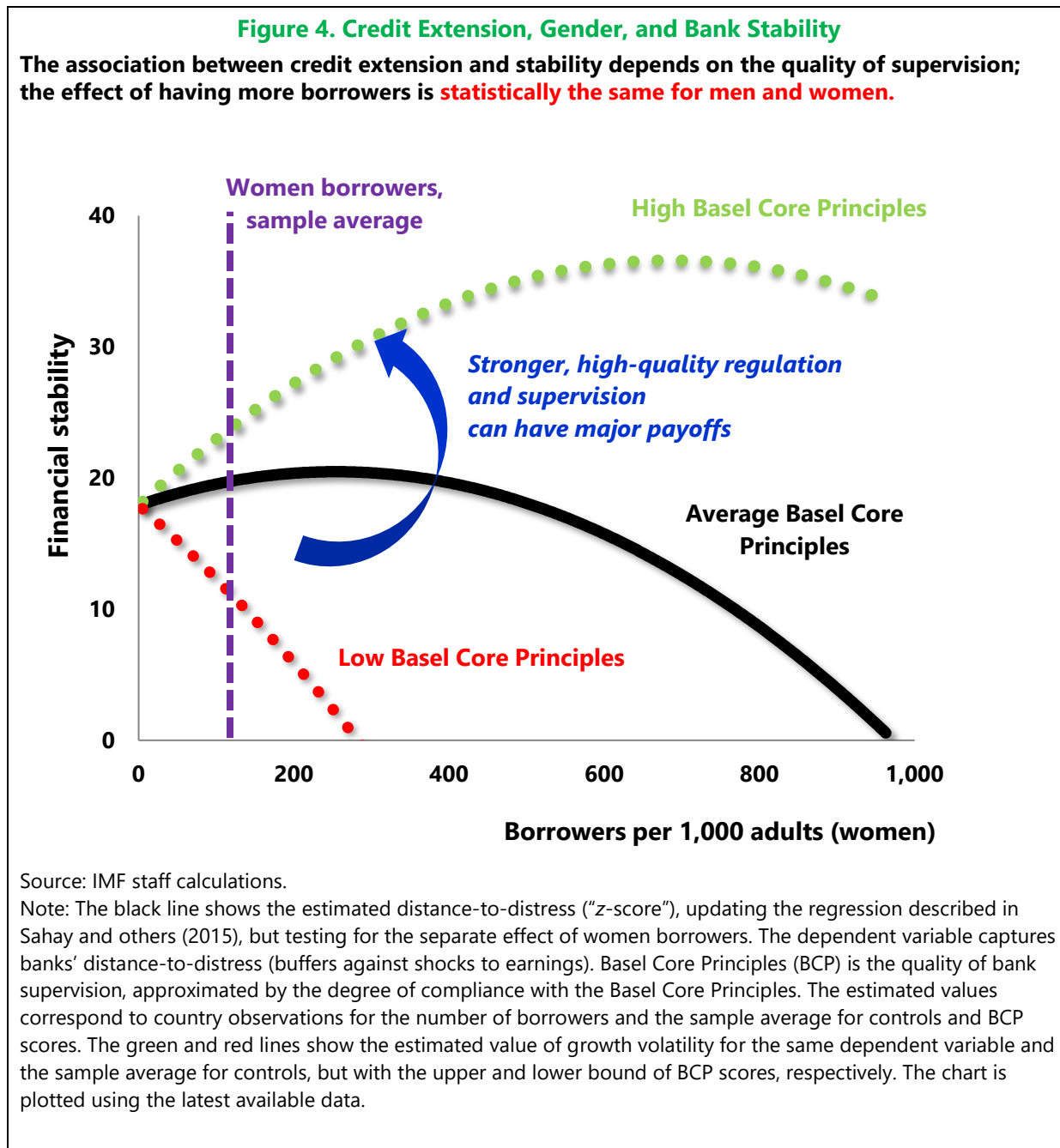
gender information. To some extent, demand-side surveys can fill in the gaps in administrative data and provide a complementary picture of the drivers of gender gaps.

**17. Turning to the effects of financial inclusion, at the micro level, there is growing evidence of benefits to increasing women’s access.** Mounting evidence shows that financially empowered women are more likely to improve their family’s welfare (Sanyal 2014). Financial services help women shape household spending decisions, make investments, and manage economic risk. Specifically, access to insurance helped women farmers in Burkina Faso and Senegal increase yields and better manage food security (Delavallade and others 2015). Women in the Philippines who used a savings account reported greater control over household decisions and increased spending on items they needed, such as washing machines and kitchen appliances (Ashraf, Karlan, and Yin 2009). In Kenya, women merchants who received a basic account invested more in their businesses (Dupas and Robinson 2013). Women-headed households in Nepal spent 20 percent more on education and 15 percent more on meat and fish after receiving a savings account (Prina 2015). More broadly, surveys of the micro literature suggest that women’s financial inclusion might enhance the growth-promoting potential of finance, help reduce income inequality, and benefit the next generation by improving the health and education of children.

**18. At the macro level, recent studies point to positive implications of financial inclusion.** Sahay and others (2015) found that households’ access to finance has a strong positive relationship with overall economic growth. The study further showed that the relationship between financial depth (the volume of financial services) and growth is bell-shaped, suggesting that there is a trade-off between growth and depth at higher levels of depth. However, there is no trade-off between growth and higher levels of financial access; in other words, economic growth always rises with financial access. Greater access of firms and households to various banking services leads to higher growth. Importantly for the current study, when the Sahay and others (2015) regressions are re-run with gender-decomposed data, the same results are obtained for increasing women users of these services. Aslan and others (2017) found that inequality in financial access is significantly related to income inequality, beyond factors previously identified in the literature. IMF (2016) suggests that the association between gender equality in financial inclusion and income equality may be due to an effect of financial inclusion on female labor force participation: an account at a financial institution provides women with a place outside the home to store money safely, and access to borrowing enables women to start a business, contributing to increases in entrepreneurship and self-employment.

**19. At the same time, higher financial inclusion affects stability and could entail trade-offs when credit is extended without strong supervision—even when the credit goes to women.** Recent IMF staff analysis (Sahay and others 2015) finds that the relationship between the share of borrowers in adult population and bank stability rises initially and then falls as the number of borrowers increases. The good news is that better supervision helps enormously in reducing this trade-off (Figure 4). Importantly for the current study, re-running the regression analysis with the gender-decomposed data shows that the relationship is statistically the same for men and women. Given that there are less women borrowers than men (9 percent of women worldwide borrowed

from financial institutions in 2017, compared with 12 percent of men), an increase in the share of women borrowers is more likely to be associated with an increase in financial stability, as illustrated in Figure 4.



## WOMEN AS PROVIDERS OF FINANCIAL SERVICES

### A. Literature Review

**20. Numerous studies have highlighted the small share of women in senior corporate management.** Female representation in senior positions in the government and the private sector is low across countries and industries (International Labour Organization 2015; Catalyst 2014; Credit Suisse 2012, 2014; Elborgh-Woytek and others 2013; and Wolfers 2006). Post and Byron (2015) and Pletzer and others (2015) offer meta-analyses of the general research on corporate boards and company performance. The meta-regressions suggest that female board representation is positively related to accounting returns, and that this relationship is more positive in countries with stronger shareholder protections, perhaps because shareholder protections motivate boards to use the different knowledge, experience, and values that each member brings.

**21. For the financial sector, some studies suggest that companies with more women board members have higher profitability and better stock-price performance** (Credit Suisse 2012; Catalyst 2014; Christiansen and others 2016). The performance of funds that are majority-owned by women has outpaced the financial industry since 2007, returning 6 percent in 2013 compared with a loss of 1.1 percent for the industry (Rothstein Kass Institute 2013). Several pension funds in the United States have mandates to invest in funds run by women, a decision motivated by diversity considerations (Catalyst 2014) as well as by business considerations. Much of the relevant literature focuses on women as leaders, but there is also some evidence on women more broadly as financial services providers. Using data for a commercial bank in Albania, Beck, Behr, and Guettler (2013) found that loans screened by female loan officers were less likely to turn problematic, and this effect cannot be explained by borrower or loan officer selection or differences in screening, work load, and experience. The results provide suggestive evidence for female loan officers' capacity to build trust relationships with borrowers.

**22. Previous studies also suggest that female executives may be more cautious than male executives in making corporate decisions.** For example, Faccio, Marchica, and Mura (2016), for a broad corporate sample, find that firms run by female CEOs have lower leverage, less volatile earnings, and a higher chance of survival than otherwise similar firms run by male CEOs. Additionally, transitions from male to female CEOs are associated with significant reductions in corporate risk-taking. Huang and Kisgen (2013), using a U.S. corporate sample, find 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 to mean that men show relative overconfidence compared with women. Other studies show that greater board diversity is associated with higher meeting attendance and better monitoring; also, female board directors are found to be more diligent monitors and to demand more audit efforts than male directors (Adams and Ferreira 2009; Gul, Srinidhi, and Tsui 2012).

**23. 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, Goldin, and Katz 2010). Differences in the structure of compensation and incentives may also explain the association between gender and the 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). But our meta-analysis of existing studies does not suggest that lower gender gaps necessarily means lower risk taking. Indeed, Adams and Raganathan (2013) and Berger, Kick, and Schaeck (2014) found that gender diversity in US and German banks, respectively, was related to *more* risk taking around the global financial crisis.

## B. Four Hypotheses: Why Gender May Matter

**24. Based on the conceptual discussion and review of the existing literature, four hypotheses could be offered on how more gender-balanced boards may be linked to higher financial stability.** These include (1) higher risk management skills of female financial executives compared with their male peers; (2) discriminatory selection practices that result in more qualified women making it onto 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 and retain more women leaders.

**25. The first hypothesis is that women possess traits more consistent with better management of risks in financial institutions.** In a global survey, PEW (2014) found that 29 percent of people thought that women would do a “better job” of running a large bank or other financial institution, 19 percent thought that men would do a better job, and 52 percent were agnostic. Experimental studies of differences in choices and preferences between men and women tend to find that women are more risk averse than men (see, for example, Croson and Gneezy 2009). Neuroeconomic studies attribute such differences in risk aversion largely to gender differences in the levels of the hormone testosterone: for example, Sapienza, Zingales, and Maestriperi (2009) find no difference in risk aversion between men and women with comparable levels of testosterone. However, surveys of the experimental literature highlight that individual study results depend heavily on the situation and elicitation method (Niederle 2014) and are less significant when adjusted for overlaps among studies (Nelson 2015). Moreover, the finding that women tend to be more risk averse than men may not necessarily translate to professional populations, such as board members and CEOs in financial institutions. Indeed, surveys among corporate directors (for instance, Adams and Funk 2012) suggest that female directors may be slightly more risk loving (less risk averse) than male directors. And finally, being more *risk averse* does not necessarily translate to having better *risk management skills*, and vice versa. While the literature points to a strong association between testosterone levels and risky behaviors, such as alcohol use and gambling, there is a lack of consistent evidence on links to financial risk management skills. Our meta-analysis

of the empirical literature finds that evidence on the “innate traits” hypothesis for the financial sector is mixed.

**26. The second hypothesis is that, because of discriminatory hiring decisions, male applicants are more likely to be selected for bank leadership positions, controlling for qualifications.** This hiring bias toward men implies that women who get hired tend to have higher qualifications than men, and that their performance on the board is likely to be of a higher quality on average. Thus, bank boards with higher shares of women will be of higher quality—and that fact, in turn, would result in better financial stability outcomes. If such hiring biases exist, a greater share of women in leadership roles may be associated with higher financial stability, even if there are no general differences in risk management skills between men and women.

**27. The third hypothesis is that there is a diversity factor, 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 helps improve the quality of board decisions and enhance the legitimacy of firm practices (Hillman, Shropshire, and Cannella 2007). Gender-diverse boards could also partially offset weak corporate governance (Gul, Srinidhi, and Tsui 2012).

**28. The fourth hypothesis is that 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; rather, higher presence of women is an indicator that the environment and decision-making process in these banks is more conducive to good practices.

**29. A finding of a positive association between gender balance on boards in banks and higher banking stability is more likely to be linked to all but the first hypothesis.** As already noted, evidence on the first hypothesis, related to differential risk-taking behavior, is mixed. In what follows, the stylized facts are explored and then the evidence relating the share of women on bank and banking-supervision boards to bank stability is presented. One of the empirical exercises attempts to control for the last hypothesis (selection bias), for which more detailed data are available.

### C. Stylized Facts

**30. The data set on women leaders in finance builds on IMF (2014), updating and expanding the data compiled by Sahay and others (2017).** The underlying data are institution-by-institution board characteristics for more than 800 banks in 72 countries from 2001 to 2013. The data set is available online together with this paper.

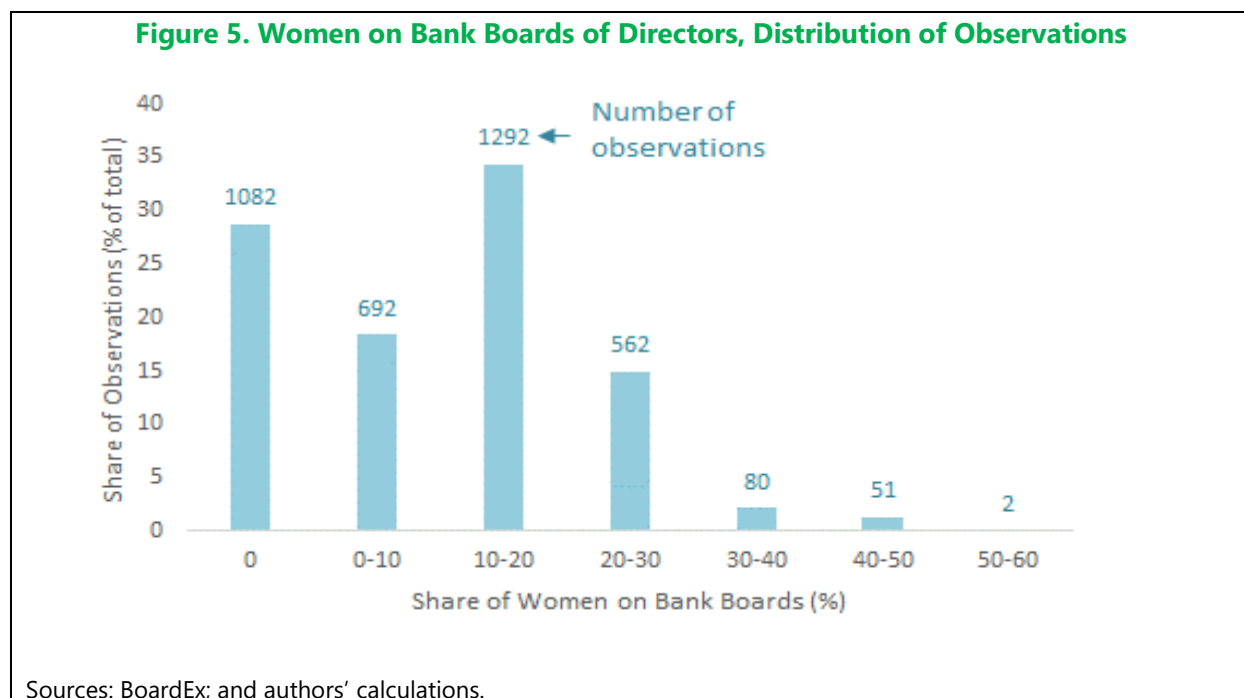
**31. About half of the banks in the sample are from the United States; about 20 percent are from Europe; and the rest are from Asia, the Americas, and Africa.** The Middle East is conspicuous by its absence—both because of a lack of data and the low representation of women in top positions. Although the sample of banks is not necessarily representative of each domestic



banking system, in many instances the total bank assets cover a substantial share of GDP. For example, the sample includes one-quarter of assets of banks in the United States (corresponding to about 95 percent of the country's GDP) and one-fifth of Polish bank assets (some 15 percent of GDP).

**32. The data confirm that the women's share of leadership positions in the banking sector is low globally, with only 2 percent of women serving as CEOs.** Only 15 banks out of almost 800 in 72 countries in the sample had women CEOs in 2013. Women hold less than 20 percent of bank board seats in 80 percent of the cases (Figure 6). Only 4 percent of observations have shares greater than 30 percent.

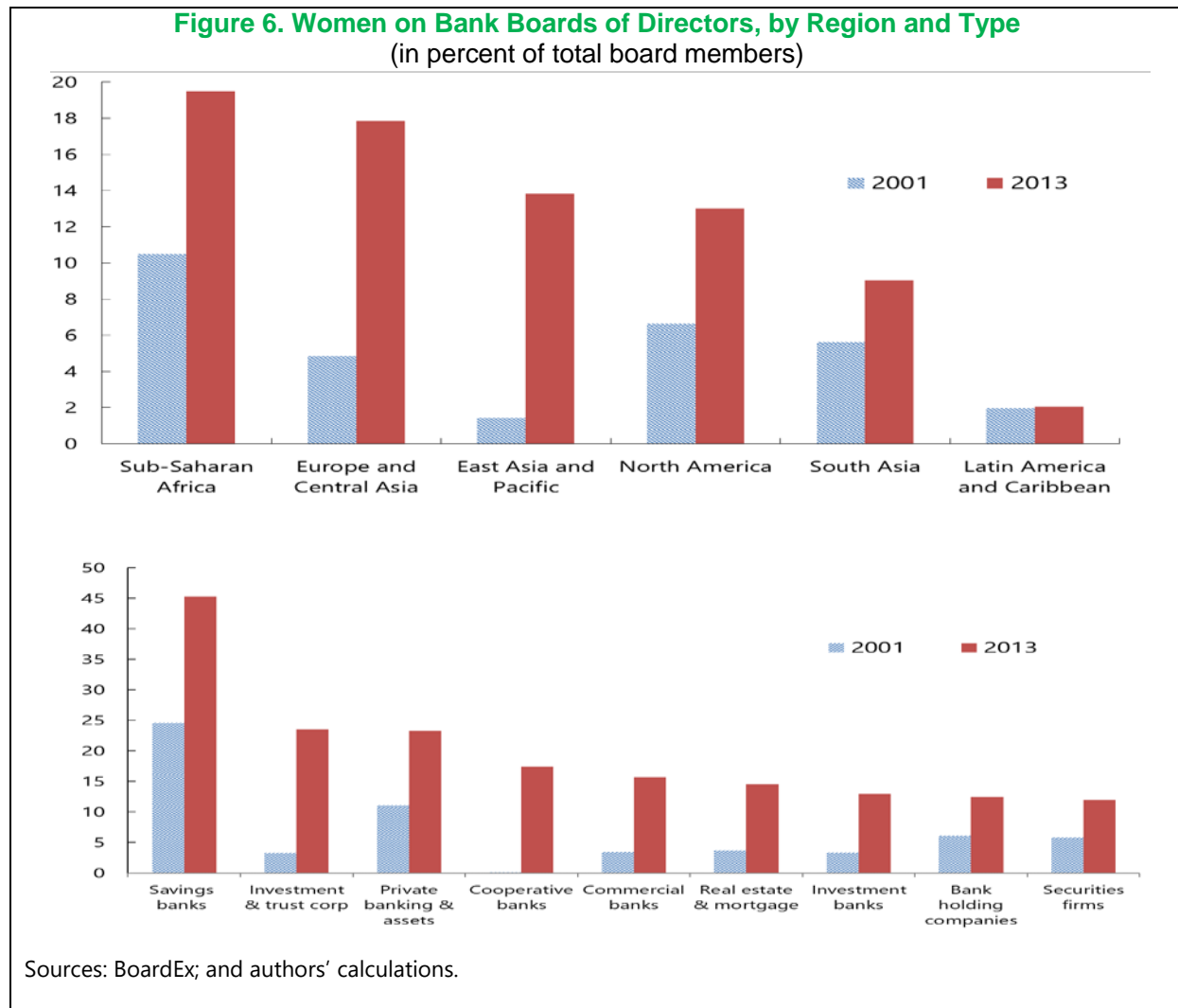
**33. The gaps remain large across geographical regions, country income levels, and types of financial institutions** (Figure 5). Based on data for 2013, the highest share in the sample is for sub-Saharan Africa, while the lowest is for Latin America and the Caribbean, with the advanced economies between those two extremes. Among types of banks, women's board participation is highest in savings banks, at more than 45 percent. Data for nonbank financial services companies, including firms in new or emerging financial technologies ("FinTech"), show that the ratios of women leaders in those companies are even lower than those for banks. It may seem paradoxical that the new technologies—which hold much promise for broadening access to and use of financial services, including by women—have themselves relatively higher gender gaps in leadership positions.



**34. On a positive note, board participation of women has been growing in many regions and in various types of banks** (Figure 6). In East Asia, the average representation rose from 2 percent in 2001 to 14 percent in 2013. In Europe and Central Asia, it increased from about 4 percent



to 18 percent over the same period. The share in Latin America, by contrast, has not changed significantly. Across types of banks, the share almost doubled in savings banks, which already had a higher share of women than other types of banks.



## D. Empirical Methodology

**35. To examine the relationship between the share of women on bank boards and bank stability, regressions are estimated in the following form:**

$$Z_{it} = \beta_0 + \beta_1 \text{Share of Women}_{it} + \beta_2 \text{Controls}_{it} + \varepsilon_{it} \quad (1)$$

- The dependent variable is bank's distance-to-distress, also known as the z-score ( $Z_{it}$ ). Distance-to-distress is defined as the buffers that banks have (capital to assets plus return on assets), scaled by their volatility of returns (standard deviation of return on assets). Higher distance-to-distress means that banks' buffers are higher relative to volatility of their earnings. The book-

value distance-to-distress is calculated from balance sheet data from Bankscope, which is a standard measure used in the literature (see, for example, Čihák and others 2012; IMF 2014; and Sahay and others 2015). As a robustness check, the study also used other stability indicators, such market value-based distance-to-distress (following IMF 2014). Market value-based measures can provide more up-to-date information, but they require that bank securities are traded in well-functioning markets (in this case, the sample size is reduced by two thirds).

- To gain insight into the components of distance-to-distress, equation (1) is re-estimated using *return on assets*, *capital to assets*, and *volatility* of profits as dependent variables. The *nonperforming loans ratio* is used as another alternative dependent variable.

**36. The independent variable of interest is *share of women*, defined as a fraction of board members on the bank’s board of directors.** Other independent variables included are as follows:

- 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 have a bearing on bank risk: 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 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 country’s economic development; *growth in GDP* per capita to control for cyclical developments; *bank assets to GDP* to control for the systemic importance of the bank in the country; the *nonperforming loans ratio* to control for the level of nonperforming loans as a share of total gross loans; and *year fixed effects* to control for common global cyclical characteristics. Some specifications include *year\*country fixed effects* to capture country time trends (Annex II).

**37. The study tested for the relationship between the *share of women* and bank stability.**

As a starting point, pooled data were examined, with regressions run to account for variations across observations. The pooled controls for various bank-specific, 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. Separate regressions were estimated for 2008 and 2009 to examine 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 various subsamples. Lagged distance-to-distress was also added to account for persistence in bank stability.

## E. Empirical Results

**38. The estimation results show that boards with higher shares of women are associated with better measures of bank stability** (Table 2). These results control for other board characteristics, bank size, country growth rates, and unobserved bank-level fixed effects. The relationship is identified both when running pooled regressions (first two columns) and when including a separate intercept for each bank type (third column). With bank fixed effects included, the coefficient representing the association between the share of women and the distance-to-distress continues to hold. Regarding the three components of the distance-to-distress—the capital-asset ratio, return on assets, and the volatility of return on assets—pooled regressions with separate intercepts for bank type show that the share of women on bank boards is associated with higher profitability (Annex II). It seems then that higher profitability plays a key role in increasing the distance-to-distress; for a similar capital ratio and even with higher volatility, the measured buffers are greater. In addition, the share of women is negatively related to the nonperforming loan ratio. The robustness of the results was also tested by truncating the sample. 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.

**39. The coefficient on the share of women is economically meaningful.** To illustrate the economic importance of the estimated coefficient, it is useful to consider the improvements in banking stability since the global financial crisis. In the sample used in this paper, we observe that average distance-to-distress has increased by about 8 since 2008. Based on the estimates in Table 2, one would expect the same difference in distance-to-distress if women's share were higher by 0.10, keeping everything else constant. In other words, a 10 percentage point difference in women's share in bank boards would be associated with higher financial stability, similar in magnitude to the improvements observed since the 2008 crisis. Such an increase would, by itself, not necessarily address all weaknesses in the financial system, but it would be a meaningful improvement in stability.

**40. The results suggest that the *presence* of women on boards may be a distinguishing feature of bank stability.** Regressions were also run, 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 being equal, a bank with female representation on its board would have on average a greater distance-to-distress.

**Table 2. Share of Women on Bank Boards versus Bank Stability**

Explanatory Variables	<i>Dependent variable: bank specific z-score</i>		
	(1)	(2)	(3)
Share of Women (lagged)	18.70*** (4.222)	14.87** (4.652)	33.48*** (8.883)
Board Independence (lagged)	6.022 (6.891)	3.221 (6.244)	17.64*** (3.310)
Time in Board (lagged)	0.299*** (0.0300)	0.224*** (0.0399)	0.909*** (0.0546)
CRO on Board (lagged)	2.367 (2.923)	1.537 (2.765)	-6.590** (2.319)
Risk Committee (lagged)	-4.044** (1.372)	-5.044*** (1.433)	-17.13*** (1.815)
Salary over Total Compensation (lagged)	-2.472 (1.694)	-3.798* (1.724)	-22.56*** (0.913)
Total Assets/GDP (bank-specific)	0.0507** (0.0179)	0.0227** (0.00751)	-0.0925 (0.0956)
Log-Change in Real GDP per capita	145.8** (51.36)	-34.15 (46.74)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.815*** (0.408)	-1.928*** (0.364)	-4.661*** (0.0529)
Lagged Z-score	0.661*** (0.0116)	0.679*** (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.

Note: Results are for the full sample (2003–13); for additional results, see Annex II.

**41. As a robustness check, the study focused on the crisis years of 2008 and 2009, in which the distance-to-distress suffered its greatest reduction, and found that higher shares of women on bank boards in 2008 increased stability.**

Cross-section regressions were first run for each of the two years, and then pooled over the two-year period. Banks with a greater share of women were more stable in 2008, after controlling for various bank-specific and country-specific characteristics. The coefficient is still positive, but not statistically significant, for 2009 (Annex II).

**42. Further robustness tests included examining more homogenous subsamples of banks to reduce the possibility that results are driven by outliers.**

Indeed, results for distance-to-distress continue to hold when the regressions are estimated separately the subsets of US and non-US banks. Results are also similar when only the subsamples of commercial banks and bank holding companies are used (Annex II).

**43. Finally, “propensity score matching” suggests that the association between lower gender gaps and financial stability holds even when addressing the selection bias.**

Gender balance in the boardroom could be endogenous for the reasons noted earlier: good management practices that result in better financial stability outcomes could have been also responsible for better human-resource management and, therefore, greater gender balance on boards. Thus, the outcomes could reflect selection bias. To address the issue, propensity score matching was used to estimate the probability of having a board with 50 percent women, based on observable characteristics such as bank size and financial experience of the board (following Abadie and Imbens 2011). Using these probabilities, or *propensity scores*, the study constructed a statistical control group with similar characteristics, but for a board with no women on it. It then calculated an *average treatment effect* as the mean difference of stability outcomes between “gender-balanced boards” (50–50 group) and “no-female” boards (0–100 group). A limitation of this study was that in the sample, less than 5 percent of banks were in the 50–50 group (and no banks in the sample had women-only boards). Nonetheless, the study was able to control for selection bias using various metrics for matching and finding that boards with a 50 percent share of women would have higher distance-to-distress on average than those with no women (Annex II). The bottom line of this analysis is that it provides evidence against the sample bias hypothesis.

## WOMEN AS FINANCIAL SECTOR SUPERVISORS

### A. Conceptual Discussion and Stylized Facts

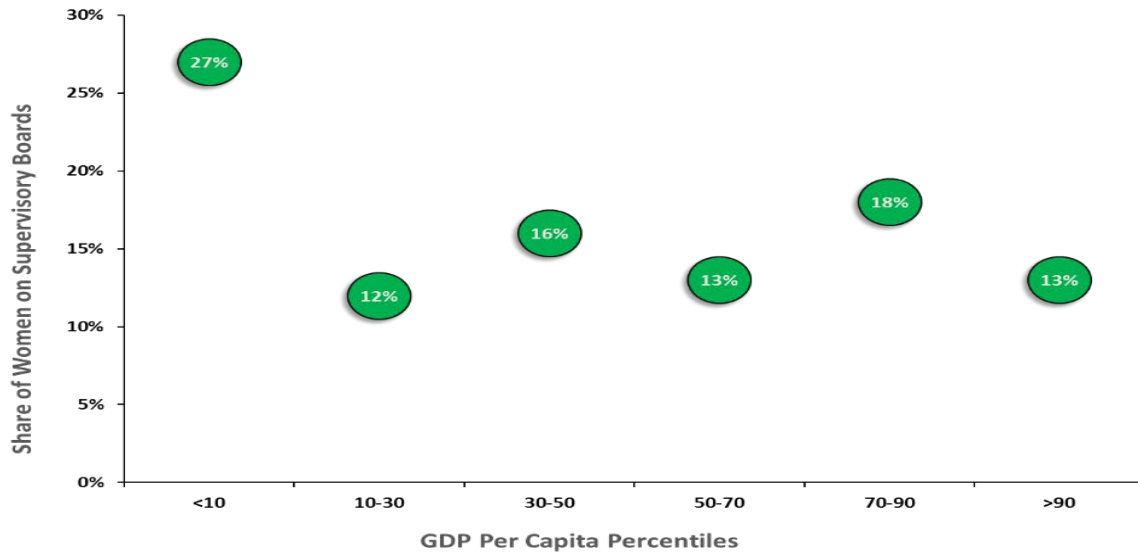
**44. In principle, the four hypotheses about why gender can matter in financial-sector supervision are similar to those for bank boards.** First, women might possess traits that lead to better supervision of risks in financial institutions. Second, due to discriminatory hiring decisions, male applicants may be more likely to be selected for supervisory-board positions, controlling for qualifications, leading to a higher average quality of women who are hired. Third, mixed-gender boards may perform better than all-male boards due to the benefits of a multiplicity of views. And fourth, less gender-biased hiring practices may be correlated with other supervisory practices and other features of the institutional framework that contribute to stability. With a higher quality of supervision, one could expect a more robust financial sector. A finding of a positive association between gender balance on boards of banking-supervision agencies and higher banking stability could be related to any of these four hypotheses.

**45. Analyzing a new data set created for 115 countries shows that the share of women on governing boards of banking-supervision agencies is low.**<sup>2</sup> The share of women on banking-supervision boards is low—about 17 percent on average in 2015—with the poorest countries exhibiting the highest shares. It is interesting that there is not a positive relationship between the share of women on banking-supervision boards and the country's (or the region's) level of income (Figure 7). In fact, supervisory boards in poorer countries tended to have more women. For instance, women account for more than 60 percent of board members in the Kingdom of Eswatini, while the share in the United States is at 13 percent. Averages across quartiles of GDP per capita show that the poorest countries have the highest shares. The shares are below 20 percent in most regions (Figure 8). Shares of women in supervision agency leadership have increased marginally in the post-crisis period, with emerging markets and developing economies showing relatively larger increases than advanced economies (Figure 9). However, the shares are still low, and an analysis of annual data does not suggest a sustained trend toward closing the gaps, with many countries even showing wider gaps in recent years. Interestingly, countries that made faster progress in closing gender gaps among finance users also tend to show more progress on closing gaps in supervisory leadership positions. But data limitations do not allow us to analyze causality between these two aspects of inclusion.

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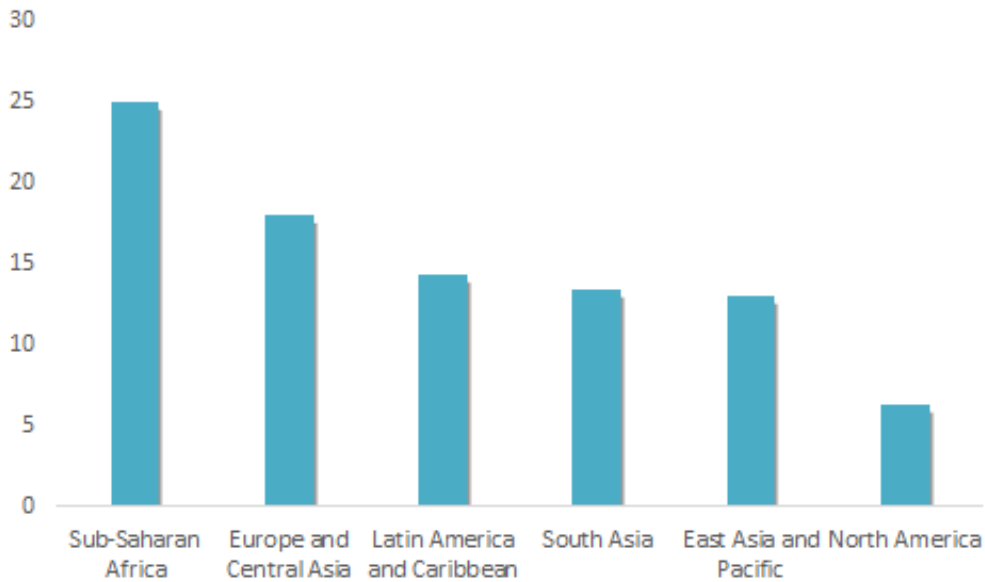
<sup>2</sup> This new data set updates and expands on Sahay and others (2017) to cover the 1999–2017 period (instead of 2011 and 2015). The data set is derived from information in Central Banking Publications (1999–2013) and on regulatory agencies websites. See Annex III for summary statistics.

**Figure 7. Women Leaders in Supervision Agencies, Averages by GDP per Capita, 2015**



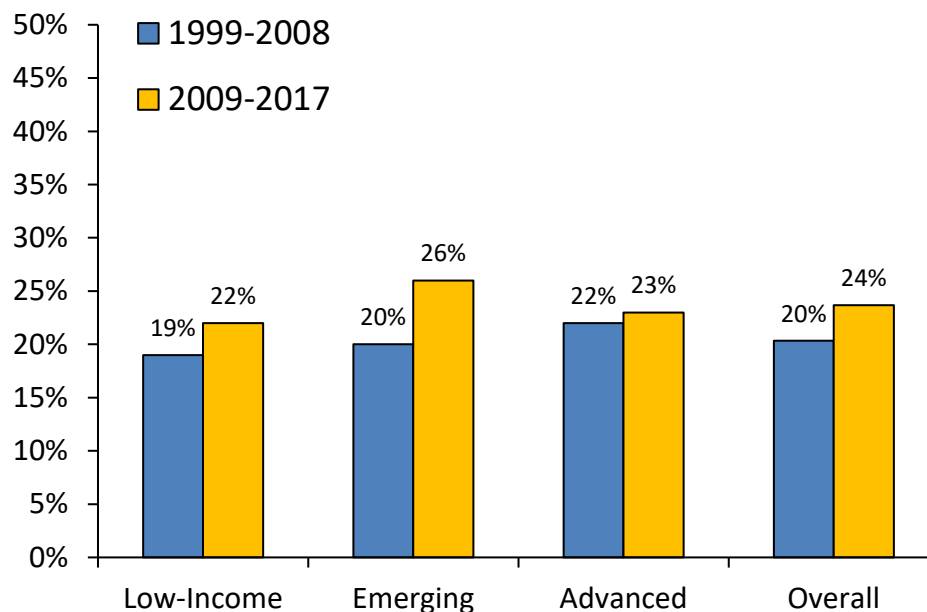
Sources: International Financial Statistics, IMF; Supervision agency websites; and authors' calculations.

**Figure 8. Women Leaders in Supervision Agencies, Regional Averages, 2015**



Sources: Supervision agency websites (<https://www.bis.org/regauth.htm?m=2%7C269>); and authors' calculations.

**Figure 9. Women Leaders in Supervision Agencies, Regional Averages, 1999–2017 (percent)**



Sources: Central Banking Publications (1999–2013); Supervisory websites listed on <https://www.bis.org/regauth.htm?m=2%7C269> for 2015, 2016, and 2017; and authors' calculations.

## B. Estimation Approach

**46. The study tested whether a higher share of women on banking-supervision boards is associated with a higher quality of supervision and overall banking stability.** It ran two sets of cross-country regressions with robust standard errors. The first set of regressions 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.

**47. 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 data set:

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

$Y_i$  are dependent variables capturing supervisory quality: (1) supervisory powers, *Suppow*, given to supervisors by existing laws, published for 2011 (Barth, Caprio, and Levine 2013); (2) stringency in loan loss provisions, *prov* (Barth, Caprio, and Levine 2013); (3) the quality of supervision measured by performance on Basel Core Principles (BCPs); and (4) the set of BCPs related to financial inclusion, *BCP\_fincl* (Sahay and others 2015). The model includes as controls *GDP per capita*, indexes for *financial institutions depth* and *financial institution access* to proxy for the features of development of the financial sector (Sahay and others 2015) being supervised, and governance indicators (*voice and accountability*, *regulatory quality*, *control of corruption*, and *rule of law*) from the Kaufman, Kraay,



and Mastruzzi (2010) database (Annex III provides details on data sources). Estimation results of equation 2 with three measures of supervisory quality are reported in Table 3.

**48. The second set of regressions tested whether the share of women was associated with bank stability outcomes, controlling for supervisory quality and other determinants.**

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

$Z_i$  are country-specific bank-stability outcomes given by distance-to-distress (“z-score”). The distance-to-distress is calculated as the average for 2011–13 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 2011, and  $GDPPC_{i,2011}$  is the per capita GDP for country  $i$  in 2011. To account for cyclical conditions, the nonperforming loan ratio and the square of GDP growth are added in one of the specifications (Table 4).

### C. Estimation Results

**49. A higher share of women on supervisory boards is associated with greater banking sector stability.** The share of women on boards of supervision agencies did not have a significant impact on the quality of regulation and supervision. The coefficients on all four measures of supervisory quality (Suppow, Prov, BCP\_fincl, and BCP) were not significant (Table 3). However, a higher share of women in bank supervision boards appears associated with greater banking sector stability (Table 4). This result holds after controlling for supervisory quality, the level of access to and depth of financial institutions, and other governance indicators. Even after adding a measure of economic stability (square of GDP growth) and financial stability (nonperforming loans ratio), the share of women was positively associated with the distance-to-distress. The fit of the regressions, however, was weaker than those for banking leaders.

**50. The weaker association may reflect the relatively less direct role of regulators and supervisors.** Much of the regulatory and supervisory framework is driven by broader legal and institutional constraints, rather than the share of women leaders in supervisory boards. Moreover, the role of regulators and supervisors in the financial sector is relatively indirect: they help create a framework for financial sector’s activities, but they do not actively provide financial services or operate financial institutions. That likely explains the relatively weaker results for regulatory and supervisory leaders.

**Table 3. 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 <sup>2</sup>	0.53	0.44	0.20	0.12

Source: Authors' estimates.

Note: Results of equation 2 estimations with four measures of supervisory quality. Annex II describes the variables. \*\*\*, \*\*, and \* denote statistical significance at 1, 5, and 10 percent, respectively.

**Table 4. Distance-to-Distress 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 <sup>2</sup>	0.04	0.09	0.11	0.18	0.18

Source: Authors' estimates.

Note: The table reports estimation results for equation 3. Annex Table A8 explains the variables. \*\*\*, \*\*, and \* denote statistical significance at 1, 5, and 10 percent, respectively.

## CONCLUSIONS

- 51. This paper examined the role of women in finance across three dimensions—as users of finance, as providers of finance, and as supervisors of finance.** Using new data sets, it presented stylized facts about women as users of finance as well as women leaders in finance. It then provided evidence on gender and resilience of the banking sector.
- 52. The study highlights that gender gaps in finance are persistent and are especially large for leadership roles.** Across regions, less than 20 percent of the boards of directors in banks are women, and less than 2 percent of banks had women CEOs (starkly contrasting with gender statistics of university graduates). Similarly, in bank-supervisory and regulatory agencies, the share of women on boards of directors is low. Interestingly, this share is not related to the income levels of countries.
- 53. This analysis suggests that lower gaps in the representation of women in bank leadership roles is associated with greater bank stability.** Banks with higher shares of women leaders had higher capital buffers, lower nonperforming loans, and higher distance to distress (“z-scores”). These results hold even after controlling for factors such as bank size, GDP per capita, experience of board members, and other board and country characteristics.
- 54. There are four reasons why a higher share of women on bank and supervisory boards contribute to higher financial stability.** First, women may be better risk managers than men. Second, discriminatory hiring practices may mean that the few women who do make it to the executive level are exceptionally well qualified. Third, having more women in executive positions contributes to diversity of thought, which leads to better decisions. And fourth, institutions that tend to attract and select female executives may be better-managed in the first place. Empirical support for the first hypothesis is mixed at best, and the tests in this study—including the propensity score matching—allow us to eliminate the fourth hypothesis. The results give some credence to the second and third hypotheses. Based on evidence in this note and related literature, the observed higher stability is therefore likely due to the beneficial effects of greater diversity of views and due to discriminatory hiring practices that lead to hiring better qualified or more experienced women than men.
- 55. More broadly, the findings strengthen the case for financial inclusion for women to enhance economic growth, reduce income inequality and foster financial stability.** Further research will allow us to draw stronger causal links, discerning which of the possible hypotheses could be driving the results. A related question worth exploring is why some countries and some institutions do place more women in leadership roles in finance.
- 56. The paper makes the case for compiling better data to monitor and understand gender gaps in finance; it also illustrates how the IMF is taking a leadership role in this area.** Regarding data on women as users of finance, the IMF has committed itself to continue to work with

country authorities to improve data availability via the Financial Access Survey. To facilitate that, the IMF launched the Data for Decisions Fund, a multi-partner trust fund to enable capacity development and to broaden the availability of data to monitor the Sustainable Development Goals. The IMF plans to make the gender-disaggregated financial access information an integral, standard part of the Financial Access Survey in the future (IMF 2018) and to disseminate this information in its official training courses on financial development and financial inclusion. Moreover, accompanying this study is a data set of women leaders in finance that can be expanded and updated in the future.

**57. The study also advocates the need for macroeconomic policymaking to integrate financial inclusion and stability to ensure better economic and financial outcomes.** Despite evidence of benefits to individuals and society, financial inclusion often proceeds on a separate track, more as a means to address social goals than mainstream macroeconomic goals. It is critical to avoid such a “silo mentality,” as there appears to be a case for financial inclusion for women—including greater access to and use of financial services by women—to enhance economic growth, reduce income inequality, and preserve financial stability. When financial systems become more inclusive, they help broaden financial markets and could well make monetary, fiscal, macroprudential, and macrostructural policies more effective.

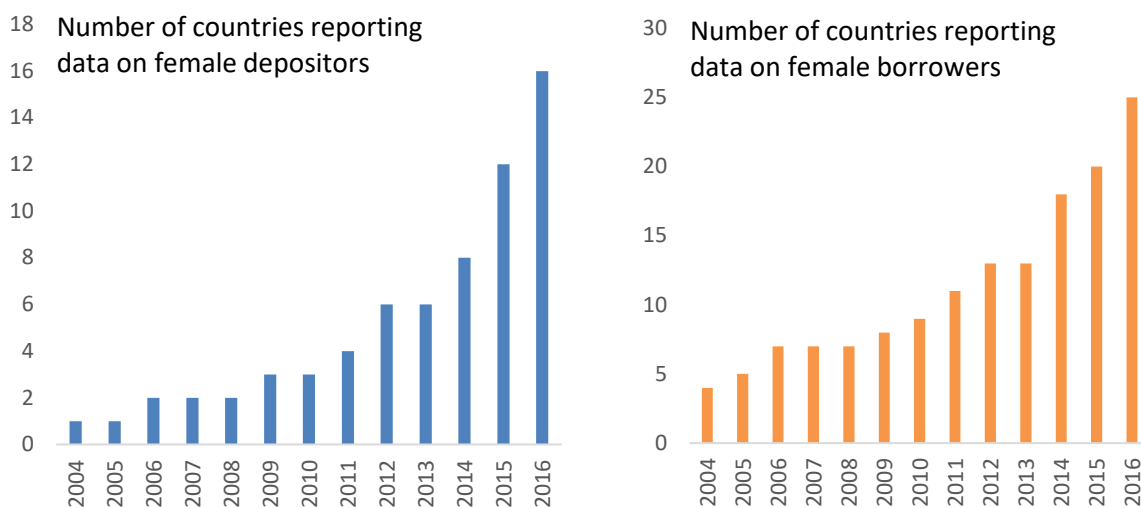
## ANNEX I. DATA ON WOMEN USERS OF FINANCE

### The IMF's Financial Access Survey

The Financial Access Survey is an annual survey managed by the IMF's Statistics Department and funded by donors. The Financial Access Survey collects and disseminates comparable time-series data on the geographical outreach and use of basic financial services provided by resident financial corporations to resident customers in a country. Outreach of financial services is approximated by evaluating financial institutions' branch network, the availability of ATMs, and the number of agent outlets for mobile money providers. Use is measured for three key financial services: deposits, loans, and insurance. The Financial Access Survey provides data for households and small and medium enterprises. The survey contains 180 time series and 65 indicators for 189 countries spanning more than 10 years. A key feature of the data set is that it is based on administrative sources, such as national central bank and other statistical authorities, and it is derived from provider-side information.

The 2016 Financial Access Survey included a pilot to capture the financial access gender data gap. The pilot, which included the participation of 28 countries, revealed that in almost half of the participating economies, financial service providers had access to their customers' gender information. An expanded pilot in 2017 invited all the IMF country members to report the gender breakdown of their commercial banks' depositors and borrowers. This time, 27 countries provided information on this breakdown from 2004 to 2016 (annex figure). The results of the expanded pilot were published on the Financial Access Survey website in March 2018 (IMF 2018). In 2018, gender-disaggregated data were mainstreamed into the survey. The 2018 round has nine series and 12 indicators disaggregated by gender.

**Annex Figure. Countries Reporting Gender-Disaggregated Financial Access Data, 2004–16**



Source: IMF 2018, calculations based on 2017 Financial Access Survey pilot on gender-disaggregated data.

**The World Bank's Global Findex**

The Global Findex database complements the Financial Access Survey by compiling demand-side data on how adults save, borrow, make payments, and manage risk. Launched with funding from the Bill & Melinda Gates Foundation, the database has been published every three years since 2011. The data are collected in partnership with Gallup, Inc., through nationally representative surveys of about 150,000 adults in 144 economies. The survey was carried out over the 2017 calendar year by Gallup, Inc., as part of its Gallup World Poll, which since 2005 has annually conducted surveys of approximately 1,000 people in each of more than 160 economies and in more than 150 languages, using randomly selected, nationally representative samples. The target population is the entire civilian, noninstitutionalized population age 15 and older. For a summary of the data and key findings, see Demirgüç-Kunt and others (2018). The Global Findex offers decompositions by individual characteristics, including gender, age, income, employment, living area (urban versus rural), and education level.

## ANNEX II. DATA ON WOMEN LEADERS IN FINANCE

Table A1. Variables Used in the Empirical Analysis

Indicator Name	Description	Data Source
<b>Dependent variables</b>		
Distance-to-distress (Z-score)	Sum of capital to assets and return on assets, divided by standard deviation of return on assets. Sign switched so that higher values mean higher risk.	Bankscope
NPL	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
<b>Explanatory variables</b>		
Share of women	The share of women directors on bank boards	BoardEx
Financial experience	Average of independent board members' financial experience as a share of their total professional experiences	BoardEx
Board experience	Total number of years that all the board members have 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
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

Note: The data set on women leaders in finance is an updated and expanded version of the earlier data compiled by Sahay and others (2017). The data set is made available online with this paper.

**Table A2. 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, 2003–13)

Explanatory Variables	<i>Dependent variable: Bank-Specific Z-score</i>			
	Share of Women <= 20% (1)	Share of Women <= 20% (2)	Share of Women <= 20% (3)	Share of Women <= 20% (4)
Share of Women (lagged)	29.73* (16.44)	27.92* (16.18)	58.00 (35.87)	80.33** (37.88)
Board Independence (lagged)	0.109 (6.288)	-2.796 (6.045)	41.24** (20.90)	44.47** (22.06)
Time in Board (lagged)	0.405 (0.297)	0.351 (0.291)	1.014 (1.250)	0.914 (1.298)
CRO on Board (lagged)	2.945 (4.341)	0.582 (4.138)	-3.304 (13.84)	-3.011 (14.60)
Risk Committee (lagged)	-3.849* (2.240)	-4.629** (2.285)	0.169 (4.143)	-0.320 (4.286)
Salary over Total Compensation (lagged)	0.0737 (4.117)	-0.836 (4.074)	-4.320 (8.034)	-5.213 (8.946)
Total Assets/GDP (bank-specific)	0.0228 (0.0232)	-0.00230 (0.0190)	-0.406 (0.379)	0.280 (0.469)
Log-Change in Real GDP per capita	134.9** (65.28)	13.86 (63.41)	-130.0 (129.7)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.466*** (0.374)	-1.592*** (0.361)	-2.999*** (0.726)	-2.981*** (0.856)
Lagged Z-score	0.650*** (0.0337)	0.661*** (0.0328)		
Constant	10.82* (5.557)	23.23*** (7.850)	20.05 (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 A3. 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, 2003–13)

Explanatory Variables	<i>Dependent variable: Bank-Specific Z-score</i>			
	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 (18.39)	21.45 (17.78)	-9.767 (33.38)	5.233 (35.58)
Board Independence (lagged)	2.130 (6.397)	-0.468 (5.974)	12.05 (22.69)	15.33 (24.19)
Time in Board (lagged)	0.347 (0.269)	0.267 (0.259)	0.881 (1.203)	1.033 (1.242)
CRO on Board (lagged)	0.958 (3.188)	0.0806 (2.910)	-0.0328 (9.073)	-3.174 (9.995)
Risk Committee (lagged)	-4.363** (2.112)	-5.324** (2.068)	-3.708 (5.063)	-3.586 (5.450)
Salary over Total Compensation (lagged)	-2.871 (4.058)	-4.006 (4.007)	-10.20 (7.389)	-12.78 (8.132)
Total Assets/GDP (bank-specific)	0.0452** (0.0206)	0.0194 (0.0184)	-0.0984 (0.231)	0.276 (0.411)
Log-Change in Real GDP per capita	161.4*** (59.17)	-5.038 (55.60)	-142.2 (103.5)	
ImpairedLoansoverGrossLoans (bank-specific)	-1.404*** (0.358)	-1.531*** (0.332)	-2.621*** (0.656)	-2.648*** (0.768)
Lagged Z-score	0.676*** (0.0399)	0.691*** (0.0408)		
Constant	9.920 (7.478)	23.50** (9.340)	42.95** (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.

**Table A4. Subsample Robustness: US and Commercial Banks**

Explanatory Variables	<i>Dependent variable: Bank-Specific Z-score</i>			
	United States		Commercial Banks & Bank Holding	
	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects
Share of Women (lagged)	20.20 (20.51)	-17.73 (36.30)	22.54 (16.44)	-10.63 (34.69)
Board Independence (lagged)	17.17 (11.20)	19.59 (24.80)	7.971 (6.988)	18.13 (23.91)
Time in Board (lagged)	0.391 (0.311)	1.480 (1.229)	0.293 (0.279)	1.280 (1.243)
CRO on Board (lagged)	5.994 (4.573)	-6.326 (11.20)	2.435 (3.422)	-4.606 (10.71)
Risk Committee (lagged)	-5.550** (2.446)	-6.494 (5.777)	-5.132** (2.169)	-7.721 (5.802)
Salary over Total Compensation (lagged)	-3.801 (4.873)	-10.32 (7.881)	-3.933 (4.214)	-11.66 (7.902)
Total Assets/GDP (bank-specific)	-0.111 (0.237)	-4.513 (6.500)	0.0606** (0.0266)	0.0727 (0.485)
Log-Change in Real GDP per capita	197.6*** (73.36)		158.1** (60.99)	
ImpairedLoansoverGrossLoans (bank-specific)	-2.205*** (0.527)	-3.512*** (0.872)	-1.830*** (0.436)	-3.665*** (0.889)
Lagged Z-score	0.654*** (0.0423)		0.656*** (0.0409)	
Constant	1.043 (11.21)		8.896 (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

**Table A5. Bank Stability in Bank Boards with 50 percent vs. 0 percent of Women:  
Nearest Neighbor Matching Average Treatment Effects**

	(1) Z-score	(2) Z-score	(3) Z-score
<i>Average Treatment Effect of 50 percent women boards versus 0 percent women boards</i>	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			

Notes: Nearest neighbor matching is used to find the average treatment effects. Different metrics are 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.

**Table A6. Association between the Share of Women on Bank Boards and Bank Stability Components (Full Sample: 2003–13)**

Explanatory Variables	<i>Return on Assets</i>	<i>Volatility of Returns</i>	<i>Capital-to-Assets</i>	<i>Nonperforming Loan-to-Gross</i>
	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				
Impaired Loans over Gross Loans (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.

**Table A7. Association between the Share of Women on Bank Boards and Bank Stability (2008 and 2009)**

Explanatory Variables	<i>Dependent variable: bank specific z-score</i>				
	Interactive effect: 2008 * Share of Women				
	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

**Table A8. Share of Women in Supervisory Agencies and Bank Stability: Data Sources**

Variables	Source
<b>Dependent variables (in logs)</b>	
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 <a href="http://www.globalbanking.org/globalbanking.taf?section=data-set">http://www.globalbanking.org/globalbanking.taf?section=data-set</a>
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 <a href="http://data.worldbank.org/data-catalog/global-financial-development">http://data.worldbank.org/data-catalog/global-financial-development</a>
<b>Explanatory variable</b>	
ShareofWomen Share of women in supervisory agency boards, 2011 (0-100 percent)	Central Banking Publications, 2011
<b>Controls</b>	
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 Governance indicators, 2011 (-2.5=weak to 2.5=strong governance performance)	Kaufman, Kraay, Mastruzzi (2010) database <a href="http://www.govindicators.org">www.govindicators.org</a>
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/ifsap/ifsap.aspx> for more information.

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