NIPE Núcleo de Investigação em Políticas Económicas e Empresariais

#17
2019

WORKING PAPER

Rose C. Liao
Gilberto Loureiro
Alvaro G. Taboada

"Women on Bank Boards: Evidence from Gender Quotas around the World"

https://www.eeg.uminho.pt/pt/investigar/nipe

FCT Fundação para a Ciência e a Tecnologia

«This paper is financed by National Funds of the FCT – Portuguese Foundation for Science and Technology within the project «UID/ECO/03182/2019»

Universidade do Minho
Escola de Economia e Gestão

Women on Bank Boards: Evidence from Gender Quotas around the World[*]

Rose C. Liao[†]
Gilberto Loureiro[‡]
Alvaro G. Taboada[†‡]

December 2019

ABSTRACT

Using a sample of 469 banks from 39 countries between 2008 and 2017 and a generalized difference-in-differences methodology, we show that board gender quota laws lead to increased female board representation. We find an increase in risk taking and systemic risk and worse long-run operating performance post quota law for banks most impacted by the reforms, and those located in countries with a smaller pool of qualified women executives. Results suggest that the addition of younger and less experienced female board members to important board committees due labor market constraints drive the risk taking and performance outcomes.

Key words: Gender quotas; director independence; bank risk taking; bank performance
JEL Classification Codes: G15, G21, G28.

---

[*]A prior version of this paper was circulated with the title "The Impact of Gender Quota Laws on Board Composition, Risk Taking and Performance of Banks: International Evidence." The authors thank Alin Marius Andrieș (discussant), Brian Blank, Ying Duan (discussant), Sonali Hazarika, Mingyi Hung, Lin Peng, Yao Shen, Claudia Williamson, Tina Yang (discussant) and participants at the Financial Management Association Conference, Northern Finance Association Conference, Southern Finance Association Conference, Baruch College, Mississippi State University, and University of Mississippi for valuable comments. We thank Zhuo Li for valuable research assistance. Any errors are our own.

[†]Associate Professor of Finance, Rutgers Business School, Rutgers University, Email: liao@business.rutgers.edu.

[‡]Associate Professor of Finance, University of Minho, School of Economics and Management & NIPE, Email: gilberto@eeg.uminho.pt.

[†‡]BancorpSouth Associate Professor of Finance, Mississippi State University, Email: ataboada@business.msstate.edu

1. Introduction

The underrepresentation of women in corporate boards around the world has been a topic of debate among policy makers, business leaders, and academics for some time. The arguments for the push to increase gender diversity go beyond promoting equality of opportunity and include plausible benefits in terms of firm performance and sustainable long-run economic growth.[1] Norway was a pioneer in its push to increase board gender diversity by enacting a gender quota law in 2003 requiring firms to have at least 40% female representation on boards of directors. Since then, many countries have passed reforms to increase female board representation (Belgium, 2011; Denmark, 2012; India, 2013, among others). While most countries first adopt voluntary corporate governance codes promoting gender diversity on boards, to accelerate progress, they tend to resort to legislation, typically accompanied with sanctions for noncompliance.[2]

The evidence to date on the impact of gender diversity reforms is mixed. Several studies document a negative impact of gender quota laws on firm value (e.g. Matsa and Miller, 2013; Ahern and Dittmar, 2012, for Norway; Hwang, Shivdasani, and Simintzi, 2018, for the U.S), others point to no effect or even a positive impact for certain firms (e.g., Nygaard, 2011; Eckbo, Nygaard, and Thorburn, 2018), yet others document positive consequences on the labor market for directors (Ferreira, Ginglinger, Laguna, and Skalli, 2018).[3] Though the lack of gender diversity in corporate boards is more pronounced in the banking industry (Adams and Kirchmaier, 2016b), little evidence

[1] The 2012 EC progress report on Women in Economic Decision-Making states "Indeed, there is a clear business case for greater gender diversity in corporate boards both from the microeconomic perspective – i.e. in terms of individual companies' performance – as well as from a macroeconomic perspective – i.e. in terms of higher, sustainable rates of economic growth." (EC, 2012, p. 7).

[2] For example, the 2003 Norwegian law became compulsory in 2006, following insufficient compliance. The 2012 EC progress report mentions that legislation, combined with sanctions, is the best way to achieve substantial progress towards greater gender diversity in boardrooms (EC, 2012).

[3] Ferreira, et al. (2018) document that the French quota law led to reductions in the turnover rate of female directors, suggesting improvements in the stability of director-firm matches.

exists as to how gender quota laws impact banks, or how gender diversity on bank boards affects bank risk taking and systemic risk.

In this paper, we aim to fill this gap in the literature by examining the impact of gender quota laws on risk taking and systemic risk using a broad international sample of banks. We focus on the banking industry for several reasons. First, the banking industry is important to the overall economy and the financial crisis underscored the importance of understanding factors affecting bank risk taking and systemic risk. Second, bank boards tend to be less gender diverse relative to those in other industries (Adams and Kirchmaier, 2016a, b), rendering potentially differential impact of gender quota laws in the banking industry. Third, the banking industry is highly regulated, resulting in significant differences in governance from firms in unregulated industries (Adams and Mehran, 2003; 2012; De Haan and Vlahu, 2016).

We build a sample of 469 banks from 39 countries, including 107 banks from eight countries that enacted gender quota laws during our sample period 2008 through 2017. We take advantage of the staggered implementation of gender quota laws across countries and use a generalized difference-in-differences (DiD) design (Wooldridge, 2010) that takes as the control group all banks without reforms as of a particular time (i.e., banks in the control group and banks in other treatment countries prior to their reforms).[4] The use of a shock-based research design mitigates endogeneity concerns that plague governance studies that explore the relation between board structure and performance (see e.g., Hermalin and Weisbach, 2003). This allows us to arguably provide more causal evidence of the impact of changes in board composition on bank risk. To this end, our study also contributes to the broader literature on bank governance and risk taking (see e.g. De Haan and Vlahu, 2016; Stulz, 2016).

[4] While political and social factors play a role in the adoption of gender quota reforms (Terjesen, Aguilera, and Lorenz, 2015), these reforms are not specific to the banking industry, and are thus exogenous to the individual banks.

We find a significant increase of 3.84 percentage points (pp) in women representation on bank boards post quota laws, about 29.1% of the sample average. We also document a time-series trend of the relative increase of women representation on board among quota law countries from 2008 to 2017. To isolate the effect of these quota laws from other confounding factors, including concurrent regulatory changes, we further examine the effects on banks that are expected to be most impacted by the quota laws ('*Most impacted*'), defined as banks with all-male boards in the year before the quota law is enacted in the country. We find that the increase in female board representation is even larger (5.76 pp, or about 36% of the treatment sample average) for most impacted banks. We show a similar pattern of the relative increase of women representation on boards when we define '*Most impacted*' as banks that do not meet the mandated gender quotas.

We next compare the characteristics of the newly added female directors in quota law countries to those of incumbent and exiting male directors. We follow Ahern and Dittmar (2012) and examine characteristics of new, retained, and exiting male and female directors. We find that, relative to both retained and exiting male directors, new female directors tend to be more independent, younger, and are less likely to be financial experts. New female directors are equally likely to be members of audit and compensation committees as their exiting male counterparts. These findings suggest that quota laws lead to significant changes in bank board composition and director characteristics, which may affect the board's monitoring function.

To test whether these mandatory changes in board diversity affect the boards' monitoring function, we examine bank stand-alone and systemic risk. We find an increase in risk taking (lower Z-score, higher non-performing loans, and higher leverage) and systemic risk (higher expected capital shortfall, *SRISK* and market leverage, *LVG*) post quota law for *Most impacted* banks, especially when there is a larger increase in the number of female directors.

Our broad international sample of banks enables us to assess the role of supply-side factors in banks' risk-taking behavior post quota law. The supply of potential directors in the local labor market has been shown to affect board composition (e.g. Knyazeva, Knyazeva, and Masulis, 2013) and supply-side constraints on the pool of female board candidates have been shown to affect the market's response to the adoption of gender quota laws (Greene, Intintoli, and Kahle, 2020; Hwang, et al., 2018; Lu, 2019). These supply-side factors are especially important in the banking sector where gender diversity lags behind other industries (Adams and Kirchmaier, 2016b). We examine how the impact of gender quota laws on bank risk is affected by the size and quality of the female labor pool using two proxies: the proportion of women in the finance profession (*Women in finance %*) and the proportion of females in high skill occupations (*Females in high skill occupations %*). We find that the increase in bank risk taking and systemic risk post quota laws among *Most impacted* banks is concentrated in countries with a smaller pool of women candidates with the necessary skills and experience.

In addition, we study the banks' long-run operating performance post quota laws and find that *Most impacted* banks have lower performance (return on equity; *ROE*) following quota laws. The deterioration in bank performance post quota laws among *Most impacted* banks is concentrated in countries with a smaller pool of women candidates with the necessary skills and experience. These findings are consistent with the notion that the law changes might impose costly and suboptimal shifts in board structure, especially in countries with a smaller candidate pool of qualified female executives.

Importantly, we explore the potential channels through which adding female directors who are younger, less experienced, and from outside of the banking industry could result in more risk-taking at the bank level. Specifically, we examine whether quota laws result in changes in the

composition of board committees, and/or whether the negative impact of these quota laws is stronger when more women directors are added to the board, achieving a critical mass. We find that young and inexperienced female directors from outside of the banking industry were indeed added to key committees such as audit, compensation, and nominating committees. Further, the negative impact of these quota laws in terms of excess risk-taking and poor long-run performance is stronger when three or more women directors are added to the board.

Our results pass several robustness checks including: (i) assessing parallel trends assumption underlying our DiD design, by testing changes in the pre-quota law period; (ii) restricting the sample to five years around the year of quota law adoptions to mitigate the effect of confounding factors; (iii) the use of alternate control groups by adding countries that passed board reforms prior to 2008; (iv) the use of alternative standard error clustering schemes, and (v) the use of alternate country-level measures for the size and quality of the female labor force.

Our paper contributes to several strands of literature. First, we contribute to studies on governance, board composition, and bank risk taking. Prior studies that examine the relation between bank board composition and performance and risk taking yield mixed results. Adams and Mehran (2012) examine the relation between bank board structure and performance (Tobin's *q*) and find that while board independence is not related to performance, board size is positively related to firm performance. A recent study by Anginer et al. (2018) documents that shareholder-friendly corporate governance (e.g. having a majority independent board) is associated with higher bank risk taking and systemic risk, especially for larger banks in countries with more generous financial safety nets.[5] The literature examining the impact of female representation on bank boards

[5] As argued by Stulz (2016), better governance does not make banks safer. The bulk of the evidence to date supports this view. Several studies document a positive relation between bank governance and bank risk taking (e.g. Laeven and Levine, 2009), and a related strand of literature documents that banks with more shareholder-friendly corporate

and bank risk taking also yields mixed results. Sahay et al. (2017) show that higher share of women on bank boards is associated with greater bank stability. Similarly, Muller-Kahle and Lewellyn (2011) show that risky subprime lenders had busier and less gender diverse boards. In contrast, several studies find that higher female representation on bank boards is associated with higher risk-taking (e.g. Berger, et al., 2014; Adams and Ragunathan, 2015). These studies do not assess the impact of mandated quota laws and do not explore the impact of country characteristics (as most are single-country studies). We add to this literature by assessing how an exogenous shock to board composition affects banks, thereby providing arguably more causal evidence on the impact of board composition on bank risk and performance; we are also able to evaluate heterogeneous effects across countries based on various country level characteristics that have been shown to affect board characteristics as well as the effectiveness of banks' internal governance mechanisms (Ferreira, Kirchmaier, and Metzger, 2012; Li and Song, 2013).[6]

We also contribute to the growing literature examining the impact of gender quota laws (e.g., Ahern and Ditmar, 2012; Matsa and Miller, 2013; Greene et al., 2020; Hwang et al., 2018; Ferreira, et al., 2018; von Meyerinck, Niessen-Ruenzi, Schmid, and Solomon, 2019), and to studies assessing the impact of board diversity (e.g. Griffin, Li, and Xu, 2019; Bernile, Bhagwat, and Yonker, 2018, Lu, 2019). The focus on bank risk taking and systemic risk is of particular importance given the well-documented breakdowns in governance that have been blamed for the global financial crisis and the push by regulators and policy makers to rein in excessive risk taking in the banking industry (Kirkpatrick, 2009). In a recent study, Arnaboldi et al. (2019) find evidence

governance performed worse during the financial crisis (e.g. Beltratti and Stulz, 2012; Fahlenbrach and Stulz, 2011; Erkens, et al., 2012).

[6] Ferreira, et al. (2012) document how laws and regulations affect the composition of banks boards, through their impact on board independence. Li and Song (2013) show that bank regulation that improves private monitoring as well as stronger investor protection increases bank board independence. De Haan and Vlahu (2016) review the literature on bank governance and document the important role of countries' legal and regulatory quality when assessing the impact of bank governance on performance and risk taking.

of increased stock return volatility post quota laws for a sample of European banks. In our study, we use a broader sample of banks around the world to assess how cross-sectional differences from supply-side factors moderate the impact of gender quota laws on bank risk taking and systemic risk. Because bank boards play a pivotal role in the effective governance, strategic direction, and risk culture of banks (see, e.g., Office of the Comptroller of the Currency, 2016), our study sheds light on how changes in board composition brought about by gender quota laws affect bank stand-alone and systemic risk. In line with the findings in Greene et al. (2020), Hwang et al. (2018), and von Meyerinck et al. (2019), who examine the market reaction to the California quota law, our results underscore the importance of supply-side factors in determining the impact of gender quotas; to this end, our study contributes to the growing literature assessing the role of supply-side factors on board composition (see e.g. Linck, Netter, and Yang, 2008; Knyazeva et al., 2013; Lu, 2019).

2. Data and Methodology

2.1 Data

We begin our analysis of gender quota laws around the world by collecting information from a variety of sources on reforms that aim to increase boardroom gender diversity. Our primary sources for quota laws are Catalyst (2018a; 2018b) and Deloitte (2017), as well as prior studies (Ahern and Dittmar, 2012; Smith, 2014). We also collect information on countries that published governance codes that include recommendations to increase gender diversity on corporate boards from the European Corporate Governance Institute (ECGI), as well as from prior studies and reports (Ahern and Dittmar, 2012; EC, 2012; Smith, 2014). For these codes, we follow Ahern and

Dittmar (2012) and identify the first year in which a governance code recommends gender diversity on corporate boards.

Table 1 reports the year of implementation of the boardroom gender diversity reforms by country. In Table IA.1 of our Online Appendix we provide more details on each of these reforms per country.[7] Our treatment group includes 107 banks from eight countries that enacted legislation to increase gender diversity on boards of directors during our sample period 2008 to 2017. Five of these countries establish specific quotas, while India requires a minimum number of female directors, and two countries (Australia and Denmark) require firms to set their own quotas.[8] Most countries that have passed legislation to increase gender diversity first introduced governance codes with specific recommendations on gender diversity, usually a few years prior to the enactment of the legislation. The compliance periods and penalties vary across reforms. For example, in Germany, firms that fail to comply with the quotas can have their board member appointments contested, while in other countries, firms that do not comply may face fines (e.g. India and Italy) and other penalties, such as their exclusion from government contracts (e.g. Australia).

The control group consists of 333 banks from 27 countries that did not adopt a quota law, including 162 banks from 15 countries that did not adopt any gender diversity board reforms during the sample period and 171 banks from 12 countries that only have governance code reforms promoting gender diversity. In some robustness tests, we also include banks from four countries that passed board gender diversity reforms before the start of our sample period: Israel, Norway, Spain, and Sweden. Because the Institutional Shareholder Services' (ISS) board-level data

[7] We removed countries where we have fewer than three banks and we dropped countries with only one year of data available. This reduced our sample (total number of observations) by about 7%.

[8] We loosely refer to all the treatment countries as "quota law countries" throughout the paper for brevity although two countries (Australia and Denmark) do not have specific quotas.

become available beginning in 2008, our treatment sample (quota law countries) includes only countries that passed quota laws after 2008.

Figure 1, Panel A shows the changes in women participation in bank boards of directors during our sample period. We find that banks in quota law countries have the greatest increase in the percentage of female directors, 18.80 pp (from 8.58% in 2008 to 27.38% in 2017). Banks in the control group have a moderate increase of 7.02 pp (from 8.17% to 15.19%).

To test the impact of gender quota laws, we collect board characteristics, bank-level, and country-level data from a variety of sources. Data on bank director characteristics are from the ISS Global Directors Database. The database contains information on 129,637 directors in 15,762 firms holding a total of 472,486 directorships (firm-year board positions) in 102 countries over the period 2008-2017. We obtain bank financials from Fitch Fundamentals Financial Data and stock price data from DataStream. Finally, country level data are from the World Bank's World Governance Indicators (WGI) and the World Development Indicators (WDI).

To assess the impact of gender quota laws on bank risk taking and systemic risk we use various measures. Following the literature (see, e.g., Keeley, 1990; Demirgüç-Kunt and Huizinga, 2010; Laeven and Levine, 2009), our measures of bank risk taking include: *Z-score*, the log of Z-score, estimated as (ROA+ equity/assets) /σ(ROA); *NPL-to-loans*, non-performing loans-to-total loans; and *Leverage*, book value of assets-to-book value of equity. We also use three measures of systemic risk: *SRISK (log)*, the natural logarithm of one plus SRISK, the expected capital shortfall (in US$ million) of a bank conditional on a crisis event (Brownlees and Engle, 2017);[9] *MES*

[9] *SRISK* is estimated from the following equation: $SRISK_{i,t} = kD_{it} - (1-k)W_{it}(1 - LRMES_{it})$. *D* is the book value of debt (proxied by the book value of liabilities), *W* is the market value of equity, and *k* is the prudential capital fraction, which we set to 8%, following Brownlees and Engle (2017). *LRMES* is the long-run marginal expected shortfall, computed as *LRMES*=1- exp (-18 x *MES*). Note that *MES* refers to the negative of the average bank return during the worst 5% of market return days in a year.

(Acharya, et al., 2017), the average bank return during the worst 5% of market return days in a year (multiplied by -1);[10] and *LVG*, market leverage, computed as the market value of equity plus the book value of liabilities, scaled by the market value of equity.

Panel A of Table 2 shows descriptive statistics of the variables used in our main analyses. Appendix A provides variable definitions. Female directors represent 13.20% of directors on average in our sample (with a median of 11.11%). The average bank board has 10 directors; on average boards are comprised of 48.58% independent directors. Turning to bank risk taking and systemic risk measures, Table 2 shows that the average bank has a Z-*score* of 3.45, slightly higher than the 2.88 average in the sample of banks in Laeven and Levine (2009), which implies a relatively low probability of default for banks in our sample. The other metrics measuring bank risk include *NPL-to-loans*, with a mean of 4.95%, and *Leverage*, measured as the ratio of assets-to-equity, with a mean of 12.46. In terms of the systemic risk measures, the average *SRISK* is 4.42, while the average *MES* (*LVG*) is 2.82% (15.15). We also examine various measures of bank performance, including *Market-to-book*, the market value of equity-to-the book value of equity, and *ROA*, net income-to-average assets. The average bank in our sample has a market-to-book ratio of 1.43, and average *ROA* of 1.47%.

Turning to the director characteristics, shown in Panel B of Table 2, we find that most directors have no attendance problems (only 3.00% of directors do have attendance problems).[11] The average director serves on 0.77 outside boards, and the average tenure of directors is 6.50 years. The mean age of the directors is 59 years, and only 4.80% are classified as a financial expert.

[10] For ease of interpretation, we multiply *MES* by -1 to ensure that all measures are increasing in systemic risk.
[11] Attendance problem is captured by an indicator variable that is equal to one if the director failed to attend at least 75% of board meetings.

2.2 Research Design

To analyze the impact of board gender quota laws, we use a generalized difference-in-differences (DiD) design and run various specifications of the following model:

$$Y_{i,c,t} = \alpha + \beta_{1\,i,c,t} Post + \beta_{2\,i,c,t} Post \times Most\ impacted_i + \gamma_i + \delta_t + \varepsilon_{ict}, \quad (1)$$

$Y_{i,c,t}$ refers to measures of a bank's board characteristics, or risk taking, systemic risk, and financial performance. *Post* is an indicator equal to one starting the year when the quota law is passed in the treatment country and zero otherwise. *Most impacted* is an indicator equal to one for banks with all-male boards in the year before (*t*-1) the law is enacted in the country and zero otherwise. Our alternative proxy for most impacted banks (*Most impacted-below quota*) is an indicator variable equal to one for banks that do not meet the gender quota prior to the enactment of the quota law.[12] Finally, γ_i and δ_t are bank and year fixed effects, which help identify the within-bank and within-year change in *Y* between treatment and control groups when countries enact the quota laws. We include the interaction term *Post* x *Most impacted*, but not *Most impacted* because there is no within-bank variation in this variable and our model includes bank fixed effects. In all regression estimations, we use robust standard errors clustered by bank.

Our DiD approach implicitly takes as the control group all banks in countries without gender quota legislation as of a particular year. The DiD design, however, is vulnerable to differences between treatment and control groups. To further strengthen the DiD design, we use a third difference, and thus a "triple difference" (DiDiD) design (Atanasov and Black, 2016). Specifically, by examining the changes for banks that are most impacted by the reforms, we obtain a DiDiD estimator (β_2) that uses banks that are least impacted by the quota laws as an additional control group. That is, β_1 captures the change for least impacted banks in the treatment group

[12] We code *Most impacted-below quota* as one for banks with all-male boards pre-quota law in treatment countries that do not set specific quotas (Australia and Denmark).

relative to the changes in the control group, while β_2 captures the incremental change for most impacted banks in the treatment group relative to other banks in the treatment group. By doing so, we address the concern that other factors unrelated to the passage of the quota laws may affect banks in the treatment and benchmark countries differently.

3. Effects of Gender Diversity Reforms on Board and Director Characteristics

3.1 The Effect of Gender Quota Laws on Female Representation in Bank Boards

We first analyze the direct impact of gender quota laws on the percentage of female directors. Panel B of Figure 1 plots the percentage of female directors around the year of the quota law in treatment countries. Consistent with the goal of the quota laws, we find that most impacted banks experience a much greater increase in female directors than the other banks (i.e., least impacted banks).

To more formally test the impact of quota laws on board composition, we estimate Equation 1 using the percentage of female directors (*Female directors %*) as the dependent variable. Table 3 shows the estimation results for female representation on bank boards. We present three variations of our baseline model in each panel, depending on whether an interaction term of *Post* x *Most impacted* or additional bank-level controls are included. In Models (1) to (3) of Table 3 we show our baseline regressions and in Models (4)-(6) we add a control, *Governance code*, that is equal to one following the first year in which a governance code in a country includes recommendations about gender diversity on corporate boards, and zero otherwise.

We first validate the average effect of gender quota laws on female director participation. The results from Model (1) in Table 3 show that quota laws lead to a 3.84 pp increase the proportion of female directors on bank boards, or 29.09% of the sample average. The impact is

stronger for *Most impacted* banks. From Model (2), *Most impacted* banks experience a 7.70 pp increase in the proportion of female directors [2.19 + 5.51]. The changes are economically significant, compared to the average percentage of female directors of 16.13% in treatment countries.[13] The results in Models (4)-(6) of Table 3 also show that there is an insignificant change in female director representation on bank boards post reform in countries that adopt governance codes that recommend gender diversity on boards. Importantly, even after controlling for the impact of governance codes, our results continue to show a positive impact of quota laws on female board representation post reform, especially for most impacted banks. The coefficients on *Post* x *Most impacted* are significant across all model specifications in Table 3, including those using our alternate definition of most impacted (*Most impacted-below quota*).

3.2. The Effect of Gender Diversity Reforms on Director Characteristics

We now turn to examine the impact of quota laws on the characteristics of female directors. To shed light on the characteristics of directors post reform, we follow Ahern and Dittmar (2012) and compare characteristics of new, exiting, and retained male and female directors post quota law for banks in treatment countries. We examine the following director characteristics: *Attendance problem*, an indicator variable equal to one if the director failed to attend at least 75% of board meetings*; Independent*, an indicator equal to one if the director is independent and zero otherwise*; # of outside boards*, the number of outside public boards held by the director*; Director age*, and *Financial expert*, an indicator equal to one if the director is classified as a financial expert. In addition, we compare committee membership (audit, nominating, and compensation) of new female directors with incumbent and exiting male directors, post quota law for banks in treatment countries.

[13] Table IA.2 of our Online Appendix reports descriptive statistics for our treatment and control groups of banks.

Panel A of Figure 2 compares characteristics of new female directors with incumbent male directors in the post quota law (t+1 to t+3) period. We find that new female directors are more independent, hold fewer directorships, are younger, and are less likely to be financial experts than retained male directors. They are also less likely to serve on committees. Panel B of Figure 2 compares characteristics of new female directors to those of their exiting male counterparts (likely the ones they are replacing). We find that new female directors are less likely to have attendance problems, more independent, hold fewer directorships, are younger, and less likely to be financial experts than their exiting male counterparts. While new female directors are less likely to serve in nominating committees than their exiting male counterparts, there is no difference in their propensity to serve on audit and compensation committees. These results highlight important differences in the characteristics of new female directors joining bank boards in the post quota law period.

4. Effects of Gender Quota Laws on Bank Risk Taking and Performance

4.1 Gender Quota Laws and Bank Risk Taking

We now turn to analyze how gender quota laws affect bank risk taking behavior and systemic risk. A priori, it is unclear how a mandated increase in female representation on bank boards may affect bank risk and performance. On one hand, an increase in the proportion of female directors could lead to a reduction in risk taking.[14] Women have been shown to be more risk-averse than their male counterparts (e.g. Croson and Gneezy, 2009; Eckel and Grossman, 2008, Sapienza, Zingales, and Maestripieri, 2009) and female directors tend to allocate more effort to monitoring (Adams and Ferreira, 2009); adding directors with such traits could help constrain

[14] In line with this view, Bernile et al. (2018) document that greater board diversity leads to lower volatility.

excessive risk taking at banks, which could be value enhancing.[15] On the other hand, increased female board participation could lead to increased bank risk taking and systemic risk. Adams and Funk (2012) find that female directors are more risk loving than their male counterparts. In addition, the characteristics of female directors (e.g., lack of financial expertise), as well as potential conflicts that may arise when female directors join traditionally male dominated bank boards may result in a deterioration of the board's monitoring ability, which could lead to excessive risk-taking and poor performance.[16] Finally, if banks elect like-minded female directors to comply with the quota, or if the newly appointed female directors lack power to exert any influence on the bank's direction, we should observe no change in bank risk associated with the mandated quotas. Ultimately, assessing the impact of gender quota laws on bank stand-alone risk and systemic risk is an empirical matter.[17]

We first assess the impact of gender quota laws on bank risk, using three proxies of stand-alone risk: *Z-score*, *NPL-to-loans*, and *Leverage*; and three systemic risk measures: *SRISK (log)*, *MES*, and *LVG*. We perform this analysis by estimating Equation 1 using these six measures as our dependent variables. In addition to bank and year fixed effects, we include a set of baseline bank, board, and country-level controls used in prior studies to explain bank risk (e.g., Anginer et al., 2014, 2018; Demirgüç-Kunt and Huizinga, 2010). Our bank-level controls, measured at lagged

[15] These effects are conditional on the new female directors having the necessary skills and experience to carry out their roles effectively.

[16] For example, the increasing opacity and complexity of banks' operations (Adams, 2012) may require bank directors to have industry specific expertise to effectively carry out their monitoring duties; the literature on the impact of financial expertise on bank risk taking and performance yields mixed results (e.g. Minton, Taillard, and Williamson, 2014; Fernandes and Fich, 2009; Erkens, Hung, and Matos, 2012). In addition to expertise, conflicts created by the addition of female directors may disrupt board functioning. In the management literature, the concept of "faultlines" has been used to rationalize negative effects of diversity on firm performance (e.g. Lau and Murnighan, 1998). Faultlines may create divisions among groups (e.g. gender, race, or age) that lead to conflicts that adversely affect board effectiveness (e.g. Veltrop, Hermes, Postma, and De Haan, 2015).

[17] We note that increases or decreases in bank risk taking could be value enhancing or detrimental. While a decrease (increase) in excessive risk taking could be value enhancing (detrimental), an increase (reduction) in risk taking that drives banks to take on (forego) value enhancing risky projects could be value enhancing (detrimental) (see e.g. Stulz, 2016).

value, include: 1) *Size*, the log of the book value of assets, 2) *Deposits-to-assets*, to capture reliance on deposits for funding, and 3) *ROA*, return on assets, to capture profitability. Because the effects of the quota laws could be attributed to changes in other board characteristics, we include two board-level controls to help us identify the effect of female director representation: (1) board size (log), the number of directors on the board, and (2) the percentage of independent directors on the board. Our country-level controls include *GDP growth*, to control for the business cycle and economic conditions; the log of real GDP per capita (*Log GDP per capita*), as a measure of economic development, and *Inflation* (percent change in the Consumer Price Index, CPI). As Demirgüç-Kunt and Huizinga (2010) argue, inflation may affect bank performance and influence bank risk taking. Finally, to control for the impact of bank regulation, which has been shown to affect bank risk taking (e.g., Laeven and Levine, 2009; Berger and Bouwman, 2013), we include three measures of regulatory quality from Barth et al. (2013): 1) *Restrictions on bank activities*, 2) *Official supervisory power*, and 3) *Capital stringency*. We also include the *Macroprudential policy index* from Alam et al. (2019), to control for the impact of changes in macroprudential policies at the country level as a result of the global financial crisis.[18] Appendix A provides our variable definitions.

Table 4 shows the results for the impact of quota laws on bank risk. In Panel A we show results for stand-alone risk and Panel B shows results for systemic risk. Models (1)-(3) of Panel A assess the average impact of quota laws on bank risk taking, while Models (4)-(9) examine the incremental effect on most impacted banks (*Most impacted* / *Most impacted - below quota*). Results in Models (1)-(3) of Table 4 show that banks in treatment countries do not experience

[18] The macroprudential policy index is from the integrated Macroprudential Policy (iMaPP) database from Alam et al. (2019). It captures tightening or loosening actions for 17 macroprudential policy instruments. The database has broader coverage than other commonly used macroprudential policy databases (e.g. Cerutti et al. (2017). In untabulated results, we use the index from Cerutti et al. (2017) and obtain qualitatively similar results.

significant changes in risk taking post quota laws relative to the control group of banks. In contrast, we find that the coefficients on *Post* × *Most impacted* are significantly negative (positive) in the Z-score (*NPL-to-loans and Leverage*) regressions, suggesting that most impacted banks experienced a relative increase in risk taking post quota laws compared to least impacted banks in treatment countries. Taking Model (5) as an example, while least impacted banks in treatment countries experience an insignificant decrease in non-performing-loans relative to the control group post quota law, most impacted banks experience a 72% increase in non-performing-loans following the quota law.[19] The *F*-test on the sum of the coefficients on *Post* and *Post* x *Most impacted*, reported on the bottom row, indicates that the most impacted banks do indeed experience an increase in risk taking post quota law relative to the control group. Results are similar when using Z-score/ *Leverage* as a proxy for bank risk taking (Models (4) and (6)). When using *Most impacted – below quota* in Models (7) to (9), we find a similar pattern, although the results for *Leverage* are no longer significant.

In Panel B of Table 4 we show results using systemic risk measures. The results show a significant increase in systemic risk (*SRISK* and *LVG*) for most impacted banks post quota law. Taking Model (4) as an example, there is a 21% decrease in *SRISK* post quota law for least impacted banks, while most impacted banks experience a 31%% increase in *SRISK* post quota law relative to the least impacted banks.[20] The *F*-test on the sum of the coefficients on *Post* and *Post* x *Most impacted* shows that most impacted banks did not significantly increase *SRISK* post quota law relative to the control group. We find similar results when using *LVG*, although there is evidence of an increase in *LVG* for least impacted banks post quota law as well. *MES* results are

[19] 72.00%= [(-1.09+4.66)/4.95], where -1.09 (4.66) is the coefficient on *Post (Post* x *Most impacted*) in Model (5) of Panel A of Table 4 and 4.95 is the average *NPL-to-loans* for the full sample (Panel A of Table 2).
[20] -21%= -0.93/4.42 (30.7%= [1.36)/4.42], where -0.93 (1.36) is the coefficient on *Post (Post* x *Most impacted*) in Model (4) of Panel B of Table 4 and 4.42 is the average *SRISK* for the full sample (Panel A of Table 2).

not significant. Results using the alternate measure, *Most impacted-below quota* (Models (7)-(9) reveal significant increases in both *SRISK* and *LVG* post quota law for most impacted banks.

Overall, the results in Table 4 are consistent with the view that changes in bank board composition imposed by quota laws lead to increased stand-alone and systemic risk for the most impacted banks.[21, 22, 23] The size and quality of the pool of female executives could play a role in determining the kinds of risks that banks engage in post quota law, because this may impact the board's monitoring ability. To further explore the impact of quota laws on bank risk, we next assess the impact of country level factors (female labor supply) that could affect the size and quality of the candidate pool of female directors (see, e.g., Adams and Kirchmaier, 2016a, b).

4.2 Impact of the Supply of Female Directors

We now turn to explore the extent to which the director labor market across countries moderates the impact of gender quota laws. The impact of quota laws on bank risk and performance will likely depend on the size and quality of the candidate pool of female directors. The supply of potential directors can affect board composition (e.g. Knyazeva et al., 2013) and supply-side constraints have been associated with the adverse market reaction to the California gender quota (Greene, et al., 2020; Hwang et al., 2018; von Meyerinck et al., 2019).[24] These supply-side constraints should be less binding for banks in countries with a larger pool of female

[21] Our results are robust to the exclusion of the year in which the law is passed as well as to the exclusion of the global financial crisis years (2008-2009). These results are reported in Table IA.3 of our Online Appendix.

[22] We use standard errors clustered by bank (not country) because some of our tests involve a small number of countries (e.g., we only have eight treatment countries). The clustered standard errors approach is not appropriate when the number of clusters is small relative to the number of observations in each cluster (Wooldridge, 2003). We nonetheless report results using country clustered standard errors for our baseline results (Panel C of Table 8).

[23] In Table IA.4 of our Online Appendix, we report results from our baseline models in Table 4 using additional board characteristics including, *# of outside boards*, *Tenure*, the average director tenure, and *CEO-Chair* duality. We obtain qualitatively similar results using these additional controls.

[24] Sultana, Cahan, and Raman (2019) find that the positive association between audit committee gender diversity and audit quality weakened after gender diversity guidelines were introduced in Australia, supporting a limited supply view.

executives that should be better able to find female directors with the necessary skills and expertise to carry out their monitoring and advisory duties; this could translate into a better functioning board of directors. Banks in such countries may in turn experience positive consequences (i.e., less excessive risk taking and better performance) after adding female directors to comply with the quotas. On the other hand, the size of the candidate pool of senior female executives is likely to be smaller in countries with a smaller female labor force. For banks in such countries, it may be difficult to find qualified female directors, or they may end up selecting female directors from a smaller pool, plausibly resulting in busier female directors, who may not be able to perform their duties effectively. In these countries, the addition of inexperienced or busier female directors could result in a deterioration in the functioning of the board, which may have adverse consequences in terms of excessive risk taking and poor performance.

We examine the impact of the size of the candidate pool of qualified female directors using two proxies. First, we use the proportion of females in the finance industry (*Women in finance %*); second, we use the proportion of females in high skill occupations (*Females in high skill occupations %)*. We obtain data on the share of women employed in the financial services industry from ILO Employment by Sex and Economic Activity. Data on the share of females in high skill occupations are from ILOSTAT. High skill occupations are based on the International Standard Classification of Occupations (ISCO) and include managers, professionals, technicians and associate professionals (broad skill levels 3 and 4). Using the time-series average of *Women in finance %* (*Females in high skill occupations %),* we create indicator variables, *High Women in finance (High females in high skill occupations*) equal to one for countries with values above the cross-country median and zero otherwise.[25]

[25] In Table IA.7 of our Online Appendix, we show results using interactions between *Post* and the levels of *Women in finance%* (*Females in high skill occupation%*). Results are similar to those using the indicators and document higher

Figure 3 compares characteristics of female directors from quota law countries with *High* and *Low* women in finance. We document that female directors in countries with *Low Women in finance* are more likely to have attendance problems and are less likely to be independent and to have financial expertise than their female counterparts in countries with *High Women in finance.* Our results suggest that in countries with a larger proportion of women in the finance industry it is more likely that female directors possess characteristics typically associated with better functioning boards. Interestingly, female directors in countries with *Low Women in finance* are just as likely to serve on important committees such as audit, nominating, and compensation committees as their female counterparts in countries with *High Women in finance.* The differences in female director characteristics along with their placement on important board committees in countries with *Low Women in finance* suggest that the impact of quota laws could have different implications for bank risk and performance based on the size and qualifications of the pool of female directors.

To more directly asses the role of country characteristics on bank risk post quota law, we estimate Equation (1) including interactions between *Post* and the two indicator variables *High Women in finance* (*High females in high skill occupations*). Panel A (B) of Table 5 presents the results on women in finance and females in high skilled occupations using the three measures of bank risk taking: *Z-score*, *NPL-to-loans*, and *Leverage* (three systemic risk measures: *SRISK (log)*, *MES*, and *LVG*). In Panel C (D), we split our sample into high and low proportion of women in finance and examine the incremental effect on most impacted banks in different subsamples. We

(lower) risk taking and systemic risk in countries with smaller (larger) pool of women in finance (share of females in high skill occupations).

also include bank and year fixed effects in addition to a set of baseline bank, board, and country-level controls used in Table 4, but we omit them from reporting for brevity.[26]

The results in Panel A of Table 5 show that the increased risk taking subsequent to the quota laws is concentrated in banks from countries with a smaller proportion of women in finance and a lower proportion of females in high skill occupations. In fact, results show a reduction in risk taking post quota law for banks in countries with higher share of women in finance and higher proportion of females in high skill occupations. The results are both statistically and economically significant. Taking the coefficients in Model (2) as an example, relative to the control group, *NPL-to-loans* increases by 1.87 pp post quota law for banks in countries with below median female in finance (37.8% of the sample average). In contrast, banks in countries with a larger share of women in finance experience a significant decrease in *NPL-to-loans* of 3.26 pp, 65.86% of the average *NPL-to-loans* (4.95%).[27] Results are similar when using other proxies for bank risk taking. Turning to the impact of females in high skill occupations, results show lower (higher) risk taking post quota law for banks in countries with higher (lower) proportion of females in high skill occupations. As an example, while banks in countries with below median *females in high skill occupations* experience a significant increase in *NPL-to-loans* of 3.88 pp (78.4% of the sample average), banks in countries with *High females in high skill occupations* experience an incremental decrease of 6.75 pp in *NPL-to loans*, such that post quota law, banks in countries with higher proportion of females in high skill occupations experience a significant decline of 2.87 pp in *NPL-*

[26] We will focus on *Most impacted* based on all-male boards as our main measure of *'Most impacted*' from now on to save space on the tables. Results are similar using *Most impacted – below quota boards* and available upon request.
[27] From the coefficients in Model (2) of Panel A of Table 5, banks in countries with *High Female Labor Force*, experience a decrease of 3.26 (1.87 + -5.13) post quota law, relative to the control group, or 65.86% (3.26/4.95) of the sample average. The decrease is statistically significant at the 1% level (*p*-value of the *F*-test for the sum of the coefficients on *Post* + Post x *High Female Labor Force*=0 is 0.001).

to-loans, or 57.98% of the average *NPL-to-loans*.[28] Results are similar when using other proxies for risk.

In Panel B of Table 5, we assess the impact on systemic risk. Consistent with the findings in Panel A for stand-alone risk, results in Panel B show that banks in countries with a smaller (larger) proportion of women in finance and lower (higher) proportion of females in high skill occupations experience an increase (decrease) in systemic risk post quota law. Results are statistically and economically significant and are consistent across all of our three measures of systemic risk. Taking the coefficients in Model (1) as an example, relative to the control group, *SRISK* increases (decreases) by 8.55% (35.95%) post quota law for banks in countries with below (above) median women in finance.[29] We find similar results using our alternate proxy for the size and quality of the pool of female directors (*High females in high skill occupations*) as well as our alternate measures of systemic risk.

In Panel C (D) of Table 5, we split our sample into above and below the median share of women in finance and examine the incremental effect on most impacted banks. We find a reduction in risk taking (Z-score and *NPL-to-loans*) post quota law in countries with higher share of women in finance, though to a lesser extent for *Most impacted* banks. In contrast, we find that a significant increase in systemic risk (*SRISK* and *LVG*) post quota law in countries with lower share of women in finance for *Most impacted* banks relative to least impacted banks in treatment countries. The

[28] From the coefficients in Model (5) of Panel A of Table 5, banks in countries with below median *females in high skill occupations* experience an increase of 3.88 pp in *NPL-to-loans* post quota law, relative to the control group. In contrast, banks in *High females in high skill occupations* countries experience an incremental 6.75 pp decrease in *NPL-to-loans* post quota law, leading to a significant 2.87 [-6.75+3.88] reduction in *NPL-to-loans* post-quota law, or (2.87/4.95) 57.98% of the sample average. (*p*-value of the *F*-test for the sum of the coefficients on *Post* + Post x *High skill occupations*=0 is 0.001).

[29] 8.55%= 0.378/4.42 where 0.378 is the coefficient on *Post* in Model (1) of Panel B of Table 5 and 4.42 is the average *SRISK* for the full sample. 35.95%= [-1.589]/4.42), where -1.589 is the sum of the coefficients on *Post (Post* x *High female in finance*) [0.378+-1.967] in Model (1) of Panel B of Table 5. (*p*-value of the *F*-test for the sum of the coefficients on *Post* + *Post* x *High women in finance* =0 is 0.011).

impact of quota laws on *Most impacted* is significantly different for banks from countries with higher and lower share of women in finance (χ^2 test is significant for *MES* and *LVG*).

Overall, the results in this section highlight stark cross-country differences on the impact of board gender quota laws on bank risk taking and systemic risk and underscore the importance of supply-side factors. Specifically, the size and qualifications of the candidate pool of female directors significantly affect the results. Our results also show that quota laws may have adverse consequences for bank risk taking and systemic risk in countries with a limited supply of qualified women directors, where the constraints imposed by the quotas are likely greater. To assess whether these changes in risk taking are beneficial or detrimental to the banks, we next assess their impact on performance.

4.3 Impact of Quota Laws on Bank Performance

So far, we find that subsequent to the enactment of quota laws, there is a significant increase in female representation on bank boards. We also document that new female directors are more independent, younger, are less likely to have attendance problems, hold fewer outside directorships, and are less likely to be financial experts relative to exiting male directors post quota law. Interestingly, we document an increase in bank risk taking and systemic risk post quota law for banks most impacted by the quota laws. In addition, we document that the increase in risk taking and systemic risk is concentrated in countries with fewer women in finance or lower proportion of females in skilled occupations. It is not yet clear whether the increased risk taking post quota law is detrimental. By taking higher risks, banks can actually increase value, as long as the risks represent positive NPV projects (see e.g. Stulz, 2016). Better corporate governance does not imply safer banks (e.g. Stulz, 2016), so the observed increased risk could be a result of a shift towards

more shareholder-friendly corporate governance, which has been shown to be associated with more risk taking and higher systemic risk (see e.g. Anginer et al., 2018; Laeven and Levine, 2009).

We now turn to examine the impact of gender quota laws on bank performance to shed light on whether the observed changes in risk are detrimental or value enhancing. To do so, we use the three-year ahead average of three common measures of bank performance: *Market-to-book*, the market value of equity-to-the book value of equity; *ROA*, net income-to-average assets; and *ROE*, net income-to-average equity. In Table 6, we show results from regressions using these three performance measures as our dependent variables. All regressions include bank and year fixed effects and a set of baseline bank, board, and country-level controls that include: *Size; Deposits-to-assets; Noninterest income; Board size; Board independence; GDP growth; Log GDP per capita*; *Inflation*; *Restrictions on bank activities*, *Official supervisory power*, *Capital stringency*, and *Macroprudential policy index*.

In Panel A of Table 6, results show that banks in treatment countries do not experience significant changes in *ROA* or *ROE* post quota law relative to the control group of banks but have higher *Market-to-book* post quota law (Model 1). In addition, we find that the coefficients on *Post* × *Most impacted* are significantly negative in the *ROE* regressions, suggesting that the most impacted banks experienced a decrease in performance post quota law, relative to least impacted banks in treatment countries. We also find some evidence that *Most impacted* banks experience a decrease in *ROE* post quota law relative to the control group (the *F*-test on the sum of the coefficients on *Pos*t and *Post* x *Most impacted* is significant at the 10% level in Model (6)). Among control variables, we find that larger banks tend to perform worse when performance is measured by *ROA/ROE*.

Overall, these results suggest that the observed increased risk taking and systemic risk post quota law for most impacted banks may not be detrimental for bank performance. Given the importance of supply-side factors in assessing the impact of quota laws on bank risk taking and systemic risk, we now turn to explore how they affect bank performance. In Panel B of Table 6, we examine the impact of *Women in finance* and *Females in high skill occupations* on bank performance subsequent to the quota laws. Results show higher *Market-to-book* post quota law for banks in countries with higher proportions of females in high skill occupations.

In Panel C of Table 6, we split our sample based on share of women in finance and examine the incremental effect on most impacted banks in different subsamples. We find most impacted banks in countries with *Low Women in finance* experience significant decreases in both *ROA* and *ROE* post quota law relative to those banks in countries with *High Women in finance*. The χ^2 test to compare differences between countries with higher and lower share of women in finance is significant for *ROE*.

Taken together, our results suggest that increased female representation on bank boards can have positive effects on bank risk and performance, but the effects depend on the size and quality of the female labor pool. Further, our results show that the constraints imposed by gender quota laws can have negative ramifications for bank risk taking, systemic risk, and performance in countries in which the size of the candidate pool of female directors is smaller and in countries with lower proportion of females in high skill occupations.

5. Mechanism

We explore several channels through which adding female directors that are younger, less experienced, and from outside of the banking industry could result in more risk-taking at the bank

level. First, we examine whether quota laws result in changes in composition of board committees. On one hand, one may argue that adding one or two females to the board should result in minimal changes if they were not serving on important committees, which could imply window-dressing. On the other hand, if young and inexperienced female directors are added to key board committees, then it becomes plausible that even just adding one or two females to the board could have a material impact on bank risk-taking behavior and performance.

In the previous sections, we show that female directors are just as likely to serve on important committees such as audit, compensation, and nominating committees in countries with lower share of women in finance (Figure 3). Importantly, when we compare incoming female directors with retained and exiting male directors in countries with lower share of women in finance, we find little difference between new female directors and retained and exiting male directors in key committee membership (Figure 4). To further drill down on changes in board composition in banks most impacted by the quota laws, we plot differences in female director characteristics between most impacted banks and others post quota law in countries with *Low share of women in finance* (Figure 5) .

In Panel A of Figure 5 we document that post quota law female directors in most impacted banks in countries with *Low share of women in finance* serve on fewer outside boards, are younger, and have less financial expertise. However, they are just as likely to serve on important committees such as nominating, and compensation committees, and are more likely to serve on audit committees; this helps explain how adding female directors in banks with no prior female board members could have a material impact on bank risk-taking and performance. More importantly, as shown in Panel B of Figure 5, we find that in *Low women in finance* countries, female directors in *Most impacted* banks are much less likely to have prior board experience (10.6% vs 27.3%) or

prior bank board experience (4.1% vs 10.8%); they are also less likely to have prior audit committee experience (1.6% vs. 7.2%) and compensation committee experience (0.0% vs 2.7%). Our results suggest that among *Most impacted* banks in countries with *Low women in finance*, female directors are less likely to possess characteristics typically associated with better functioning boards. The differences in female director characteristics suggest that the impact of quota laws could have significant implications for bank risk and performance.

Second, we explore whether a critical mass is needed for female directors to impact bank risk-taking and performance. If the impact of quota laws on bank risk taking and systemic risk is driven by the addition of female directors, the impact should be more pronounced for banks that achieve a critical mass of female directors (e.g. Konrad, Kramer, and Erkut, 2008). Table 7 reports the results assessing the impact of quota laws on bank risk taking, systemic risk, and performance for banks that increase the number of female directors post quota law by two and by three or more.

Consistent with our hypothesis that the effect is driven by banks with a critical mass of female directors, we find a larger increase in risk taking (lower *Z-score*, higher *NPL-to-loans* and *Leverage*) and systemic risk (higher *SRISK*) post quota law for banks with an increase of three or more female directorships, compared to those banks with just one or two women added to the board. Our evidence suggests that when banks add a larger number of female directors who are younger and less experienced to the traditionally male dominated bank boards, it could lead to increased bank risk taking and systemic risk due to a deterioration of the board's monitoring ability. These results help paint a clearer picture of the mechanism through which quota laws may impact bank risk and performance.

6. Robustness Tests

We explore the robustness of our results and conduct several additional tests. We first assess the parallel trends assumption underlying our DiD design and conduct a test that includes an additional indicator for the pre-quota law period. Specifically, we include *Pre quota*, an indicator that is equal to one for years *t-2* and *t-1* relative to the year of the quota law and zero otherwise, and interactions between *Pre quota* and *Most impacted*. We show results in Panel A of Table 8 using bank risk taking and systemic risk measures. These results confirm our prior findings –the coefficients on *Post* are mostly insignificant while the coefficients on *Post* x *Most impacted* are all statistically and economically significant. These results also suggest that treatment and control banks followed similar patterns in risk taking and systemic risk pre quota.

Next, as an attempt to further isolate the impact of the quota laws from other confounding factors, we restrict our sample period to the five years around the quota law (-5, +5).[30] We replicate our main results from Table 4 for this period in Panel B of Table 8 using bank risk taking (Models (1) – (3)) and systemic risk measures (Models (4) – (6)). We continue to find an increase in risk taking and systemic risk for most impacted banks, confirming our prior results. In Panel C of Table 8, we replicate results from Table 4 (Models (4)-(6)) using country-clustered standard errors. Our results corroborate our earlier findings.

We perform several additional robustness tests and report the results in our Online Appendix. In Table IA.4, we test the robustness of our main results in Table 4 to the inclusion of additional controls for board characteristics, including the average tenure of directors, the average # of outside boards held by directors, and whether the CEO is also the Chair of the board. In Table IA.5 of our Online Appendix we show results using banks from countries with board gender

[30] We find qualitatively similar results using the periods [- 3+3] around the results.

reforms prior to 2008 as additional controls. Results continue to show an increase in risk taking and systemic risk for *Most impacted* banks post quota law. We also test the robustness of our results from Table 5 assessing the impact of labor market characteristics. In Table IA.6 of our Online Appendix, we show results using two alternate proxies for female labor supply: *Female labor force %,* and the World Economic Forum's *Gender Gap index*. In Table IA.7 we replicate results from Table 5 using the levels of *Women in Finance* (*Females in high skill occupations*) instead of the indicator variables. Our results continue to show an increase (decrease) in risk taking and systemic risk in countries with larger (smaller) supply of qualified women executives. Finally, in Table IA.8, we replicate results from Panel C of Table 6 splitting the sample into countries with High (low) share of females in high skill occupations. We continue to find deterioration in performance (*ROA* and *ROE*) for *Most impacted* banks in countries with *Low females in high skill occupations*.

7. Conclusion

We assess the impact of boardroom gender quota laws around the world on bank risk taking and systemic risk. We exploit quota-oriented legislation to identify the change in board gender diversity at the bank level. We document an increase in female directors on bank boards of about 3.84% of the sample average after the enactment of gender quota laws. The new female directors are more independent, younger, hold fewer outside directorships, are less likely to have attendance problems, and are less likely to be financial experts relative to exiting male directors post quota law.

We find an increase in bank risk taking and systemic risk post quota law for banks most impacted by the quotas, i.e. those with all-male boards or below quota prior to quota laws.

Importantly, we document differences in female director characteristics (e.g. independence; financial expertise) based on supply-side factors (countries' share of women in finance and/or high skill occupations). These country characteristics are important determinants of the effect of gender quota laws on bank risk taking and systemic risk. We observe a significant decrease in bank risk taking and systemic risk and improvements in bank performance post quota law in countries with larger share of women in finance and higher proportion of females in high skill occupations. In contrast, we find evidence of increased stand-alone and systemic risk, and deterioration in bank performance post quota law in countries with a smaller share of females in finance (high skill occupations).

Our findings relate to previous studies that document the effect of gender diversity reforms; these papers are predominantly single country studies (e.g. Ahern and Dittmar, 2012; Matsa and Miller, 2013; Hwang, et al., 2018, von Meyerinck et al., 2019). However, this literature and our study differ in a significant way: we assess the impact of legislation reforms on the *banking* sector, where boards tend to be less gender diverse, across a *large* number of countries and examine their impact on bank risk taking and systemic risk. Our results suggest that differences in the supply of female directors across countries affects the impact of quota laws on bank risk taking, systemic risk, and performance. In this aspect, our paper relates to studies examining the relation between board gender diversity and economic outcomes. However, our study uses a shock-based research design, namely the quota laws, which reduces concerns related to endogeneity. We can therefore establish an arguably more causal relation between the impact of boardroom gender diversity on stand-alone bank risk, systemic risk, and bank performance.

Our evidence shows that gender quota laws change the dynamics of the board by increasing female board representation. In turn, these female directors help to improve bank performance

and lower bank risk taking and systemic risk, but only in countries where the candidate pool of qualified female directors is larger. In contrast, our evidence suggests that quota laws may be harmful to bank performance in countries in which the supply-side constraints may be more binding (i.e. countries in which the pool of women with relevant skills and expertise is smaller). We explore several channels of excessive risk taking associated with adding inexperienced women directors from outside of the banking industry to important board committees.

Our findings have important policy implications, as policy makers continue to debate the enactment of board gender diversity reforms. Our study echoes recent studies on how board gender diversity differs across industries (Adams and Kirchmaier, 2016a, b) and those highlighting the importance of supply-side factors as key determinants of the outcome of mandated quotas (Hwang et al., 2018; Sultana, et al., 2019; Lu, 2019; Greene et al., 2020).

References

Acharya, V., Pedersen, L., Philippon, T., Richardson, M., 2017. Measuring systemic risk. *Review of Financial Studies*, 30, 2-47.

Adams, R. B., and Ferreira, D., 2009.Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics* 94, 291-309.

Adams, R. B. 2012. Governance and the financial crisis. *International Review of Finance* 12 (1), 7-38.

Adams, R. B., and Funk, P., 2012. Beyond the glass ceiling: Does gender matter? *Management Science* 58, 219-235.

Adams, R. B. and Kirchmaier, T., 2016a. Women on boards in Finance and STEM industries. *American Economic Review* 106 (5): 277–281

Adams, R. B. and Kirchmaier, T., 2016b. Women in Finance. European Corporate Governance Institute Working Paper.

Adams, R. B., and Mehran, H. 2003. Is corporate governance different for bank holding companies? *FRBNY Economic Policy Review* 9, 123-142.

Adams, R. B., and Mehran, H. 2012. Bank board structure and performance: Evidence for large bank holding companies. *Journal of Financial Intermediation* 21, 243-267.

Adams, R. B., and Ragunathan, V. 2015. Lehman sisters. FIRN Research Paper. Available at SSRN: https://ssrn.com/abstract=2380036 or http://dx.doi.org/10.2139/ssrn.2380036.

Ahern, K., and Dittmar, A., 2012. The changing of the boards: the impact on firm valuation of mandated female board representation. *Quarterly Journal of Economics* 128, 137–197.

Alam, Z., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E., and Wang, N. 2019. Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database. IMF Working Paper.

Anginer, D., Demirgüç-Kunt, A., Huizinga, H., and Ma, K. 2018. Corporate governance of banks and financial stability. *Journal of Financial Economics* 130, 327-346.

Anginer, D., Demirgüç-Kunt, A., and Zhu, M. 2014. How does deposit insurance affect bank risk? Evidence from the recent crisis. *Journal of Banking and Finance* 48, 312-321.

Arnaboldi, F., Casu, B., Kalotychou, E., and Sarkisyan, A. 2019. Board diversity reforms: Do they matter for EU bank performance. *European Financial Management*, Forthcoming.

Atanasov, V., and Black, B., 2016. Shock-based causal inference in corporate finance and accounting research. *Critical Finance Review* 5, 207-304.

Barth, James R., Gerard Caprio, and Ross Levine, 2013, Bank regulation and supervision in 180 countries from 1999-2011, *Journal of Financial Economic Policy* 5, 111-220.

Beltratti, A., and Stulz, R. M. 2012. The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics* 105 (1), 1-17.

Berger, A., and Bouwman, C. 2013. Does capital affect bank performance during financial crises? *Journal of Financial Economics* 109 (1), 146-176.

Berger, A., Kick, T., and Schaeck, K. 2014. Executive board composition and bank risk taking. *Journal of Corporate Finance* 28, 48-65.

Bernile, G., V. Bhagwat, and S. Yonker. 2018. Board diversity, firm risk, and corporate policies. *Journal of Financial Economics* 127:588-612.

Brownlees, C.T. and R.F. Engle, 2017, SRISK: A conditional capital shortfall measure of systemic risk. *Review of Financial Studies*, 30, 48-79.

Catalyst, 2018a. Regulatory Board Diversity. https://www.catalyst.org/regulatory-board-diversity.

Catalyst, 2018b. Legislative Board Diversity. https://www.catalyst.org/legislative-board-diversity.

Cerutti, E., Claessens, S., and Laeven, L. 2017. The use and effectiveness of macroprudential policies: New evidence. *Journal of Financial Stability* 28 (C), 203-224.

Croson, R., and Gneezy, U. 2009. Gender Differences in Preferences. *Journal of Economic Literature* 47:2, 448–474.

De Haan, J., and Vlahu, R. 2016. Corporate governance of banks: A survey. *Journal of Economic Surveys* 30, 228-277.

Deloitte, 2017. Women in the boardroom: A global perspective.

Demirgüç-Kunt, A., and Huizinga, H. 2010. Bank activity and funding strategies: The impact on risk and returns. *Journal of Financial Economics* 98, 626-650.

EC, 2012. Women in economic decision-making in the EU: Progress report. European Commission.

Eckbo, B.E.., Nygaard, K., and Thorburn, K.S. 2018. Board gender-balancing and firm value. European Corporate Governance Institute (ECGI) Working Paper.

Eckel, C. C., P. J. Grossmann. 2008. Men, women, and risk aversion: Experimental evidence. C. R. Plott, V. L. Smith, eds. Handbook of Experimental Results. Elsevier, Amsterdam, 1061–1073.

Erkens, D. H., Hung, M., and Matos, P. 2012. Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance* 18, 389-411.

Fahlenbrach, R., and Stulz, R.M. 2011. Bank CEO incentives and the credit crisis. *Journal of Financial Economics* 99, 11-26.

Fernandes, N. and Fich, E. M. 2009. Does financial experience help banks during credit crises? Working Paper. Drexel University.

Ferreira, D., Kirchmaier, T., and Metzger, D. 2012. Boards of banks. European Governance Institute (ECGI) Finance Working Paper 289.

Ferreira, D., Ginglinger, E., Laguna, M.A., and Skalli, Y. 2018. Board quotas and director-firm matching. LSE working paper.

Greene, D., Intintoli, V., and Kahle, K. 2020. Do board gender quotas affect firm value? Evidence from California Senate Bill No. 826. *Journal of Corporate Finance* 60, forthcoming.

Griffin, Dale W. Li, K. and Xu, T. 2019. Board gender diversity and corporate Innovation: International evidence. Available at SSRN: https://ssrn.com/abstract=3266080.

Hermalin, B., Weisbach, M., 2003. Boards of directors as an endogenously determined institution: a survey of the economic literature. *Economic Policy Review* 9, 7-26.

Hwang, S., Shivdasani, A., and Simintzi S., 2018. Mandating women on boards: evidence from the United States, UNC working paper.

Keeley, M., 1990. Deposit insurance, risk, and market power in banking. *American Economic Review* 80, 1183-1200.

Kirkpatrick, Grant, 2009. The corporate governance lessons from the financial crisis. *Financial Markets Trends* 96, 1-30.

Knyazeva, A., Knyazeva, D., and Masulis, R. W. 2013. The Supply of Corporate Directors and Board Independence. *Review of Financial Studies* 26, 1561-1605.

Konrad, A. M., Kramer, V., and Erkut, S. 2008. The impact of three or more women on corporate boards. *Organizational Dynamics* 37, 145-164.

Laeven L., and Levine, R. 2009. Bank governance, regulation and risk taking. *Journal of Financial Economics* 93, 259-275.

Lau, D. C., and Murnighan, J. K. 1998. Demographic diversity and faultlines: the compositional dynamics of organizational groups. *Academy of Management Review* 23 (2), 325-340.

Li, L., and Song, F. M. 2013. Do bank regulations affect board independence? A cross-country analysis. *Journal of Banking and Finance* 37, 2714-2732.

Linck, J. S., Netter, J. M., and Yang, T. 2008. The effects and unintended consequences of the Sarbanes-Oxley Act on the supply and demand for directors. *Review of Financial Studies* 22, 3287-3328.

Lu, S. 2019. Quota or Disclosure? Evidence from Corporate Board Gender Diversity Policies. Evidence from Corporate Board Gender Diversity Policies. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3493375

Matsa, D. A., and Miller, A. R., 2013. A female style in corporate leadership? Evidence from quotas. *American Economic Journal: Applied Economics* 5, 136–169.

Minton, B. A., Taillard, J. P., and Williamson, R. 2014. Financial expertise of the board, risk taking, and performance: Evidence from bank holding companies. *Journal of Financial and Quantitative Analysis* 49, 351-380.

Muller-Kahle, M. I. and Lewellyn, K. B. 2011. Did board configuration matter? The case of US subprime lenders. *Corporate Governance: An International Review*, 19(5): 405–417.

Nygaard, K. 2011. Forced board changes: Evidence from Norway. NHH Dept. of Economics Discussion Paper No. 5/2011.

Office of the Comptroller of the Currency. 2016. The director's book: Role of directors for national banks and federal savings associations.

Sahay, R., Čihák, M., N'Diaye, P., Barajas, A., Kyobe, A. J., and Mitra, S. 2017. Banking on women leaders: A case for more? IMF Working Paper No. 17/99. Available at SSRN: https://ssrn.com/abstract=3053197

Sapienza, P., L. Zingales, D. Maestripieri. 2009. Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National*. *Academy of Sciences of the United States of America* 106(36) 15268–15273.

Smith, N., 2014. Quota regulations of gender composition on boards of directors. CESifo DICE Report 2/2014, 42-48.

Stulz, R. M. 2016. Risk management, governance, culture, and risk taking in banks. *FRBNY Economic Policy Review* 22, 43-59.

Sultana, N., Cahan, S. F., and Rahman, A. 2019. Do gender diversity recommendations in corporate governance codes matter? Evidence from audit committees. *AUDITING: A Journal of Practice & Theory*. In-Press.

Terjesen, S., Aguilera, R. V., and Lorenz, R., 2015. Legislating a woman's seat on the board: Institutional factors driving gender quotas for boards of directors. *Journal of Business Ethics* 128, 233–251.

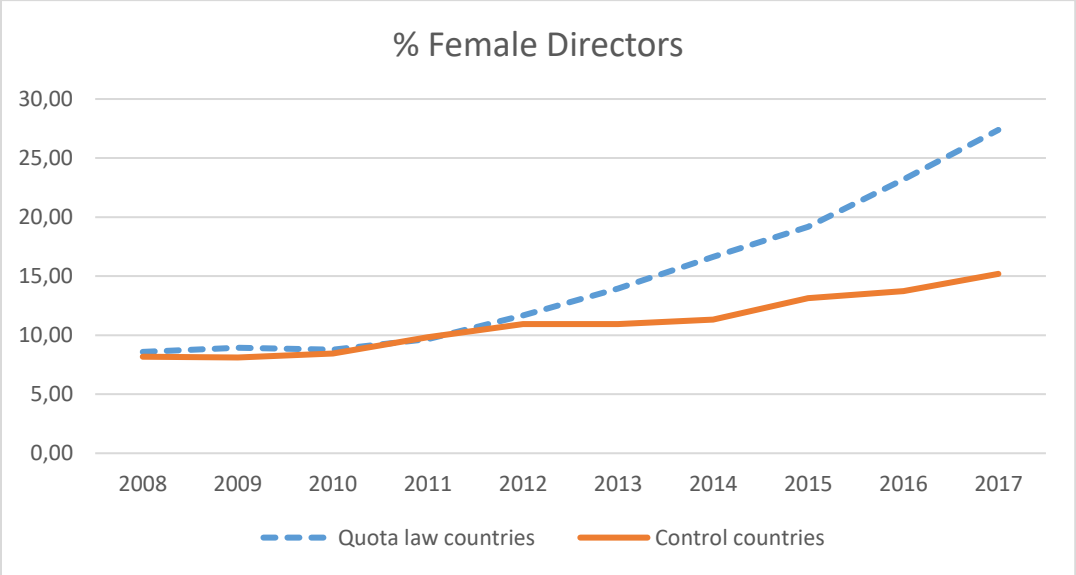
Veltrop, D., Hermes, N., Postma, T, and de Haan, J. 2015. A tale of two factions: exploring the relationship between fractional faultlines conflict management and the moderating role of reflexivity in pension fund boards. *Corporate Governance: An International Review* 23, 145–160.

von Meyerinck, F., Niessen-Ruenzi, A., Schmid, M., and Davidoff Solomon, S. 2019. As California goes, so goes the nation? The impact of board gender quotas on firm performance and the director labor market. The impact of board gender quotas on firm performance and the director labor market. Available at SSRN: https://ssrn.com/abstract=3303798.

Wooldridge, J. M., 2010. Econometric Analysis of Cross Section and Panel Data. MIT Press.

Figure 1. Evolution in the Percentage of Female Directors.
Figure shows the evolution of women participation in boards of directors from 2008 through 2017 for our sample countries. Quota law countries are the eight countries in our sample that passed quota laws during our sample period that aim to increase the participation of women in boardrooms. The control countries consist of 27 countries that did not adopt quota laws during our sample period. In Panel B we show the proportion of female directors around the year of the quota law in quota law countries. *Most impacted (Other)* banks are those with all-male boards (with female board members) as of year t-1 relative to the enactment of the quota law and zero otherwise.

Panel A: % Female Directors



Panel B: % Female Directors around the Passage of Quota Laws

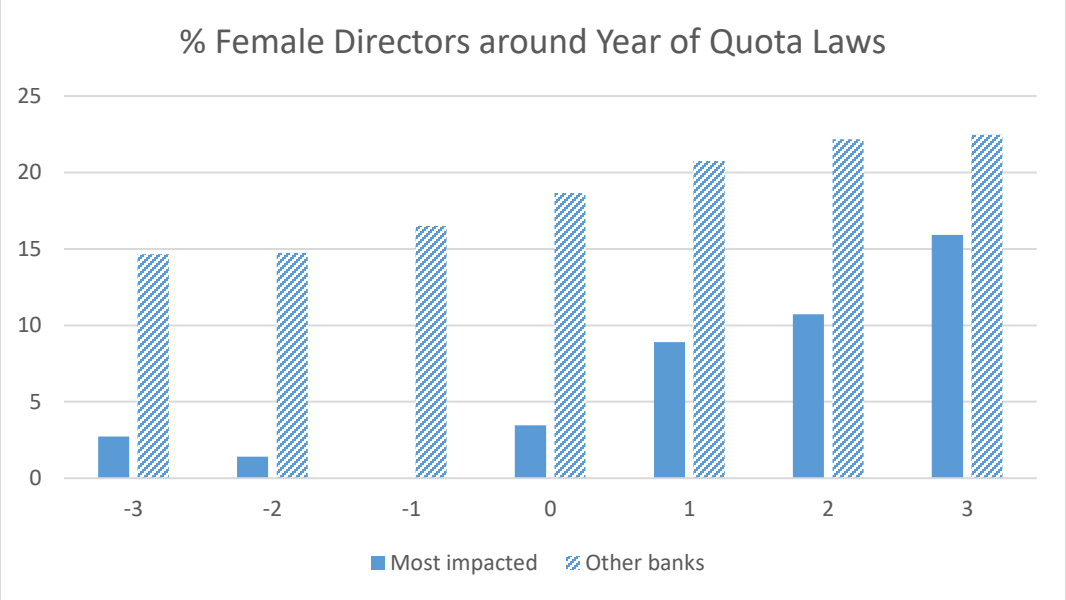
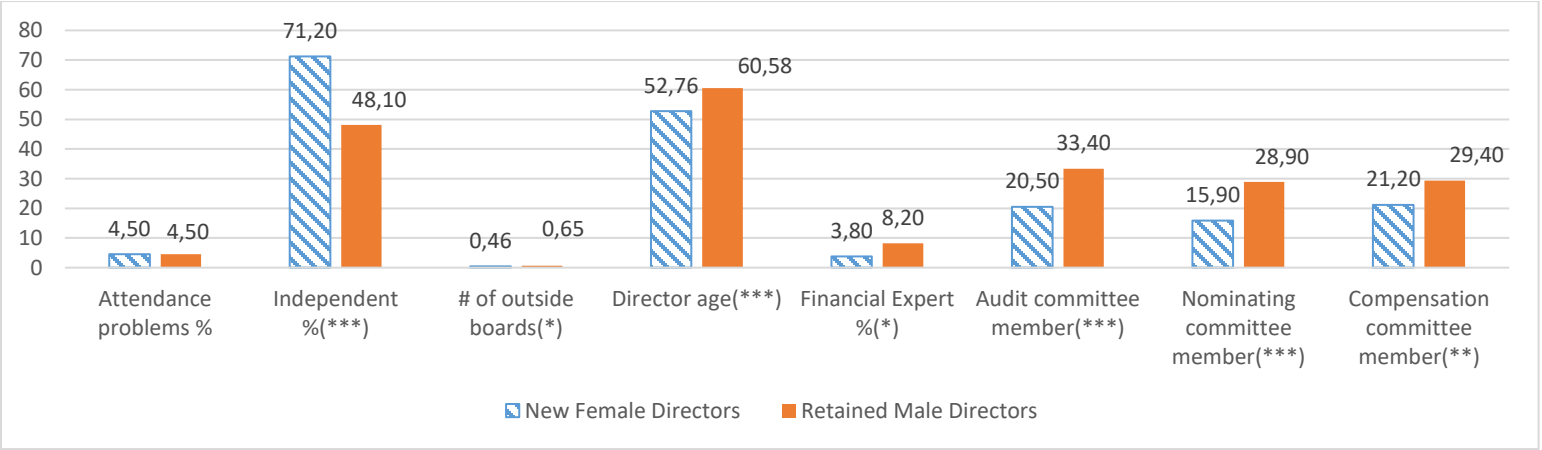


Figure 2 Characteristics of New Female, Retained Female and Exiting Male Directors

Figures show average female and male director characteristics from t+1 to t+3 following gender quota laws for banks in our treatment sample (quota law countries). Quota law countries are those that passed quota legislation during our sample period that aim to increase the participation of women in boardrooms. All variables are defined in Appendix A. Panel A (B) compares new female directors to retained (exiting) male directors. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A. New Female Directors and Retained Male Directors



Panel B. New Female Directors and Exiting Male Directors

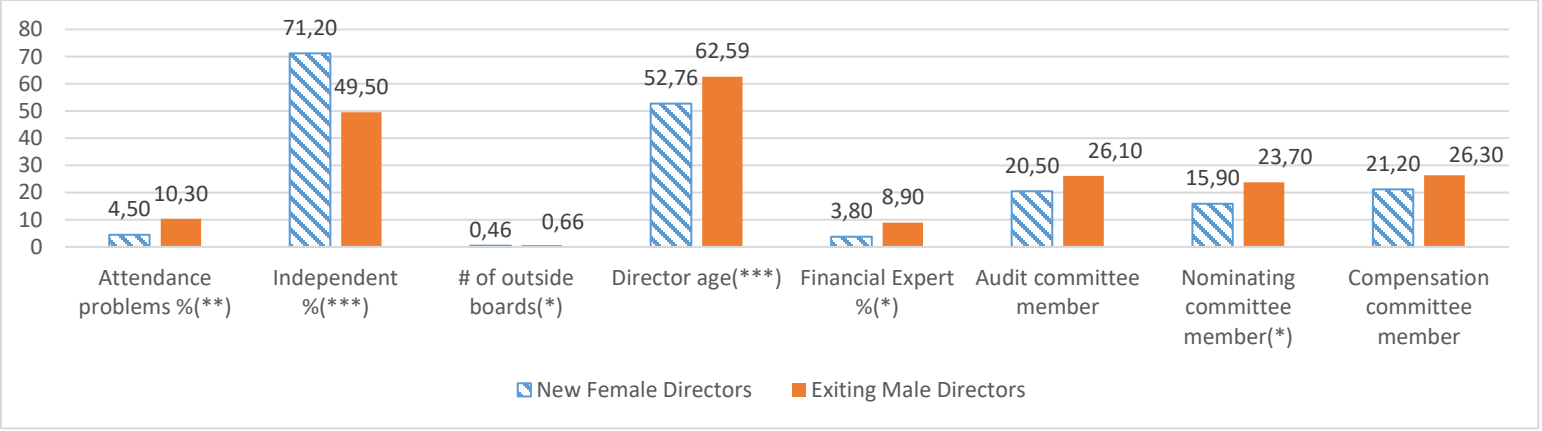


Figure 3. Characteristics of Female Directors Post-Quota Laws.

Figures show average female director characteristics from t+1 to t+3 following gender quota laws in countries with *High* (above median) and *Low share of women in finance* for banks in our treatment (quota law) sample. Quota law countries are those that passed quota legislation during our sample period that aim to increase the participation of women in boardrooms. All variables are defined in Appendix A. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

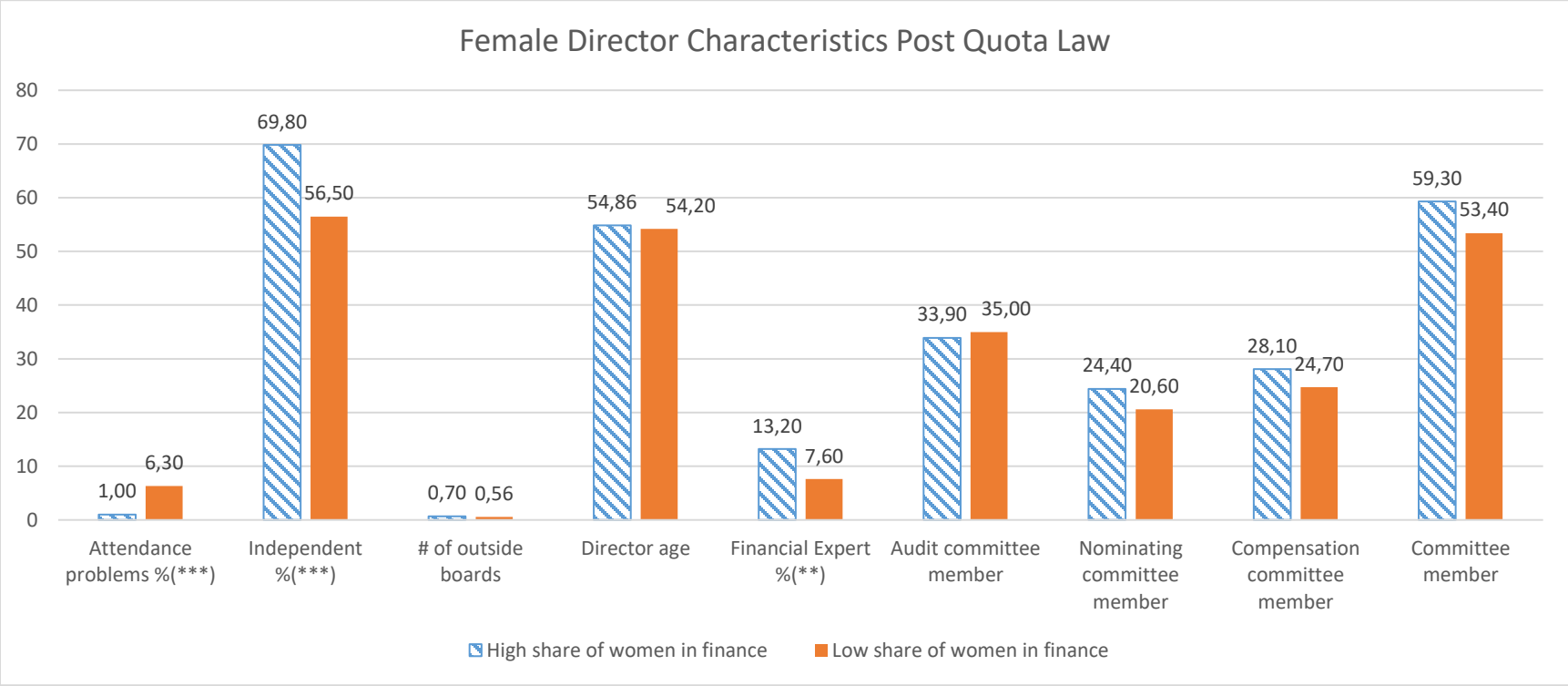
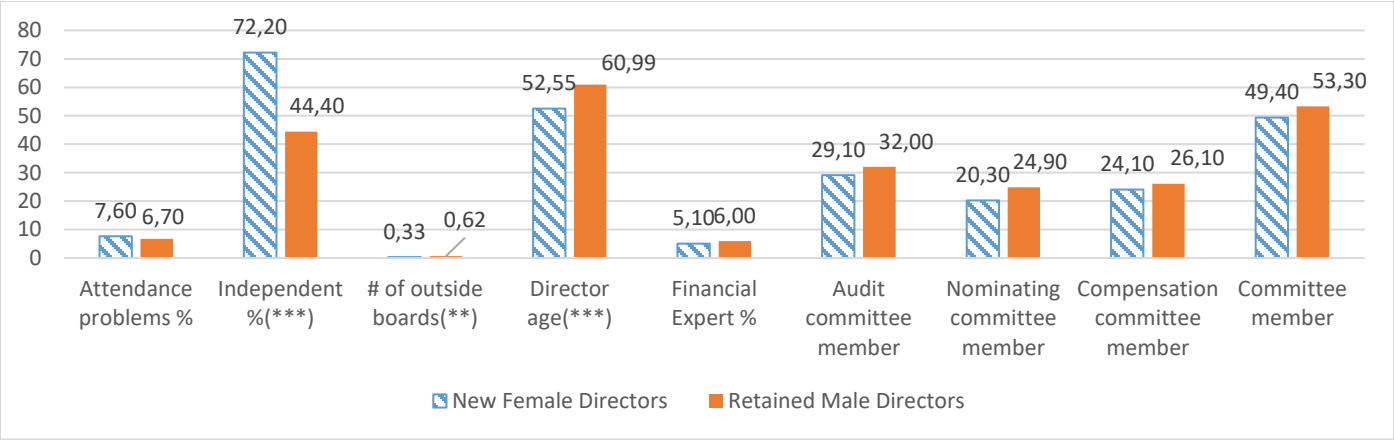


Figure 4. Characteristics of New Female, Retained Female and Exiting Male Directors in Countries with Low Share of Women in Finance

Figures show average female and male director characteristics from t+1 to t+3 following gender quota laws for banks in our treatment sample (quota law countries) in countries with Low (below median) share of women in finance. Quota law countries are those that passed quota legislation during our sample period that aim to increase the participation of women in boardrooms. All variables are defined in Appendix A. Panel A (B) compares new female directors to retained male (exiting male) directors. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A. New Female Directors and Retained Male Directors in Countries with Low Share of Women in Finance



Panel B. New Female Directors and Exiting Male Directors in Countries with Low Share of Women in Finance

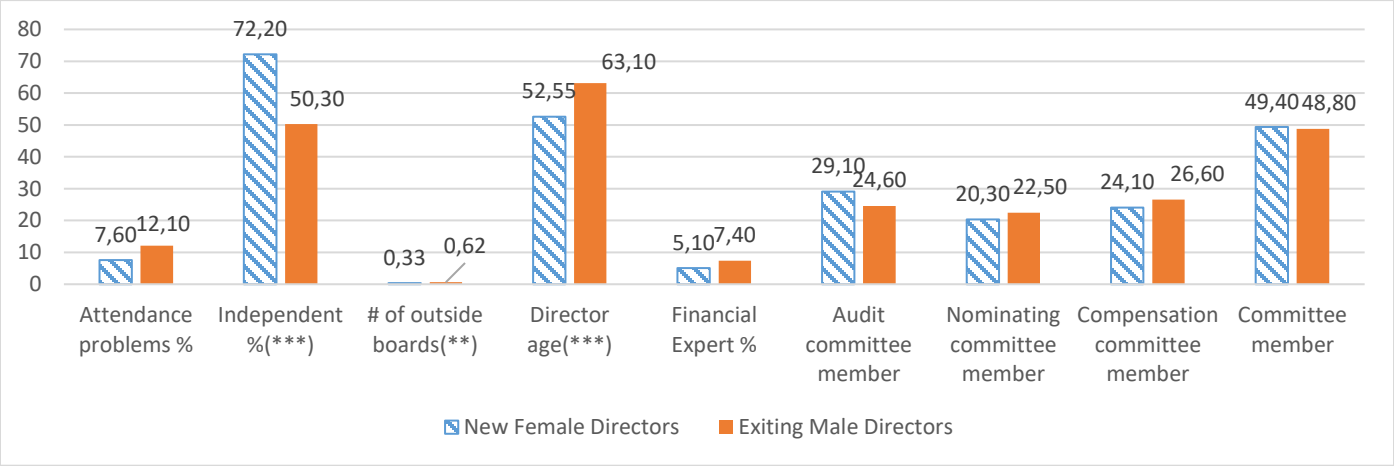
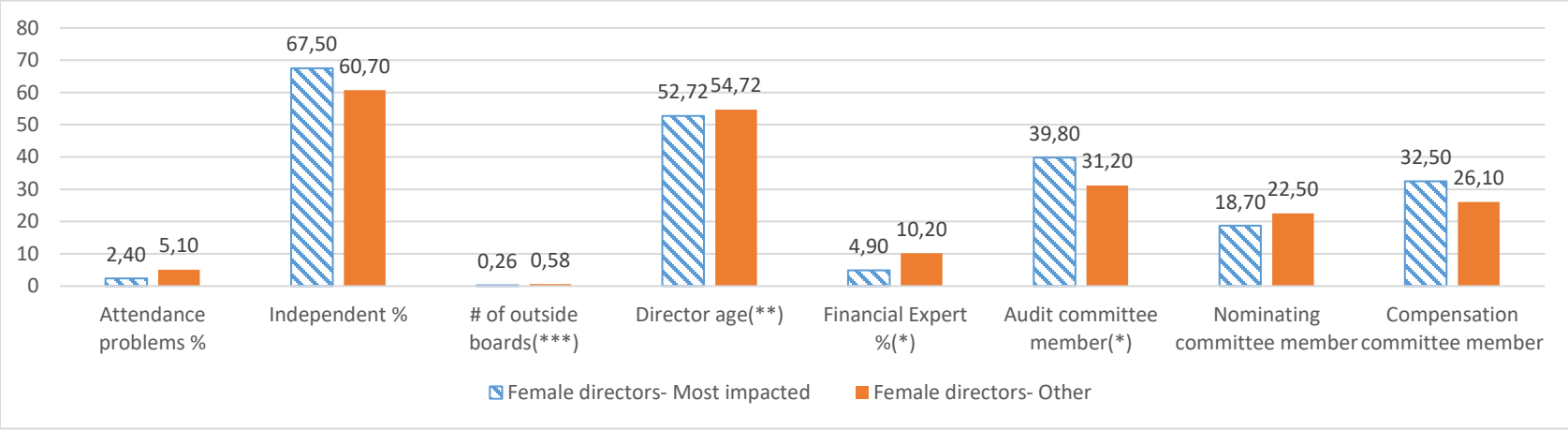


Figure 5. Female director characteristics post quota law in countries with *Low* share of *Women in finance*: Most impacted vs other banks

Figures show the characteristics of female directors characteristics (Panel A) and prior experience (Panel B) post quota law for *Most impacted* versus other banks in our treatment sample (quota law countries) in countries with Low (below median) share of women in finance. Quota law countries are those that passed quota legislation during our sample period that aim to increase the participation of women in boardrooms. All variables are defined in Appendix A. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A: Female director characteristics post quota law – Most impacted vs. other



Panel B: Prior experience of female directors post quota law – Most impacted vs. other

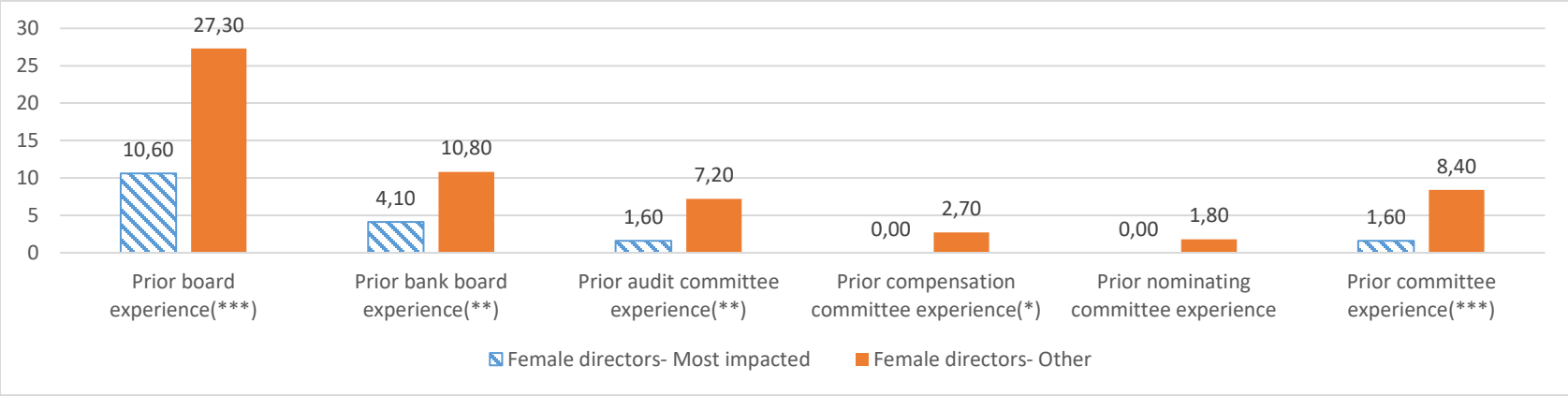


Table 1 Boardroom Gender Quota Laws. Sample Description.

The table reports characteristics and year of implementation of quota laws that aim to increase the participation of women in boardrooms. Treatment countries are those that passed gender quota laws during our sample period 2008-2017. Countries without board gender reforms are used as our control sample. Year of code is the first year in which the country's governance code includes recommendations associated with gender diversity on corporate boards.

	Sample Description 2008-2017					
COUNTRY	**# of banks**	**# of obs.**	**Year of quota law**	**Quota (Compliance year)**	**Treatment country**	**Year of code**
ARGENTINA	4	32			0	.
AUSTRALIA+	17	96	2012	Not specified.	1	2010
AUSTRIA	3	30	.		0	2009
BELGIUM	4	27	2011	33% (2017)	1	2009
BRAZIL	10	66	.		0	.
CANADA	24	181	.		0	.
CHILE	5	35	.		0	.
CHINA	18	85	.		0	.
COLOMBIA	4	19	.		0	.
DENMARK	7	55	2012	Not specified.	1	2008
FRANCE+	10	72	2011	20% (2014); 40% (2017)	1	2010
GERMANY+	13	94	2015	30% (2016)	1	2010
GREECE+	8	48	.		0	2013
HONG KONG+	18	89	.		0	2013
INDIA	27	122	2013	≥ 1female director	1	2014
INDONESIA	10	84	.		0	.
IRELAND+	5	35	.		0	2010
ISRAEL*+	6	54	1999	≥ 1female director	0	.
ITALY	23	174	2011	(20%) 2012; (33%) 2015	1	2011
JAPAN+	5	45	.		0	2014
KOREA, REPUBLIC+	27	149	.		0	.
MALAYSIA+	16	109	.		0	2011
MEXICO	11	66	.		0	.
NETHERLANDS	6	47	2011	30% (2013)	1	2008
NORWAY*	5	30	2003	40% (2008)	0	2004
PHILIPPINES+	13	83	.		0	.
POLAND+	9	83	.		0	2010
PORTUGAL	3	27	.		0	.
RUSSIAN FEDERATION+	5	41	.		0	.
SINGAPORE+	8	65	.		0	2012
SOUTH AFRICA	13	91	.		0	2009
SPAIN*	11	72	2007	40% (2015)	0	2006
SWEDEN+	7	65	.		0	2004
SWITZERLAND	21	154	.		0	2014
TAIWAN, PROVINCE+	9	62	.		0	.
THAILAND+	18	110	.		0	2012
TURKEY	14	110	.		0	.
UNITED ARAB EMIRATES	5	13	.		0	.
UNITED KINGDOM	47	327	.		0	2010
TOTAL	**469**	**3,147**				

* These countries are not part of our treatment sample because the quota laws were passed before the start of our sample period.
+ These countries are those with High (above median) share of women in finance.

Table 2 Descriptive Statistics

The table shows descriptive statistics of variables used in our analysis of board gender quota laws. Panel A presents the overall sample statistics. In Panel B we show director-level variables. *Female directors %* is the percentage of female directors on the board. *Most impacted* is an indicator variable equal to one for banks with all-male boards as of year t-1 relative to the enactment of the quota law and zero otherwise; *Most impacted-below quota* is an indicator variable equal to one for banks that do not meet the gender quota requirement prior to the enactment of the quota law. *Board size* (log) is the log of the total number of directors; *Independent directors %* is the fraction of independent directors on the board; *# outside boards* is the average number of outside boards held by directors; *Tenure* is the average tenure of directors, and *CEO-Chair* is an indicator equal to one if the CEO is also Chair of the board. Risk measures include the log of *Z-score*, (ROA+equity/assets) /σ(ROA); *NPL-to-loans %*, nonperforming loans-to-loans, and *Leverage*, assets-to-equity. Measures of systemic risk are: *SRISK(log)* is the natural logarithm of bank level *SRISK*– the expected capital shortfall (US $ million) when the country's stock market is in the 5% left tail of returns; *MES(%)* is the negative of the bank's average returns during the worst 5% market return days in a year; *LVG* is measured as the market value of assets-to-the market value of equity. Other bank level variables include: *Deposits-to-assets; Market-to-book*, market value of equity-to-book value of equity; *ROA*, net income-to-average assets, *ROE*, net income-to-average equity; and *Size*, the log of the book value of assets. Country level variables include *Capital stringency*, an index measuring the stringency of capital regulations; *Females in high skill occupations*, the proportion of females in high skill occupations; *GDP growth*, the annual growth in real GDP; *Inflation*, the percent change in the consumer price index, CPI; *Log GDP per capita*, the annual log of real gross domestic product per capita; *Macroprudential policy index*, an index capturing the tightening or loosening actions for 17 macroprudential policy instruments from Alam et al. (2019); *Official supervisory power*, an index measuring whether supervisory entities have authority to take action to prevent and correct problems; *Restrictions on bank activities*, an index of regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities, and *Women in finance*, women's share of employment in the financial services industry. Director characteristics include: *Attendance problems*, an indicator variable equal to one if a director did not attend at least 75% of meetings in a given year; *Independent*, an indicator equal to one if the director is classified as being independent; *# outside boards*, the number of outside boards held by a director; *Director age* (*tenure*), the director's age (tenure); and *Financial expert*, an indicator that is equal to one if the director is classified as a financial expert. Financial data are from Fitch Fundamentals database; market data are from DataStream, and data on boards of directors are from Institutional Shareholders Services' (ISS) Global Directors Database. All variables are defined in Appendix A.

Panel A. Descriptive Statistics- Full Sample.

	N	Mean	p25	p50	p75	Std. dev.
Board Characteristics						
Female director (%)	3,147	13.200	0.000	11.110	21.050	12.460
Most impacted	3,147	0.071	0.000	0.000	0.000	0.256
Most impacted-below quota	3,147	0.138	0.000	0.000	0.000	0.345
Board size (log)	3,147	2.297	2.079	2.398	2.639	0.503
Independent directors (%)	3,147	48.580	28.570	50.000	69.230	29.260
# outside boards	3,113	0.716	0.150	0.556	1.000	0.718
Tenure	3,010	6.537	3.700	5.757	8.714	3.982
CEO-Chair	3,147	0.065	0.000	0.000	0.000	0.246
Risk Measures						
Z-score (log)	2,701	3.448	2.836	3.482	4.093	0.978
NPL-to-loans (%)	2,265	4.952	1.180	3.010	5.900	6.266
Leverage	3,147	12.460	6.742	11.070	15.800	10.490
SRISK (log)	3,042	4.415	0.000	5.390	8.191	4.197
MES (%)	3,061	2.823	1.441	2.402	3.759	1.986
LVG	3,042	15.150	4.521	9.888	18.160	18.110
Other bank-level variables						
Deposits-to-assets	2,984	0.605	0.475	0.695	0.803	0.260
Market-to-book	3,116	1.434	0.714	1.084	1.713	1.334
ROA (%)	3,126	1.469	0.341	0.842	1.745	2.650
ROE (%)	3,126	8.956	4.151	9.510	15.030	12.720
Size (Log assets US$ M)	3,147	10.190	8.820	10.270	11.580	2.163
Country-level variables						
Capital stringency	3,147	6.551	5.000	7.000	8.000	2.102
Females in high skill occupations	3,062	0.451	0.438	0.460	0.490	0.076
GDP growth (%)	3,144	2.584	1.067	2.357	4.112	3.317
Inflation (%)	3,135	2.818	0.970	2.250	4.065	2.690
Log GDP per capita	3,144	9.944	9.263	10.420	10.720	1.037
Macroprudential policy index	2,848	3.801	-1.000	2.000	7.000	9.892
Official supervisory power	3,147	10.490	8.000	11.000	12.000	2.309
Restrictions on bank activities	3,147	6.591	5.000	6.000	8.000	2.189
Women in finance	2,770	0.485	0.439	0.492	0.531	0.084

Table 2 Descriptive Statistics. Continued.

Panel B. Director Characteristics						
	N	**Mean**	**p25**	**p50**	**p75**	**Std. dev.**
Attendance problem	37,459	0.030	0.000	0.000	0.000	0.170
Independent	37,459	0.482	0.000	0.000	1.000	0.500
# outside boards	36,433	0.769	0.000	0.000	1.000	1.366
Tenure	34,581	6.503	2.000	4.000	9.000	6.622
Age	33,353	58.810	53.000	59.000	65.000	9.186
Financial expert	37,459	0.048	0.000	0.000	0.000	0.214

Table 3 Changes in % Female Directors Subsequent to the Gender Quota Laws

The table shows results from regressions assessing the impact of gender quota laws during our sample period. The dependent variable is *Female directors %*, the percentage of female directors on the board. *Post* is an indicator variable equal to one starting the year when the gender quota law is passed in the country and zero otherwise. *Most impacted* is an indicator variable equal to one for banks with all-male boards as of year t-1 relative to the enactment of the quota law and zero otherwise. *Most impacted- below quota* is an indicator variable equal to one for banks that do not meet the gender quota requirement prior to the enactment of the quota law and zero otherwise. For countries that do not establish specific quotas (i.e. Australia and Denmark), we code *Most impacted- below quota* as one for banks with no female directors in the pre-quota law period. Control group includes banks from countries that do not enact gender quota laws during our sample period. Governance code is an indicator variable equal to one starting the first year a country's governance code mentions that gender should be considered in board appointments and zero otherwise. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. All variables are defined in Appendix A. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Dependent variable:	**Female directors %**					
	(1)	(2)	(3)	(4)	(5)	(6)
Post	3.835***	2.194*	1.582	3.681***	2.043*	1.459
	(3.90)	(1.88)	(1.08)	(3.75)	(1.76)	(1.00)
Post x Most impacted		5.506***			5.503***	
		(2.98)			(2.97)	
Post x Most impacted- below quota			4.177**			4.145**
			(2.12)			(2.10)
Log(assets) t-1	0.320	0.234	0.401	0.323	0.238	0.403
	(0.45)	(0.33)	(0.57)	(0.46)	(0.34)	(0.57)
Board size (log) t-1	0.688	0.549	0.647	0.677	0.539	0.638
	(1.12)	(0.90)	(1.05)	(1.10)	(0.88)	(1.03)
% of independent directors t-1	0.020	0.021	0.020	0.020	0.021	0.020
	(1.42)	(1.49)	(1.42)	(1.45)	(1.52)	(1.44)
# of outside boards t-1	-0.125	-0.142	-0.101	-0.127	-0.144	-0.103
	(-0.22)	(-0.25)	(-0.18)	(-0.22)	(-0.25)	(-0.18)
Tenure t-1	-0.396***	-0.439***	-0.442***	-0.395***	-0.438***	-0.441***
	(-3.48)	(-3.87)	(-3.88)	(-3.47)	(-3.86)	(-3.86)
Log GDP per capitat-1	-26.681***	-26.456***	-25.461***	-26.929***	-26.702***	-25.696***
	(-5.41)	(-5.43)	(-5.19)	(-5.50)	(-5.53)	(-5.26)
GDP growth t-1	0.412***	0.402***	0.399***	0.413***	0.403***	0.401***
	(5.34)	(5.18)	(5.13)	(5.35)	(5.19)	(5.14)
Governance code				-0.620	-0.614	-0.565
				(-0.84)	(-0.83)	(-0.77)
Observations	2,373	2,373	2,373	2,373	2,373	2,373
Adjusted R^2	0.324	0.329	0.327	0.324	0.329	0.327
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	416	416	416	416	416	416
F-test [Post + Post x Most impacted]=0		*25.96***	*19.86***		*24.65***	*18.60***

Table 4. The Effect of Board Gender Quota Laws on Bank Risk Taking and Systemic Risk

This table reports the results assessing the impact of quota laws on bank risk taking and systemic risk. In Panel A, the dependent variables are *Z-score*, the log of *Z-score*, measured as (ROA+equity/assets)/σ(ROA); *NPL-to-loans %*, nonperforming loans-to-loans; and *Leverage*, assets-to-equity. In Panel B, we use systemic risk measures: *SRISK (log)*, the natural logarithm of bank level SRISK, the expected capital shortfall (US $ million) when the country's stock market is in the 5% left tail of returns; *MES*, the negative of the bank's average returns during the worst 5% market return days in a year; and *LVG*, the market value of assets-to-the market value of equity. Control group includes banks from countries that do not enact gender quota laws during our sample period. We report results for the average effect of quota laws on bank risk in treated countries as well as results that include the interaction term, *Post* x *Most impacted*, that tests the incremental effect of quota laws on banks most impacted by the quota laws. *Post* is an indicator variable equal to one starting the year when the gender quota law is passed in the country and zero otherwise. *Most impacted* is an indicator variable equal to one for banks with no female directors as of year t-1 relative to the enactment of the quota law and zero otherwise. *Most impacted- below quota* is an indicator variable equal to one for banks that do not meet the gender quota requirement prior to the enactment of the quota law and zero otherwise. For countries that do not establish specific quotas (i.e. Australia and Denmark), we code *Most impacted- below quota* as one for banks with no female directors in the pre-quota law period. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. *F*-statistics from tests of the sum of the coefficients *Post* + *Post* x *Most impacted=0* are shown in the last row. All variables are defined in Appendix A. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A. The Impact of Quota Laws on Bank Risk Taking

Dependent variable:	**Z-score**	**NPL-to-loans**	**Leverage**	**Z-score**	**NPL-to-loans**	**Leverage**	**Z-score**	**NPL-to-loans**	**Leverage**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	0.003	-0.146	0.559	0.149	-1.092	-0.307	0.318**	-1.411*	-0.166
	(0.02)	(-0.21)	(0.74)	(0.99)	(-1.56)	(-0.34)	(2.25)	(-1.91)	(-0.21)
Post x Most impacted				-0.555*	4.655***	3.309**			
				(-1.75)	(2.89)	(2.19)			
Post x Most impacted- below quota							-0.676***	2.974**	1.502
							(-2.69)	(2.51)	(0.80)
Log(assets) t-1	-0.292**	-1.403	3.832***	-0.280**	-1.477*	3.771***	-0.317***	-1.143	3.885***
	(-2.44)	(-1.58)	(5.16)	(-2.36)	(-1.69)	(5.23)	(-2.62)	(-1.28)	(5.19)
Deposits-to-assets t-1	0.602*	5.536*	-2.738	0.611*	5.322*	-2.800	0.639**	5.523*	-2.831
	(1.86)	(1.76)	(-1.28)	(1.91)	(1.70)	(-1.32)	(1.97)	(1.74)	(-1.33)
ROA t-1	0.049***	-0.682***	-0.160**	0.048***	-0.657***	-0.153*	0.047***	-0.652***	-0.156**
	(3.50)	(-3.10)	(-2.03)	(3.44)	(-3.05)	(-1.96)	(3.43)	(-3.00)	(-1.97)
Board size (log) t-1	-0.088	0.123	0.432	-0.079	0.028	0.379	-0.088	0.058	0.436
	(-1.10)	(0.22)	(1.55)	(-1.00)	(0.05)	(1.33)	(-1.12)	(0.11)	(1.56)
% of independent directors t-1	0.002	-0.009	-0.006	0.002	-0.006	-0.005	0.002	-0.009	-0.006
	(0.98)	(-0.86)	(-0.72)	(0.87)	(-0.60)	(-0.58)	(1.08)	(-0.92)	(-0.78)
Log GDP per capitat-1	1.489**	-22.643***	2.014	1.478**	-22.634***	2.097	1.320**	-22.073***	2.393
	(2.22)	(-3.81)	(0.41)	(2.26)	(-3.92)	(0.43)	(1.98)	(-3.71)	(0.49)
GDP growth t-1	-0.008	0.094	-0.257**	-0.007	0.083	-0.262**	-0.006	0.086	-0.261**
	(-1.05)	(1.50)	(-2.17)	(-0.94)	(1.33)	(-2.21)	(-0.83)	(1.36)	(-2.19)
Inflation t-1	-0.000	-0.054	0.035	-0.001	-0.052	0.039	-0.002	-0.043	0.038
	(-0.01)	(-0.65)	(0.21)	(-0.06)	(-0.63)	(0.23)	(-0.12)	(-0.52)	(0.23)
Restrictions on bank activities	0.034	-0.302**	0.176	0.032	-0.281*	0.192	0.025	-0.255*	0.194
	(1.33)	(-2.13)	(1.37)	(1.24)	(-1.96)	(1.53)	(0.99)	(-1.81)	(1.51)
Official supervisory power	0.013	-0.102	0.225	0.020	-0.174*	0.184	0.029	-0.185*	0.191
	(0.64)	(-1.00)	(1.33)	(1.00)	(-1.73)	(1.06)	(1.48)	(-1.90)	(1.02)
Capital stringency	-0.037*	0.818***	-0.343*	-0.040*	0.845***	-0.333*	-0.034	0.812***	-0.349*
	(-1.76)	(4.95)	(-1.74)	(-1.88)	(5.20)	(-1.67)	(-1.57)	(4.86)	(-1.78)
Macroprudential policy index t-1	0.031**	-0.135**	0.120	0.031**	-0.130**	0.123	0.033***	-0.148**	0.116
	(2.44)	(-2.04)	(1.34)	(2.42)	(-2.02)	(1.35)	(2.61)	(-2.20)	(1.30)
Observations	2,025	1,626	2,084	2,025	1,626	2,084	2,025	1,626	2,084
Adjusted R^2	0.136	0.293	0.116	0.142	0.312	0.120	0.146	0.302	0.116
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# banks	376	298	384	376	298	384	376	298	384
F-test Post + Post x Most impacted=0				*1.96*	*5.52***	*5.72***	*2.62*	*2.14*	*0.75*

Table 4. The Effect of Board Gender Quota Laws on Bank Risk Taking and Systemic Risk. Continued.

Panel B. The Impact of Quota Laws on Systemic Risk									
Dependent variable:	SRISK (log)	MES %	LVG	SRISK (log)	MES %	LVG	SRISK (log)	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	-0.581	0.157	7.352***	-0.925**	0.056	5.373***	-1.529***	0.112	4.140*
	(-1.58)	(1.00)	(4.11)	(-2.15)	(0.33)	(2.65)	(-2.66)	(0.66)	(1.78)
Post x Most impacted				1.364***	0.389	7.854**			
				(3.13)	(1.38)	(2.20)			
Post x Most impacted- below quota							1.999***	0.094	6.778**
							(3.36)	(0.37)	(2.15)
Log(assets) t-1	1.155***	0.453**	5.964***	1.132***	0.446**	5.833***	1.233***	0.456**	6.227***
	(3.97)	(2.27)	(3.88)	(3.82)	(2.25)	(3.81)	(4.28)	(2.29)	(4.09)
Deposits-to-assets t-1	1.068	-0.381	-1.900	1.044	-0.388	-2.039	0.944	-0.387	-2.321
	(1.19)	(-0.78)	(-0.50)	(1.16)	(-0.80)	(-0.53)	(1.06)	(-0.79)	(-0.61)
ROA t-1	-0.027	0.027*	-0.159	-0.024	0.028*	-0.138	-0.020	0.028*	-0.136
	(-1.54)	(1.67)	(-1.27)	(-1.36)	(1.72)	(-1.10)	(-1.22)	(1.68)	(-1.10)
Board size (log) t-1	0.177	-0.016	2.124**	0.151	-0.022	1.974*	0.175	-0.016	2.119**
	(1.03)	(-0.12)	(2.03)	(0.87)	(-0.17)	(1.85)	(1.02)	(-0.12)	(2.03)
% of independent directors t-1	-0.002	-0.003	-0.008	-0.001	-0.003	-0.006	-0.002	-0.003	-0.010
	(-0.52)	(-1.52)	(-0.33)	(-0.42)	(-1.48)	(-0.26)	(-0.72)	(-1.54)	(-0.42)
Log GDP per capita t-1	1.670	-3.487***	27.100**	1.707*	-3.478***	27.312***	2.180**	-	28.829***
	(1.64)	(-3.99)	(3.16)	(1.69)	(-4.01)	(3.24)	(2.04)	(-3.96)	(3.51)
GDP growth t-1	0.027	0.028	-	0.025	0.027	-0.823***	0.022	0.027	-0.829***
	(0.98)	(1.39)	(-3.98)	(0.90)	(1.36)	(-4.05)	(0.79)	(1.38)	(-4.10)
Inflation t-1	0.043	-0.018	0.116	0.045	-0.018	0.126	0.048	-0.018	0.131
	(0.72)	(-0.70)	(0.40)	(0.75)	(-0.68)	(0.43)	(0.79)	(-0.69)	(0.45)
Restrictions on bank activities	0.120*	-0.123***	0.259	0.127*	-0.121***	0.301	0.144**	-	0.342
	(1.71)	(-3.86)	(0.82)	(1.80)	(-3.79)	(0.95)	(2.04)	(-3.85)	(1.11)
Official supervisory power	-0.032	-0.008	0.558	-0.050	-0.013	0.456	-0.079	-0.010	0.399
	(-0.55)	(-0.25)	(1.25)	(-0.86)	(-0.40)	(1.00)	(-1.42)	(-0.31)	(0.87)
Capital stringency	0.023	-0.028	-0.980	0.027	-0.027	-0.955	0.014	-0.028	-1.008*
	(0.34)	(-0.61)	(-1.60)	(0.40)	(-0.57)	(-1.55)	(0.21)	(-0.61)	(-1.66)
Macroprudential policy index t-1	0.038	0.006	0.583***	0.039	0.007	0.588***	0.031	0.006	0.560**
	(1.29)	(0.33)	(2.66)	(1.32)	(0.34)	(2.68)	(1.04)	(0.31)	(2.54)
Observations	2,025	1,626	2,084	2,016	2,025	2,016	2,026	2,025	1,626
Adjusted R^2	0.128	0.263	0.168	0.133	0.263	0.174	0.141	0.262	0.173
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# banks	370	372	370	370	372	370	370	372	370
F-test Post + Post x Most impacted=0				*2.08*	*2.86**	*17.89****	*3.22**	*0.79*	*19.85****

Table 5. The Effect of Board Gender Quota Laws on Bank Risk and Systemic Risk: Female Labor Force

This table reports the cross-country impact of characteristics of the female labor force on the effect of quota laws on bank risk taking. The dependent variables are *Z-score*, the log of *Z-score*, measured as (ROA+equity/assets) /σ(ROA); *NPL-to-loans %*, nonperforming loans-to-loans; and *Leverage*, assets-to-equity. The systemic risk measures are: *SRISK (log)*, the natural logarithm of bank level SRISK, the expected capital shortfall (US $ million) when the country's stock market is in the 5% left tail of returns; *MES*, the negative of the bank's average returns during the worst 5% market return days in a year, and *LVG*, the market value of assets-to-the market value of equity. Control group includes banks from countries that do not enact gender quota laws during our sample period. *Post* is an indicator variable equal to one starting the year when the gender quota law is passed in the country and zero otherwise. *High share of women in finance* (*High females in high skill occupations*) is an indicator variable equal to one if the country's share of women in the financial services industry (share of females in high skill occupations) is above the cross-country median and zero otherwise. To rank countries, we first obtain the time series average of each measure by country and rank countries based on the median value of this variable. Panels A and B show results using interactions between *Pos*t and the *High* indicators, while Panels C and D split the sample by *High* and *Low share of women in finance* and include the interaction term *Post* x *Most impacted*. *Most impacted* is an indicator variable equal to one for banks with no female directors as of year t-1 relative to the enactment of the quota law and zero otherwise. Regressions include the same bank and country level controls used in Table 4 but are not reported for brevity. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. All variables are defined in Appendix A. *F*-statistics from tests of the sum of the coefficients *Post + Post* x *High (Most impacted)=0* are shown in the last row of each panel. The last row of Panels C and D show χ^2 tests for the equality of the coefficients on the interaction term *Post* x *Most impacted* in regressions of *High* and *Low share of women in finance*. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A. Bank Risk Taking						
Dependent variable:	Z-score	NPL-to-	Leverage	Z-score	NPL-to-loans	Leverage
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.211	1.872*	2.209*	-0.456**	3.882***	2.706**
	(-1.08)	(1.94)	(1.81)	(-2.00)	(3.93)	(2.18)
Post x High women in finance	0.442*	-5.129***	-3.582*			
	(1.70)	(-5.31)	(-1.86)			
Post x High females in high skill occupations				0.766***	-6.748***	-3.363*
				(2.90)	(-6.21)	(-1.89)
Observations	1,776	1,434	1,828	1,973	1,584	2,031
Adjusted R^2	0.129	0.350	0.128	0.147	0.360	0.124
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	322	260	329	360	285	367
F-test Post + Post x High=0	*1.36*	*26.76***	*1.10*	*3.72**	*18.30***	*0.33*
Panel B. Systemic Risk						
Dependent variable:	SRISK	MES %	LVG	SRISK	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.378	0.417*	10.045***	0.646**	0.736***	12.105***
	(1.27)	(1.95)	(4.00)	(2.40)	(3.08)	(4.53)
Post x High women in finance	-1.967***	-0.542**	-5.743*			
	(-3.00)	(-2.27)	(-1.67)			
Post x High females in high skill occupations				-1.989***	-0.959***	-7.469**
				(-3.79)	(-3.62)	(-2.08)
Observations	1,771	1,779	1,771	1,963	1,972	1,963
Adjusted R^2	0.151	0.287	0.181	0.144	0.287	0.175
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	316	318	316	353	355	353
F-test Post + Post x High=0	*6.39***	*0.48*	*3.01**	*6.89***	*1.61*	*3.52**

Table 5. The Effect of Board Gender Quota Laws on Bank Risk and Systemic Risk: Female Labor Force. Continued.

Panel C. Bank Risk Taking. Most impacted – By share of women in finance						
Dependent variable:	Z-score		NPL-to-loans		Leverage	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of women in finance:	*High*	*Low*	*High*	*Low*	*High*	*Low*
Post	0.169	0.657***	-3.344***	-1.122	-0.175	-0.937
	(0.82)	(3.08)	(-4.58)	(-1.08)	(-0.13)	(-0.83)
Post x Most impacted	-1.074**	-0.253	1.654*	2.484	1.222	1.676
	(-2.07)	(-0.76)	(1.85)	(1.62)	(0.47)	(1.28)
Observations	848	928	692	742	872	956
Adjusted R^2	0.233	0.120	0.527	0.403	0.172	0.131
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects			Bank, Year			
# banks	152	170	119	141	153	176
F-test Post + Post x most impacted=0	*3.18**	*1.53*	*2.93**	*0.74*	*0.23*	*0.35*
χ^2 test Post x Most impacted [High=Low]	*1.81*		*0.23*		*0.02*	

Panel D. Systemic Risk. Most impacted – By share of women in finance						
Dependent variable:	SRISK (log)		MES %		LVG	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of women in finance:	*High*	*Low*	*High*	*Low*	*High*	*Low*
Post	-1.479**	-0.576	0.078	-0.085	8.604***	1.152
	(-2.33)	(-1.31)	(0.35)	(-0.27)	(3.12)	(0.37)
Post x Most impacted	-0.063	0.875**	-0.532	0.406	-8.264*	7.837**
	(-0.11)	(2.35)	(-1.42)	(1.12)	(-1.90)	(2.11)
Observations	832	939	839	940	832	939
Adjusted R^2	0.207	0.206	0.398	0.225	0.271	0.155
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects			Bank, Year			
# banks	145	171	147	171	145	171
F-test Post + Post x most impacted=0	*15.14****	*0.56*	*2.33*	*0.56*	*0.01*	*5.37***
χ^2 test Post x Most impacted [High=Low]	*1.95*		*3.32**		*8.18***	

Table 6. The Effect of Board Gender Quota Laws on Long-Term Bank Performance

This table reports the impact of gender quota laws on bank performance. The dependent variables are the three-year ahead average of *Market-to-book*, *ROA*, and *ROE*. Control group includes banks from countries that do not enact gender quota laws during our sample period. *Post* is an indicator variable equal to one starting the year when the gender quota law is passed in the country and zero otherwise. *Most impacted* is an indicator variable equal to one for banks with no female directors as of year t-1 relative to the enactment of the quota law and zero otherwise. In Panel B, we show results using indicators of *High share of women in finance* (*High females in high skill occupations*) equal to one if the country's share of women in the financial services industry (share of females in high skill occupations) is above the cross-country median and zero otherwise. In Panel C, we split the sample by *High* and *Low share of women in finance* and show results from regressions including the interaction term *Post* x *Most impacted*. Regressions include the same bank and country level controls used in Panel A, but are not reported in Panels B and C, for brevity. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. All variables are defined in Appendix A. We report *F*-statistics from tests of the sum of the coefficients *Post + Post* x *Most impacted (High)=0*. The last row of Panel C shows χ^2 tests for the equality of the coefficients on the interaction term *Post* x *Most impacted* in regressions of *High* and *Low share of women in finance*. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A. Impact of Quota Laws on Bank Performance						
Dependent variable:	Market-to-book	ROA	ROE	Market-to-book	ROA	ROE
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.191***	0.035	-0.434	0.211***	0.062	0.410
	(3.07)	(0.24)	(-0.40)	(3.11)	(0.52)	(0.36)
Post x Most impacted				-0.079	-0.109	-3.355*
				(-0.50)	(-0.35)	(-1.91)
Log(assets) t-1	-0.062	-0.401**	-3.581***	-0.061	-0.399**	-3.532***
	(-1.30)	(-2.05)	(-3.13)	(-1.29)	(-2.05)	(-3.15)
Deposits-to-assets t-1	0.140	0.428	6.509**	0.141	0.430	6.561**
	(0.83)	(0.85)	(2.24)	(0.84)	(0.85)	(2.28)
Board size (log) t-1	-0.020	-0.400**	-2.285***	-0.018	-0.398**	-2.221**
	(-0.47)	(-2.15)	(-2.59)	(-0.43)	(-2.13)	(-2.56)
% of independent directors t-1	0.000	0.011***	0.033**	0.000	0.011***	0.032**
	(0.40)	(3.12)	(2.27)	(0.38)	(3.11)	(2.21)
Log GDP per capitat-1	-0.398	-1.096	-21.648**	-0.401	-1.099	-21.737***
	(-1.31)	(-1.44)	(-2.57)	(-1.33)	(-1.46)	(-2.62)
GDP growth t-1	-0.007*	0.030**	0.376***	-0.007*	0.030**	0.380***
	(-1.74)	(2.44)	(3.02)	(-1.73)	(2.45)	(3.06)
Inflation t-1	0.015	0.026	0.129	0.015	0.025	0.125
	(1.54)	(1.09)	(0.71)	(1.53)	(1.08)	(0.68)
Restrictions on bank activities	0.017	-0.034	-0.131	0.017	-0.035	-0.147
	(1.23)	(-0.95)	(-0.58)	(1.21)	(-0.97)	(-0.66)
Official supervisory power	0.008	-0.031	-0.346*	0.009	-0.030	-0.304
	(0.97)	(-0.93)	(-1.66)	(1.15)	(-0.86)	(-1.42)
Capital stringency	-0.019	-0.017	0.634**	-0.019	-0.018	0.625**
	(-1.50)	(-0.39)	(2.04)	(-1.52)	(-0.39)	(2.01)
Macroprudential policy index	-0.016**	-0.037*	-0.336***	-0.016**	-0.037*	-0.337***
	(-2.36)	(-1.94)	(-2.64)	(-2.38)	(-1.95)	(-2.67)
Observations	1,931	1,947	1,947	1,931	1,947	1,947
Adjusted R^2	0.110	0.120	0.223	0.119	0.128	0.233
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	340	343	343	340	343	343
F-test Post + Post x Most impacted =0				*0.87*	*0.02*	*2.92**

Table 6. The Effect of Board Gender Quota Laws on Long-Term Bank Performance. Continued.

Panel B. Share of Women in Finance and Share of Females in High Skill Occupations						
Dependent variable:	Market-to-book	ROA	ROE	Market-to-book	ROA	ROE
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.201**	-0.152	-0.576	0.053	-0.140	-1.795
	(2.14)	(-1.14)	(-0.41)	(0.56)	(-0.71)	(-1.17)
Post x High share of women in finance	-0.046	0.158	-0.889			
	(-0.43)	(0.76)	(-0.59)			
Post x High females in high skill occupations				0.216*	0.247	1.994
				(1.81)	(1.13)	(1.19)
Observations	1,688	1,704	1,704	1,882	1,898	1,898
Adjusted R^2	0.120	0.140	0.226	0.119	0.122	0.218
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	289	292	292	324	327	327
F-test Post + Post x High=0	*5.62***	*0.00*	*1.55*	*12.30****	*0.43*	*0.03*

Panel C. Long-Term Performance. Most impacted – By share of women in finance						
Dependent variable:	Market-to-book		ROA		ROE	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of women in finance:	*High*	*Low*	*High*	*Low*	*High*	*Low*
Post x Most impacted	0.153	-0.138	2.143	-0.518**	7.786**	-6.567***
	(0.77)	(-0.75)	(1.27)	(-2.59)	(1.99)	(-3.24)
Post	0.225***	0.212	-0.131	-0.025	-2.161	2.135
	(2.85)	(1.29)	(-1.03)	(-0.11)	(-1.43)	(1.21)
Observations	812	876	818	886	818	886
Adjusted R^2	0.148	0.140	0.225	0.161	0.328	0.230
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	134	155	135	157	135	157
F-test Post + Post x Most impacted =0	*3.99***	*0.18*	*1.44*	*4.86***	*2.26*	*4.82***
χ^2 test Post x Most impacted [High=Low]	*1.19*		*2.54*		*10.96****	

Table 7. Potential Channels: Banks with Increases in Female Directorships Post Quota Law

This table reports the results assessing the impact of quota laws on bank risk taking and systemic risk for banks that increase the number of female directorships post quota law by two and by three or more. The dependent variables are measures of bank risk taking and systemic risk: *Z-score*, *NPL-to-loans*, *Leverage*, *SRISK (log)*, *MES*, and *LVG*. Control group includes banks from countries that do not enact gender quota laws during our sample period. *Post* is an indicator variable equal to one starting the year when the gender quota law is passed in the country and zero otherwise. *Increase of two (>= three) female director*ships is an indicator variable equal to one for banks that increased the number of female directorships post quota law by two (three or more). Regressions include the same bank and country level controls used in Table 4, but are not reported in Panel B, for brevity. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. All variables are defined in Appendix A. *F*-statistics from tests of the sum of the coefficients *Post* + *Post* x *Increase female directorships=0* are shown in the last row. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Bank Risk Taking and Systemic Risk – By Banks that Increase Female Directors Post Quota Law						
Dependent variable:	Z-score (log)	NPL-to-loans	Leverage	SRISK (log)	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Post x Increase >= three female directorships (A)	-0.675**	2.930**	3.612*	1.240*	-0.103	3.373
	(-2.03)	(2.50)	(1.72)	(1.79)	(-0.31)	(0.77)
Post x Increase of two female directorships (B)	-0.214	2.504	1.474	0.886	-0.180	2.764
	(-0.58)	(1.15)	(0.81)	(1.26)	(-0.53)	(0.75)
Post (C)	0.220	-1.415*	-0.663	-1.094*	0.224	5.873**
	(1.50)	(-1.73)	(-0.53)	(-1.92)	(1.24)	(2.37)
Observations	2,025	1,626	2,084	2,016	2,025	2,016
Adjusted R^2	0.143	0.301	0.120	0.132	0.262	0.168
Controls	No	Yes	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	376	298	384	370	372	370
F-test [A+ B+C]=0	*2.07*	*2.92**	*2.76**	*1.45*	*0.02*	*5.07***

Table 8. Robustness Tests. The Effect of Board Gender Quota Laws on Bank Risk.

This table reports the results from various robustness tests assessing the impact of quota laws on bank risk taking and systemic risk. The dependent variables are measures of bank risk taking and systemic risk: *Z-score*, *NPL-to-loans*, *Leverage*, *SRISK (log)*, *MES*, and *LVG*. In Panel A we show results that include an indicator equal to one for years t-1 and t-2 prior to passage of quota law and zero otherwise. In Panel B we report results from regressions limiting the sample period to *t-5* to *t+5* around the year of the quota law in treatment countries. In Panel C we show results from regressions using standard errors clustered at the country level. *Pre quota* is an indicator that is equal to one for years t-2 and t-1 relative to the year in which the quota law is passed and zero otherwise; *Most impacted* is an indicator variable equal to one for banks with all-male boards as of year t-1 relative to the enactment of the quota law and zero otherwise. Regressions include the same bank and country level controls used in Table 4 but are not reported for brevity. See Table 1 for the reform country and year and Table 2 for summary statistics of control variables. All variables are defined in Appendix A. *t*-statistics, in parentheses, are based on robust standard errors clustered at the bank level in Panels A and B and at the country level in Panel C. *, **, and *** indicate significance at the 0.10, 0.05, and 0.01 two-tailed levels, respectively.

Panel A: Parallel Trends. Bank Risk Taking and Systemic Risk						
Dependent variable:	Z-score	NPL-to-loans	Leverage	SRISK (log)	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Pre quota x Most impacted	-0.103	-0.915	1.689	-0.192	0.062	1.286
	(-0.48)	(-1.04)	(1.08)	(-0.47)	(0.19)	(0.44)
Post x Most impacted	-0.596*	4.231***	4.060**	1.269***	0.445*	8.627**
	(-1.90)	(2.77)	(2.30)	(2.92)	(1.71)	(2.34)
Pre quota	-0.044	0.727	-0.454	0.193	-0.465***	-3.614*
	(-0.43)	(1.43)	(-0.30)	(1.12)	(-2.67)	(-1.71)
Post	0.126	-0.720	-0.541	-0.827**	-0.179	3.545
	(0.83)	(-1.07)	(-0.52)	(-2.16)	(-1.06)	(1.60)
Observations	2,025	1,626	2,084	2,016	2,025	2,016
Adjusted R^2	0.141	0.312	0.120	0.133	0.266	0.175
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	376	298	384	370	372	370
F-test Post + Post x Most impacted =0	*2.75**	*5.95***	*8.48****	*1.47*	*1.13*	*17.24****

Table 8. Robustness Tests. The Effect of Board Gender Quota Laws on Bank Risk. Continued.

Panel B. Bank Risk Taking and Systemic Risk [-5,+5]						
Dependent variable:	Z-score (log)	NPL-to-loans	Leverage	SRISK (log)	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Post x Most impacted	-0.509	4.376***	3.137**	1.341***	0.296	6.917**
	(-1.60)	(2.90)	(2.06)	(3.05)	(1.11)	(2.13)
Post	0.134	-0.948	-0.227	-0.929**	0.099	5.819***
	(0.89)	(-1.36)	(-0.25)	(-2.15)	(0.58)	(2.86)
Observations	1,996	1,599	2,054	1,986	1,995	1,986
Adjusted R^2	0.142	0.300	0.118	0.134	0.266	0.196
Controls	No	Yes	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# banks	376	297	383	369	371	369
F-test Post + Post x High=0	*1.65*	*5.75***	*5.44***	*1.81*	*2.43*	*19.82****

Panel C. Bank Risk Taking and Systemic Risk. Country Clustered Standard Errors						
Dependent variable:	Z-score (log)	NPL-to-loans	Leverage	SRISK (log)	MES %	LVG
	(1)	(2)	(3)	(4)	(5)	(6)
Post x Most impacted	-0.555***	4.655***	3.309**	1.364**	0.389	7.854***
	(-2.94)	(3.38)	(2.21)	(1.98)	(1.13)	(3.42)
Post	0.149	-1.092	-0.307	-0.925	0.056	5.373**
	(1.00)	(-0.88)	(-0.29)	(-1.29)	(0.22)	(2.06)
Observations	2,025	1,626	2,084	2,016	2,025	2,016
Adjusted R^2	0.142	0.312	0.120	0.133	0.263	0.174
Controls	No	Yes	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# countries	35	35	35	35	35	35
F-test Post + Post x High=0	*2.70*	*4.75***	*6.94***	*1.39*	*1.29*	*40.43****

Appendix A. Variable Definitions

Variables	Description	Source
Variables of interest		
% female directors	Percentage of female directors on the board.	ISS Global Directors Database
Z-score	The log of Z-score. Z-score is estimated as: (ROA+equity/assets) /σ(ROA); the standard deviation of ROA, σ(ROA), is estimated as a 3-year moving average using quarterly data.	Fitch Fundamentals Financial data
NPL-to-loans %	Total non-performing loans (past-due 90 days or more) divided by total loans.	Fitch Fundamentals Financial data
Leverage	Total assets divided by the book value of equity.	Fitch Fundamentals Financial data
MES (%)	The negative of the average stock return of the bank when the country's stock market is in the 5% left tail of returns.	DataStream. Authors' calculations.
SRISK (log)	The log of one plus SRISK. SRISK is the expected capital shortfall (US $million) when the country's stock market is in the 5% left tail of returns. $SRISK_{i,t} = kD_{it} - (1-k)W_{it}(1 - LRMES_{it})$. LRMES is the long-run marginal expected shortfall. LRMES=1-exp (-18 × MES); W is the market value of equity, and k is the prudential capital ratio (set to 8%), and D is the book value of debt.	DataStream; Fitch Fundamentals Financial data. Authors' calculations.
LVG	Market leverage. The market value of equity plus the book value of liabilities, scaled by the market value of equity.	DataStream; Fitch Fundamentals Financial data. Authors' calculations.
Post	An indicator equal to one starting the year after a treatment country enacts legislation or adopts corporate governance codes addressing board gender composition, and zero otherwise.	EU (2012), Smith (2014), Deloitte (2017), Catalyst (2018).
Most impacted	An indicator variable equal to one for banks with all-male boards as of year t-1 relative to the enactment of the quota law and zero otherwise.	ISS Global Directors Database
Most impacted- below quota	An indicator variable equal to one for banks that do not meet the gender quota requirement prior to the enactment of the quota law.	ISS Global Directors Database
Board-level characteristics		
Board size	Total number of directors.	ISS Global Directors Database
Independent directors %	Percentage of independent directors on the board.	ISS Global Directors Database
# outside boards	Average number of outside boards held by bank's directors.	ISS Global Directors Database
Tenure	The average tenure of the bank's directors.	ISS Global Directors Database
CEO-Chair	Indicator variable equal to one if the CEO is also chair of the board and zero otherwise.	ISS Global Directors Database
Other bank-level variables		
Bank Governance Score	Governance pillar score in ASSET4.	Thomson Reuters' ASSET4
Market-to-book	The market value of equity-to-the book value of equity (three-year ahead average).	Fitch Fundamentals Financial data; DataStream
ROA	Net income divided by average book value of assets (three-year ahead average)..	Fitch Fundamentals Financial data
ROE	Net income divided by average book value of equity (three-year ahead average)..	Fitch Fundamentals Financial data

Appendix A. Variable Definitions. Continued.

Variables	Description	Source
Size	The log of the book value of assets.	Fitch Fundamentals database
Deposits-to-assets	The ratio of total deposits to the book value of assets.	Fitch Fundamentals database
Country-level controls		
Log GDP per capita	The log of real GDP per capita.	World Development Indicators
GDP growth	Annual growth rate of real GDP.	Worldwide Development Indicators
Inflation	Percent change in Consumer Price Index (CPI).	World Development Indicators
Restrictions on bank activities	Index measuring regulatory impediments to banks engaging in securities market activities, insurance activities, and real estate activities.	Barth, Caprio, and Levine. (2013)
Official supervisory power	Index measuring whether supervisory entities have authority to take action to prevent and correct problems. The index ranges from 0-14, with higher values indicating greater power.	Barth, Caprio, and Levine (2013)
Capital stringency	Index measuring the stringency of regulations regarding how much capital banks must hold, as well as the sources of funds that count as regulatory capital. The index ranges from 0-10, with higher values indicating greater stringency.	Barth, Caprio, and Levine. (2013)
Macroprudential policy index	An index of macroprudential policies that captures tightening or loosening actions for 17 macroprudential policy instruments.	The integrated Macroprudential Policy (iMaPP) database. Alam et al. (2019).
Women in Finance %	Women's share of employment in the financial services industry. From ILO Employment by Sex and Economic Activity, Revision 4 (ISIC Rev. 4).	ILOSTAT
Females in high skill occupations	Females in high skill occupations as proportion of total employment in high skill occupations. High skill occupations are based on the International Standard Classification of Occupation (ISCO). High skill occupations include managers; professionals, and technicians and associate professionals (board skill levels 3 and 4).	ILOSTAT
Gender gap index	An index that examines the gap between men and women across four fundamental categories: Economic Participation and Opportunity, Educational Attainment, Health and Survival and Political Empowerment. It ranks countries according to their proximity to gender equality rather than to women's empowerment. Higher values indicate closer proximity to gender equality.	World Economic Forum
Female labor force %	Female labor force as a proportion of total labor force.	World Bank; ILOSTAT
Director characteristics		
Attendance problem	Indicator variable equal to one if the director did not attend at least 75% of meetings and zero otherwise.	ISS Global Directors Database
Independent	Indicator equal to one if the director is independent and zero otherwise.	ISS Global Directors Database
# outside boards	The number of outside boards held by a director.	ISS Global Directors Database
Tenure	Tenure of the director.	ISS Global Directors Database

Appendix A. Variable Definitions. Continued.

Variables	Description	Source
Age	Director's age.	ISS Global Directors Database
Financial expert	Indicator equal to one if the director is classified as a financial expert and zero otherwise.	ISS Global Directors Database

Most Recent Working Paper

NIPE WP 17/2019	Liao, R. C., **Loureiro, G.**, and Taboada, A. G., "Women on Bank Boards: Evidence from Gender Quotas around the World", 2019
NIPE WP 16/2019	**Luís Sá,** "Hospital Competition Under Patient Inertia: Do Switching Costs Stimulate Quality Provision?", 2019
NIPE WP 15/2019	**João Martins** and **Linda G. Veiga**, "Undergraduate students' economic literacy, knowledge of the country's economic performance and opinions regarding appropriate economic policies", 2019
NIPE WP 14/2019	**Natália P. Monteiro, Odd Rune Straume** and **Marieta Valente,** "Does remote work improve or impair firm labour productivity? Longitudinal evidence from Portugal", 2019
NIPE WP 13/2019	**Luís Aguiar-Conraria,** Manuel M. F. Martins and **Maria Joana Soares**, " Okun's Law Across Time and Frequencies", 2019
NIPE WP 12/2019	Bohn, F., and **Veiga, F. J.,** "Political Budget Forecast Cycles", 2019
NIPE WP 11/2019	**Ojo, M. O., Aguiar-Conraria, L**. and **Soares, M. J., "**A Time-Frequency Analysis of Sovereign Debt Contagion in Europe", 2019
NIPE WP 10/2019	Lommerud, K. E., Meland, F. and **Straume, O. R.**, "International outsourcing and trade union (de-) centralization", 2019
NIPE WP 09/2019	**Carvalho, Margarita** and **João Cerejeira**, "Level Leverage decisions and manager characteristics",2019
NIPE WP 08/2019	**Carvalho, Margarita** and **João Cerejeira**, "Financialization, Corporate Governance and Employee Pay: A Firm Level Analysis", 2019
NIPE WP 07/2019	**Carvalho, Margarita** and **João Cerejeira,** "Mergers and Acquisitions and wage effects in the Portuguese banking sector", 2019
NIPE WP 06/2019	Bisceglia, Michele, Roberto Cellini, Luigi Siciliani and **Odd Rune Straume**, "Optimal dynamic volume-based price regulation", 2019
NIPE WP 05/2019	Hélia Costa and **Linda Veiga**, "Local labor impact of wind energy investment: an analysis of Portuguese municipalities", 2019
NIPE WP 04/2019	**Luís Aguiar-Conraria,** Manuel M. F. Martins and **Maria Joana Soares**, " The Phillips Curve at 60: time for time and frequency", 2019
NIPE WP 03/2019	**Luís Aguiar-Conraria,** Pedro C. Magalhães and Christoph A. Vanberg, "What are the best quorum rules? A Laboratory Investigation", 2019
NIPE WP 02/2019	**Ghandour, Ziad R**., "Public-Private Competition in Regulated Markets", 2019
NIPE WP 01/2019	**Alexandre, Fernando**, Pedro Bação and **Miguel Portela**, "A flatter life-cycle consumption profile", 2019
NIPE WP 21/2018	**Veiga, Linda**, Georgios Efthyvoulou and Atsuyoshi Morozumi, "Political Budget Cycles: Conditioning Factors and New Evidence", 2018
NIPE WP 20/2018	**Sá, Luís**, Luigi Siciliani e **Odd Rune Straume**, "Dynamic Hospital Competition Under Rationing by Waiting Times", 2018
NIPE WP 19/2018	Brekke, Kurt R., Chiara Canta, Luigi Siciliani and **Odd Rune Straume**, "Hospital Competition in the National Health Service: Evidence from a Patient Choice Reform", 2018
NIPE WP 18/2018	Paulo Soares Esteves, **Miguel Portela** and António Rua, "Does domestic demand matter for firms' exports?", 2018
NIPE WP 17/2018	**Alexandre, Fernando,** Hélder Costa, **Miguel Portela** and Miguel Rodrigues, "Asymmetric regional dynamics: from bust to recovery", 2018
NIPE WP 16/2018	**Sochirca, Elena** and Pedro Cunha Neves, "Optimal policies, middle class development and human capital accumulation under elite rivalry", 2018
NIPE WP 15/2018	**Vítor Castro** and Rodrigo Martins, "Economic and political drivers of the duration of credit booms", 2018
NIPE WP 14/2018	**Arash Rezazadeh** and **Ana Carvalho,** "Towards a survival capabilities framework: Lessons from the Portuguese Textile and Clothing industry", 2018
NIPE WP 13/2018	**Areal, Nelson** and **Ana Carvalho**, "Shoot-at-will: the effect of mass-shootings on US small gun manufacturers", 2018