Gender Diversity, Banks' Performance, and Stability across Central and Eastern European Countries*

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Abstract

This paper investigates the impact of board diversity on the performance and riskiness of banks across Central and Eastern European (CEE) countries. We emphasize identifying features of the board structure that could increase performance and lower the possible losses of banks. Using a unique, hand-collected dataset of 156 banks from CEE countries during 2005–2012, we assess whether banks with more female directors or chairwomen display lower risk and higher performance. The analysis first shows that banks with a chairwoman and a higher proportion of females among the members of a bank's board record a higher level of profitability and tend to have a lower level of credit losses. Additionally, the results suggest that the higher proportion of females among members on bank boards, on average, the higher the level of bank stability during the financial crisis of 2008. Our results also reveal that the regulatory framework in the host-country affects the relationship between board gender diversity and bank performance and risk.

Keywords: females, risk, financial crisis, bank performance, board of directors
JEL Codes: G21, G34, M14

1. Introduction

The presence of female managers in the leadership position of the board of corporations, the effect of their presence on firm performance, and equal pay for women have been the focus of political and corporate governance debates and discussions for many years (see Adams/Ferreira 2009, Dezsö/Ross 2012). By the same token, the data provide evidence that while the share of female university graduates versus males is high and growing, this growth is not matched with the increase of females at top management positions. For instance, according to an analysis carried out by Deloitte[1] using 7,000 companies in 60 countries, female

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1 https://www2.deloitte.com/global/en/pages/risk/articles/women-in-the-boardroom5th-edition.html#.

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presence on corporate boards globally grew from 12 % in 2015 to 15 % in 2017. However, this growth is not statistically significant and women are still underrepresented on corporate boards at a global level. One perceived motive, perhaps mistakenly, for this mild increase could be that corporations are concerned that the participation of females in making top-level decisions may natively affect the performance of the firm and increase the probability of failure. Nevertheless, according to Laura Berger in the Forbes Coaches Council, companies with at least three female board members observed median productivity of 1.2 % above competitors (Berger 2019).

All of this provides strong motivation to further examine the impact of gender diversity of the board of directors, in general, and the presence of females on the boards of directors, in particular, on the performance of corporate governance.

Along the same line, the study of risk and performance in the commercial banking industry has been the focus of a large body of finance and corporate governance literature in recent decades (e.g., Iannotta et al. 2007, Brissimis et al. 2008, Festić et al. 2011, Aebi et al. 2012, Guidara et al. 2013, de Haan/Vlahu 2016, Srivastav/Hagendorff 2016, Dong et al. 2017, Kosmidou et al. 2017, Gontarek/Belghitar 2018, Onofrei et al. 2018). Clearly, bank managers' poor financial performance and high risk-taking behavior results in panic, insolvency, and the likelihood of a financial crisis. As such, the level of risk to which a bank is exposed and the level of its performance are not only prominent topics within the literature, but are also of importance to economic policymakers and regulatory agencies.

There is a recent line of debate on whether the presence of females and gender diversity on a bank's board of directors, can be an effective corporate governance mechanism leading to better financial performance and lower risk-taking behavior in the management of liabilities and assets. The effect of gender on the performance and possible riskiness of the firm in general, and the banking industry in particular, has been the focus of several studies in economic and finance literature for many years (e.g., Sierra et al. 2006, Andres/Vallelado 2008, Terjesen et al. 2009, Berger et al. 2014, Fernandes et al. 2016, Sahay et al. 2017, Arnaboldi et al. 2018, Adusei 2019). This follows the fact that the issue of equal pay and pay differentials due to performance differentials have recently become the subject of political and economic controversy in many corners, which intensified following the 2008 financial crisis. While several studies find a positive influence of gender diversity on performance, there are studies that report a negative relationship or no relationship at all. Therefore, the existing empirical evidence is mixed and inconclusive. Some authors report a positive correlation between the presence of females on boards and bank's performance (Mateos de Cabo et al. 2012, Pathan/Faff 2013, Del Prete/Stefani 2015, García-Meca et al. 2015), others have shown either no impact (Liang et al. 2013, Ghosh 2017) or a

negative correlation between gender and performance (Gulamhussen/Santa 2015, Berger et al. 2014). However, the differences in empirical findings could be due to divergent samples, time periods, the types of institutions, and industry coverage, as well as endogeneity problems (Pathan/Faff 2013).

The purpose of this paper is to examine the effect of the presence of female directors and female diversity in banks' boards of directors on the financial performance and risk-taking behavior of banks. To examine this effect, we use a dataset from Central and Eastern European (CEE) countries. Since the early 1990 s, CEE countries have experienced significant and extensive economic changes. One of the main challenges was to create a stable and efficient banking system as a prerequisite for stable economic growth (Allen et al. 2017). During the last two decades, the banking sectors of CEE countries experienced an extraordinary credit boom and bust cycle. Andrieș and Brown (2017) showed that the credit boom in Eastern Europe far exceeded that in other regions but ended abruptly with the financial crisis of 2008 and left a legacy of credit losses in the region. Moreover, completing the picture of a classic credit boom and bust cycle, most of the non-performing loans materialized in those countries of the CEE region where the pre-crisis credit boom was the most extreme. The conditions in CEE countries created unprecedented opportunities for researchers because, in the described setting, the strengths and weaknesses of institutional arrangements and governmental and regulatory policies were exposed. The vital role of banks in these economies encompasses their participation in the payment system, the transmission of monetary policy, and the provision of credit (Toader et al. 2018). Thus, any market failure, inefficiency, or anticompetitive conduct among banks, is likely to impose more severe costs throughout the economy than would similar defects in other industries (Delis 2010).

In this paper, we examine whether banks with a higher share of female directors and female diversity in banks' board of directors had better performance and moderate risk-taking behavior. In the majority of CEE countries banks can choose between the one-tier and the two-tier system. The large majority of the banks are organised under a two-tier system (EBRD 2016). The empirical results of our study show that banks with a chairwoman and a higher proportion of females among bank's board of directors exhibit a higher level of profitability measured by return on assets (ROA) and return on equity (ROE). Our findings also indicate that banks with a chairwoman and a higher proportion of females among the board members tend to have lower levels of risk measured by non-performing loans (NPLs) and loan loss provisions.

This study makes several contributions to the literature. First, while much of the previous studies have concentrated on the effect of gender diversity on the performance of non-financial firms, we focus on the banking industry. As the governance of banks was decisive in shaping the financial crisis, it is interesting to

investigate the influence of female representation in this process, considering that our sample includes pre- and post-global financial crisis periods. Second, our sample comprises banks from CEE countries. The inclusion of these banks is interesting from the governance point of view, because they have carried out a transition from the communist system to the market economy with the adaptation of their old governance structures. Third, we use a methodology that allows us to control for the endogeneity and heterogeneity biases. More specifically, we employ a set of instruments that accounts for the percentage of firms in the private sector with top female managers, the number of interlocks for all members of banks' boards, and an index that ranks countries according to the gender imbalances.

The remainder of this paper is organized as follows. In Section 2 we review the current literature on the effect of the diversity of bank board of directors on the performance and risk-taking behavior of commercial banks. Section 3 describes the data and methodology of the study, Section 4 discusses the empirical results, and Section 5 provides a summary and conclusions.

2. Literature review

To mention a few contributions to the literature on the presence of females on the boards of directors and its consequences, Terjesen et al. (2009) review the effect of corporate board gender diversity on financial performance. These authors draw theoretical and practical implications based on their review and suggest there are political and other pressures (such as lobbyists movements) to promote the inclusion of females on corporate boards. Nielsen and Huse (2010) investigate the gender diversity of the boards of directors and its impact on financial performance using a survey conducted on corporations in Norway. These authors find that the presence of females on the boards of directors is positively related to "board strategic control" and board efficiency.

Campbell and Bohdanowicz (2015) provide a cost/benefit analysis in the framework of a set of theories from agency theory to upper echelons theory of Hambrick and Mason (1984). Gabaldon et al. (2016) discuss a framework to study the issues related to the presence of females on corporate boards and to structure approaches by which females are promoted to the top-levels of management. They study the reasons for the absence of female representations on the boards and offer policy solutions to solve this underrepresentation. Seierstad (2016) employs data of Norwegian public limited companies to study the outcome of mandated quota laws to increase the presence of females on top-level management positions. The author provides evidence that women in their sample are in favor of this law and they believe it expands the opportunities for them to be appointed to boards of directors.

Terjesen and Sealy (2016) make a case that in spite of legal, legislative, and political efforts, female presence on corporate boards of directors is not as much as that of males. These authors study the resulting tensions created by the board gender legislatives in the framework of a set of theories. Most recently, Kirsch (2018) examines the corporate governance literature related to board gender structure to provide evidence of how the presence of females on the boards of directors impacts the financial performance of corporations. This author further examines the differences between female and male board members and the effect females on the boards and other related issues.

For the banking industry, the structure of the boards is extremely important, and the governance mechanisms of financial intermediaries might differ to a great extent from the practices of non-financial firms. The presence of regulations, the high leverage of financial institutions and the competition in the managerial labor market and in the product market make the design of internal governance mechanisms different across banks and non-financial firms. Adams and Mehran (2003) consider that in order to evaluate reforms on the governance structures of banks it is important to understand current governance practices as well as how governance differs between a highly regulated sector like banking and less regulated firms. In the same vein, Gulamhussen and Guerreiro (2009) highlight that there is a clear conflict inside banks between the interests of the shareholders and of the depositors, since managers are usually willing to take high-risk projects that increase share value at the expense of the value of the deposits. To avoid crises of confidence and bank runs, small deposits are insured and banks are intensely regulated (John et al. 2000). Thus, financial institutions are subject to more intense regulations than other firms, since both the credit and payment systems and the economic development depends on the banks' financial condition (Andres/Vallelado 2008). The existence of an implicit or explicit public safety net against bank failures can generate moral hazard and could make banks take on more risks (Demirgüç-Kunt/Kane 2002, Kahn/Santos 2005). Against this backdrop, regulation could change the relationship between board structure and performance (Booth et al. 2002) and regulatory constraints might not allow a bank's board to be optimal (Hermalin/Weisbach 2003). Another difference comparing banks to non-financial companies is the fact that the complexity of the banking business increases the asymmetry of information and diminishes stakeholders' capacity to monitor bank managers' decisions (Andres/Vallelado 2008). The literature on the relationship between the composition of bank boards, from a gender perspective, and bank performance is recent and still limited. Only a few studies investigate whether the presence of female members on the bank boards enhances financial performance (Sierra et al. 2006, Andres/Vallelado 2008, Adams/Mehran 2012, Pathan/Faff 2013, Fernandes et al. 2016, Sahay et al. 2017, Arnaboldi et al. 2018, Owen/Temesvary 2018) or firm's value (Agyemang-Mintah/ Schadewitz 2019, Eckbo et al. 2019). The main hypothesis of the

previous studies is that females may be more risk-averse than males; thus, they engage in less risky undertakings that diminish a bank's level of risk exposure. Studies in behavioral finance have stressed that risk-taking behavior differs between male and female bank executives (Sila et al. 2016). The general view is that the presence of females on banks' boards of directors can influence the risk-taking behavior of banks and that females take lower risks than men (Agarwal/Wang 2009, Beck et al. 2013, Skała/Weill 2018). In Reddy and Jadhav's (2019) survey on gender diversity on boardrooms, the authors document inconclusive results in the literature, from both the perspective of the impact of board gender diversity on firm performance and on the impact of gender quota legislation on firm performance.

Reinert et al. (2016) used credit institutions data in Luxembourg between 1999 and 2013 to investigate the relationship between the proportion of females in the top management of banks and bank financial performance. They find a positive relationship between the level of female management and bank performance, with the positive relationship being stronger during the global financial crisis compared to normal market conditions. Adams and Ragunathan (2015) employed a sample of 300 large U.S. banks over a four-year period including the period between 2007 and 2008 (the year in which financial crisis took place) to analyze the relationship between board gender diversity and risk-taking behavior. They report that the banks in their sample with more female directors were not exposed to a lower risk of operation compared to other banks during the crisis, but these banks did have better performance. Palvia et al. (2015) investigated whether bank capital ratios and default risk were associated with the gender of a bank's CEO and chairperson of the board using a sample of U.S. commercial banks. These authors reported that banks with female chief executive officers demonstrated a conservative capital structure. Similarly, Berger et al. (2014) examined the relationship between the presence of female on boards and risk-taking behavior of banks and found a positive connection between the two. They provided evidence to indicate that portfolio risk increases after adding more females to the boards of directors. Their explanation for the results was that females have less background and experience in business and risk-taking activities than their male colleagues. Focusing on the Chinese banking system, Dong et al. (2017) found that the proportion of female directors on the board appears to be linked to higher profitability and seems to lower traditional banking risk. Farag and Mallin (2017), using a sample of 99 European banks over the period 2004–2012, report that female representation on a board of directors may reduce banks' vulnerability to a financial crisis.

Pathan and Faff (2013) employ a panel of large U.S. banks between 1997 and 2011. The findings of these authors imply that board structure is more relevant to banks with low market power, and that gender diversity had a positive effect on the bank performance in the 1997–2002 period; however, this effect dimin-

ished after this period and during the financial crisis period. García-Meca et al. (2015) find that gender diversity increases bank performance based on a sample of 159 banks from nine developed countries between 2004–2010. Del Prete and Stefani (2015), using a sample of Italian banks, report a positive impact of gender diversity on the quality of credit and profitability. They show that past bank performance significantly affects the gender composition of the board. Mateos de Cabo et al. (2012) use a sample of 612 European banks to investigate the relationship between the gender structure of boards and the risk-taking behavior of banks. These authors find that a higher percentage of females on bank boards is related to lower bank risk-taking, results that also hold in the study of Sahay et al. (2017) showing that the presence of females as well as a higher share of females on bank boards is associated with increased bank stability and lower NPL ratios. These results support the view of a negative relationship between the presence of female on the board and bank risk-taking. In addition, Mateos de Cabo et al. (2012) report that investment banks and real estate firms are likely to include more females on their boards and conclude that the likelihood to include females on the board was higher for the banks that were more growth-oriented. Mersland and Øystein Strøm (2009) find that females appointed as CEOs induce a higher financial performance in the microfinance institutions.

The different measures utilized to assess the financial performance of a bank could explain the inconclusive findings regarding the relationship between performance and board composition. The most widely used proxies to determine bank performance are: the return on assets (ROA) (see e.g., Choi/Hasan 2005, Pathan/Faff 2013, Del Prete/Stefani 2015, García-Meca et al. 2015); return on equity (ROE) (see e.g., Gulamhussen/Guerreiro 2009, Liang et al. 2013, Pathan/Faff 2013); and non-performing loans ratio (see e.g., Liang et al. 2013, Del Prete/Stefani 2015). Another reason for the inconclusive results found in the literature could be linked to the fact that there is a nonlinear relationship between gender diversity on boards and bank performance (Owen/Temesvary 2018).

From an Agency Theory perspective, some studies suggest that gender diversity on the boards of directors can provide better corporate governance (Adams/Ferreira 2009, Terjesen et al. 2009). This way, Carter et al. (2003) state that the presence of women on the board increases the board independence because female directors are more inclined to ask questions that would not be asked by male directors. Also, women directors can enhance the monitoring and control, and they are more likely to be included in corporate governance committees (Adams/Ferreira, 2009). Several recent papers investigated the effect of board gender diversity and its relationship to the performance of financial institutions. Arnaboldi et al. (2018) investigate the relationship between general board features and the financial performance of a sample of European publicly quoted banks. They report that the performance of banks included their sample is not impacted by the board gender diversity. Owen and Temesvary (2018), however,

stress that there is a nonlinear relationship between gender diversity on bank boards and bank performance, and female participation positively impacts bank performance once a certain threshold level of gender diversity is achieved.

Adusei (2019) departs from accounting measures of performance and uses a non-parametric approach to calculate overall technical efficiently and pure technical efficiency to assess the performance of a sample of 410 microfinance institutions and examine the relationship between efficiency and board gender diversity. This author reports the pure technical efficiency (PTE) and overall technical efficiency (OTE), measures of performance, and board gender diversity are negatively and statistically significantly associated. Fan at al. (2019) investigate the relationship between board gender diversity and the earning management of 91 bank holding companies from 2000 to 2014. These authors report an inverted *U*-shaped relation between women on boards and bank earnings management. In the same context, Mollah et al. (2019) document that board structure and CEO power have a significant influence on future cash flows.

Regarding the relationship between the gender diversity of boards and bank firm performance, Agyemang-Mintah and Schadewitz (2019) find a statistically significant positive relationship between board gender diversity and the value of financial firms employing a sample of 63 financial institutions from the UK over a period of 12 years. Furthermore, Eckbo et al. (2019) show that the gender quota law that applies in several countries[2] has a non-zero impact on firm value. In line with the theories from sociology and psychology women can influence the board deliberations (Gul et al. 2011). For instance, Daily and Dalton (2003) argue that the presence of women on corporate boards generate unique perspectives, experiences, and work styles compared to their male peers. Female directors can enhance the board's deliberations and their communication style is more participative and process-oriented. Similarly, Jelinek and Adler (1988) argue that women have good interpersonal skills, which can enhance decision-making processes by encouraging the board to considerer different perspectives and opinions and improving the communication of information. Besides, women are generally more conservative and risk-averse (Byrnes et al. 1999). Women are also less likely to be overconfident (Lundeberg et al. 1994) and incorporate higher ethical standards in their decision-making (Ambrose/Schminke 1999). Therefore, gender diversity has important implications from an economic point of view. The representation of women on a board affects the governance of the firm, and thus, it may influence firm value and firm efficiency (Shrader et al. 1997).

2 Norway was the first country to enact a 40 % female quota legislation for corporate boards in 2003. In 2018, California became the first U.S. state to impose board gender diversity legislation. Greene et al. (2020) show that investors reacted negatively to this corporate board gender quota in a study of 602 firms.

Recent work also includes studies on the impact of gender diversity in banks on environmental performance (Birindelli et al. 2019) and systemic risk (Liao et al. 2019). If the relationship between gender diversity in banks and environmental performance is nonlinear, gender quota laws lead to an increase in bank risk-taking and systemic risk.

The present study, therefore, is motivated by the body of literature discussed above to fill the gap in the literature by using a larger sample size in 17 Eastern European countries among which there are non-European members and as well as new EU members. Consequently, this paper attempts to extend the current literature to identify the impact of the presence of females on the boards of banks on the banks' business models, performance, and risk outcomes in CEE countries. Banks from the CEE countries present interesting settings given the fact that their performance and risk could be highly influenced by the connection with their bank holding companies from Western Europe because many of them have foreign ownership (Andrieș et al. 2020). Given this motivation, the hypotheses that we want to test in this paper can be stated as follows:

Hypothesis 1. *The presence of women on a bank's board of directors enhances bank performance.*

Hypothesis 2. *The presence of women on a bank's board of directors diminishes bank risk-taking.*

3. Data and methodology

For our analysis, we employ a panel regression model and a dataset of 156 commercial banks from 17 CEE countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine) for the 2005–2012 period.

To start, we use all commercial banks from CEE countries available in the BankScope database in 2012. One concern related to the empirical analysis is the potential heterogeneity among different financial institutions. Furthermore, the impact of financial crises arguably might differ across commercial banks, cooperative banks, investment banks, and real estate and mortgage banks. To guarantee consistency across the sample, we restrict the investigation to the commercial banking sector, which comprises one of the largest segments of depository institutions in Europe (Chortareas et al. 2013).

Following Andrieș and Brown (2017), we collect data for 462 active banks from 17 CEE countries from 2005 to 2012. Out of the 462 banks, only 260 banks have detailed information for at least 5 years. Similarly, following Claessens and van Horen (2014), we apply two further selection rules to avoid duplication in

our sample. First, we account for mergers and acquisitions and entry and exit during the analyzed period. Second, to prevent double entries between parent banks and subsidiaries, we exclude bank-holding companies because the inclusion of these institutions could lead to double counting, as these are corporations that control one or more banks and use unconsolidated financial statements (Clerides et al. 2015).

We hand-collected data on various aspects of the organizational structure of the supervisory board for each bank in each year from the banks' annual reports, financial statements, capital adequacy and risk management reports, and websites. A complete dataset was produced for 156 banks, 39 domestic banks, and 117 foreign banks, which accounted for 82.31 % of the total assets of CEE banking systems in 2012.

Foreign ownership in the banking sector has grown dramatically during the recent decade across CEE countries, and by 2008, foreign banks controlled around 80 % of the assets in the region's banking industry, and in countries such as Estonia or Slovak Republic, more than 95 % (Andrieș et al. 2018). The CEE banking markets cannot easily separate themselves from Western Europe because Western European banks like Raiffeisen Bank International, Erste Bank, UniCredit, Société Générale, Intesa, and KBC, and regional banks like OTP and NLB, are dominant forces in the CEE (EIB, 2013). The number of foreign banks per country ranges from 5 in Albania and Lithuania to 12 in Poland and Romania. In terms of home countries, the greatest numbers of foreign banks in CEE countries are from Austria (29), Italy (20), and Greece (13).

The recent 2008–2009 global financial crisis has increased interest in studying the behavior of foreign banks in developing countries during periods of financial turmoil. The 2008 crisis was unique because it originated in the home markets of the banking groups operating in emerging European countries (De Haas et al. 2015). Previous studies show a clear dissimilarity between the bank management behavior of foreign and domestic banks that operated in CEE before the crisis, and this dissimilarity intensified during the financial crisis (Cull/Martínez Pería 2013, Feyen et al. 2014, Choi et al. 2016). We classify banks into foreign and domestic banks based on whether 50 % or more of a bank's shares are owned by foreigners, by central and local governments, or by the domestic private sector, respectively (Claessens/van Horen 2014).

We study the link between the gender diversity of the banks' boards and the banks' performance, risk, and business model in CEE banking systems, using the following regression model:

$$\mathrm{Perf}_{i,c,t} = \alpha + \beta \times \mathrm{Female}_{i,c,t} + \gamma \times \mathrm{BC}_{i,c,t} + \vartheta \times \mathrm{BS}_{c,t} + \delta \times \mathrm{Macro}_{c,t} + \varphi_c(1) + \vartheta_t + \varepsilon_{i,c,t}$$

where $Perf_{i,c,t}$ is one of the alternative bank's performance indicator for bank *i* in country *c* during year *t*); $Female_{i,c,t}$ denotes one of the alternative board diversity measures; $BC_{i,c,t}$ is the bank level of control variables; $BS_{c,t}$– denotes the bank system level control variables; and $Macro_{c,t}$ measures macroeconomic control variables. We include fixed effects by country and year in all specifications to control for omitted variables at the country and year level.

Following previous studies (Andres/Vallelado 2008, Pathan/Faff 2013, García-Meca et al. 2015), we employ five alternative proxies of bank performance and risk to investigate the relationship between gender diversity and bank performance. These proxies include *Return on Average Assets (ROA), Return on Average Equity (ROE), Z-score indicator (Z-score), Impaired Loans to Gross Loans ratio (NPL) and Loan Loss Provisions to Total loans ratio (LLP)*.

Two alternative measures of profitability are used: *Return on Average Assets (ROA)* and *Return on Average Equity (ROE)*. In principle, ROA reflects the ability of a bank's management to generate profits from the bank's assets, although that measure may be biased due to off balance-sheet activities (Athanasoglou et al. 2008). ROE is net income after tax as a percentage of the average book value of a bank's total equity. The latter is often referred to as the bank's equity multiplier, which measures financial leverage.

As a measure of bank risk, we use the bank's *Z-score*, which is computed as the ratio between the sum of return on assets (ROA) and level of capitalization for each bank (equity/total assets) and the standard deviation of the return on assets for every three year period as below. The Z-score represents the number of standard deviations below the mean by which profits would have to fall to deplete the bank's equity capital (Demirgüç-Kunt/Huizinga 2010). In this way, the Z-score measures the distance from bank insolvency (Laeven/Levine 2009), and a high *Z-score* denotes that the bank is more stable. The Z-score has been widely used in the recent literature for measuring bank risk (Demirgüç-Kunt/Huizinga 2010, Delis et al. 2014, Köhler 2015).

In order to assess the impact of the gender diversity of the banks' boards on risk-taking behavior, we use as two alternative risk measures: *Credit losses* (NPL) and *Loan Loss Provisions to Total loans ratio* (LLP). We use the Impaired Loans to Gross Loans ratio as a measure for *Credit losses.* Non-performing loans represent a major obstacle to the development of the banking sector. Previous work has identified that non-performing loans signal future financial problems for banks and point out that NPLs can be used to mark the onset of a banking crisis (Reinhart/Rogoff 2011). The quality of bank loans plays an essential role in the overall soundness of a bank since one of the core activities of banking institutions is to make loans, even though its importance has been gradually decreasing in recent decades (Park 2012).

Table 1. Descriptive statistics

	Obs.	Mean	Std. Dev.	Min	Max	Pre-Crisis	Crisis	Diff. (t-test)
Females on boards (%)	1143	0.141	0.115	0	0.571	0.1455	0.1342	0.01
Chairwoman	1142	0.091	0.288	0	1	0.0944	0.0856	0.01
Blau index	1143	0.2162	0.1464	0	0.5	0.2211	0.2083	0.0128
Shannon index	1143	0.3458	0.2124	0	0.6931	0.3523	0.3352	0.0171
Return On Avg. Equity (ROE) (%)	1131	6.789	18.761	-82.007	39.665	9.0570	3.6055	5.45***
Return On Avg. Assets (ROA) (%)	1133	0.753	1.797	-7.598	5.518	0.9967	0.2278	0.76***
Impaired Loans (NPLs)/ Gross Loans (%)	844	10.038	10.582	0.120	58.860	9.7735	10.4057	-0.63*
Loan loss provisions/Total loans	1104	1.984	2.860	-1.037	19.082	1.5863	2.6207	-1.03***
Z-score indicator	840	415.189	1345.788	-0.050	10443.610	487.023	344.712	142.311*
Bank size (Logarithm of total assets)	1133	14.561	1.365	10.616	17.373	14.4762	14.6991	-0.22***
Capital structure	1133	11.149	5.060	3.439	35.728	11.1966	11.0720	0.12
Asset structure	1133	0.624	0.143	0.168	0.895	0.6057	0.6540	-0.04***
Boards size (Logarithm of Number of board members)	1143	2.380	0.301	1.099	3.178	2.3795	2.3797	-0.00
Bank concentration (%)	1008	59.555	14.915	26.163	99.644	60.3303	58.5209	1.80*
Bank deposits to GDP (%)	990	44.246	11.636	19.879	66.955	42.3497	46.6945	-4.34***
Net interest margin (%)	1008	4.087	1.517	1.262	8.412	4.1813	3.9612	0.22**
Index of regulation and supervisory framework	1152	0.605	0.110	0.368	0.901	0.6127	0.5925	0.02***
GDP growth (annual %)	1152	2.592	5.046	-17.955	12.233	4.4423	-0.4921	4.93***
Inflation (%)	1152	4.701	3.726	-2.167	22.311	4.7688	4.5886	0.18

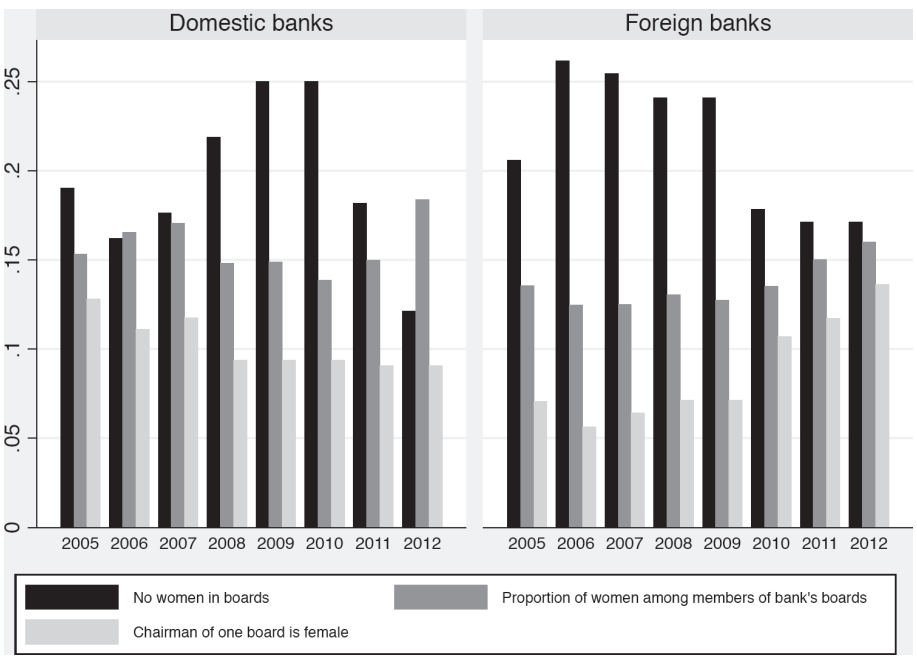
***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

The summary statistics presented in Table 1 show that the average ROE ranges from -82 % to 39.66 %, while the minimum and maximum values for ROA are -7.59 % and 5.51 %, respectively. The mean score of all banks in the sample is 10.38 % for NPLs (standard deviation is 10.58) and 1.98 for LLP (standard deviation is 2.86). We conduct winsorization approach to minimize the impact of outliers at the bank-level explanatory variables at the 1 % and 99 % levels.

Our main regressors are represented by the presence of female among managing and supervisory boards. These regressors are hand-collected from banks' Annual Reports, Financial Statements, Reports on capital adequacy and risk management, and from their websites.

Female on board is our main independent variable in the empirical analysis, and we define this variable as the proportion of females among members of the banks' boards. Therefore, its value must lie between 0 % and 100 %. The average value of *Female on board* is 14.1 %, with a standard deviation of 11.5 %. The second variable, *Chairwoman*, measures if the chairperson of the board is female; on average, 9 % of chairpersons are female.

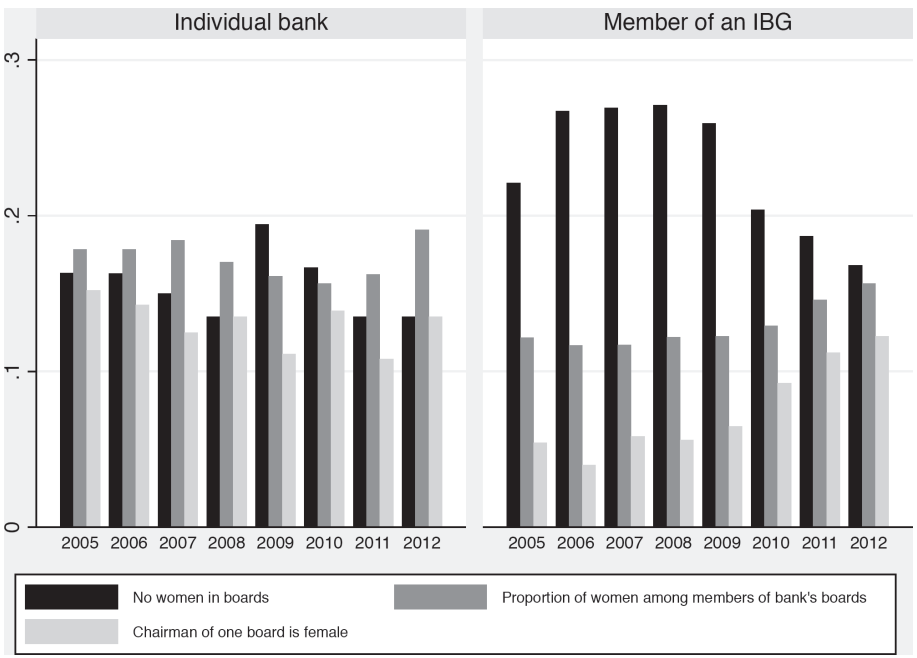
Figure 1. Share of *Females on bank boards* and *Chairwoman* for banks by ownership



Source: Authors' calculation

Figure 1 suggests a significant difference between domestic and foreign banks regarding level of *Female on board* and *Chairwoman* indicators. More specifically, foreign banks have slightly higher levels of the *Female on board* and *Chairwoman* indicators than domestic banks before the crisis (14 % and 9 % for foreign banks versus 13 % and 8 % for domestic banks). However, we observe that during the financial crisis, the proportion of females among members of the bank boards of foreign banks operating in CEE countries increased significantly from 12 % in 2008 to 15 % in 2012 and the number of chairwomen increased from 7 % in 2008 to 13 % in 2012.

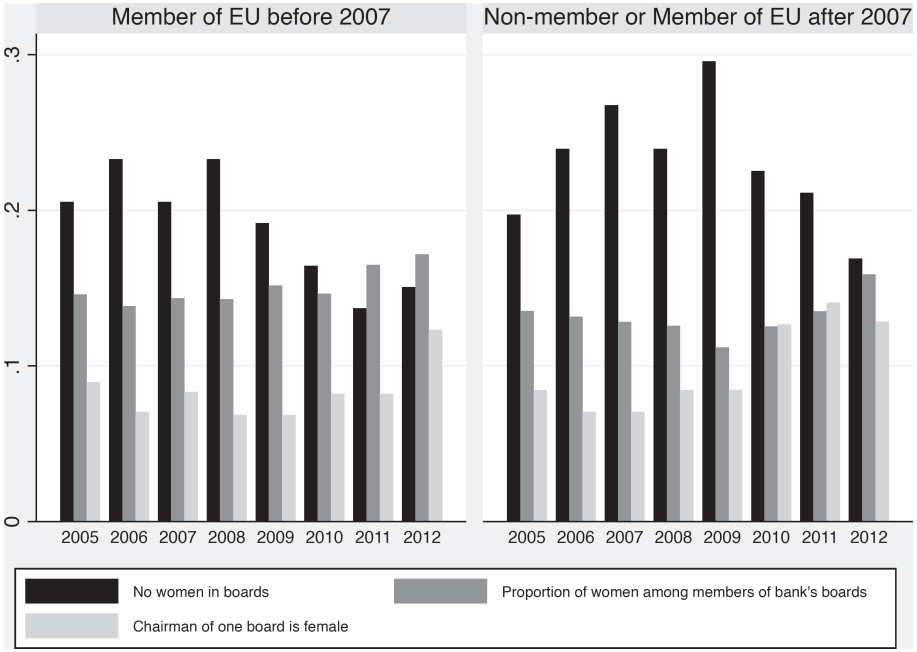
Figure 2. Share of Females on board and Chairwoman for banks by type of banks (members of an International Banking Group – IBG)



Source: Authors' calculation

Figure 2 reveals the same pattern for banks that are members of an international banking group with higher exposure in the CEE region. From Figure 3 we note that, on average, the proportion of females among members of bank boards that operate in countries that became members of European Union (EU) before 2007 is higher than in the case of banks that operate in non-EU countries or became EU members after 2007. However, in the case of the *Chairwoman* indicator, the situation is the opposite.

Figure 3. Share of *Females on board* and *Chairwoman* for banks by type of country (EU membership before or after 2007)



Source: Authors' calculation

As a robustness check, we use two measures of gender diversity built on the variables that reflect the proportion of board members in each of the two categories, female and male, to control for the heterogeneity among board members, namely the Blau index of heterogeneity and the Shannon index of diversity. The Blau index of heterogeneity among boards is adapted from the form proposed by Blau (1977):

$$\text{Blau index} = 1 - \Sigma_{i=1}^{n}(\text{Share of board members}_i)^2 \quad (2)$$

Share of board members$_i$ is the proportion of board members in each of the two categories female and male and n is the total number of board members within the bank (Blau 1977). The value of this index ranges from 0 (all board members in only one category) to 0.5 (an equal number of female and men among bank boards).

Next, we compute the Shannon index of diversity among boards, adapted from Shannon (1948):

$$\text{Shannon index} = -\Sigma_{i=1}^{n}\text{Share of board members}_i \times \log(\text{Share of board members}_i) \quad (3)$$

The value of the Shannon index ranges from 0 (no gender diversity) to 0.69 (an equal number of females and males on the banks' board). This index presents the advantage of better capturing small differences in the gender structure of banks since it is based on the logarithm of the proportion of females and males among the board members.

To account for the potentially confounding effects of bank-specific, banking system, and macroeconomic characteristics, we utilize several control variables In terms of bank-specific characteristics, we control for bank size, capital and asset structure, and board size. To address one of the important questions concerning what bank size optimizes bank performance, we use the logarithm of the bank's total assets to measure *Bank size.* In addition, we use the ratio of equity to assets as a proxy for a bank's *Capital structure*. To characterize the asset side of a bank's balance sheet, we follow Beltratti and Stulz (2012) and employ the *Asset structure*, an indicator of a bank's investment strategy. This variable is calculated as the ratio of Loans to Total Assets. We take an approach proposed by Andrieș and Brown (2017) to define the corporate governance of a bank using board size, which is the natural logarithm of the number of directors on a bank's board.

We control for cross-country differences in the national structure and competitive conditions of the banking sector using *Bank concentration,* represented by the Herfindahl-Hirschman Index (HHI), which is calculated as the sum of the squares of the market shares of all of the banks in the banking system. Furthermore, we use the *Bank deposits to GDP* ratio to assess the impact of the level of financial intermediation, and the net-interest margin, defined as the difference between a bank's interest income and interest expense as a percentage of interest-earning assets. The indicator is a proxy for the (in)efficiency of financial intermediation (Demirgüç-Kunt/Huizinga 1999). Additionally, we construct an *Index of regulation and supervisory framework,* as the normalized unweighted average index of three regulation and supervision indicators, i.e., a *Restrictions on banking activities index*, a *Capital regulatory index*, and an *Official supervisory power index*. This index is based on data from the survey of bank regulations conducted by the World Bank (Barth et al. 2004).

Finally, we include two macroeconomic variables in our model: the annual real *GDP growth rate and* the annual percentage change in the consumer price index to represent the annual *Inflation rate.*

4. Empirical Results

4.1 Female directors and bank performance

We first analyze whether banks with a higher proportion of female directors demonstrate higher profitability, stability, and a lower level of risk. Table 2

presents the results of a multivariate regression analysis. We estimate ten models employing our full sample of banks based on Equation 1. All of these models include bank and time fixed effects, which allow for clustering of standard errors at the country level.

A positive coefficient corresponds to improved performance level, while a negative coefficient is related to the declining performance of banks. Overall, the empirical findings indicate that banks with a higher proportion of female among their board members and with a chairwoman demonstrate a higher level of profitability measured by ROA and ROE (Table 2, Models 1 through 4). A one standard deviation increase in the *Female on board* indicator (proportion of female among members of a bank's board) generates, on average, an increase in ROE of about 2.43 % and in ROA of about 0.27 %. Table 2 shows that the presence of a female as the chairwoman of the board is associated with a 9.58 % higher ROE (Model 2) and a 0.93 % higher ROA (Model 4). Our findings are in line with Adams and Mehran (2012), Cornett et al. (2009) and Liang et al. (2013).

We note that the coefficients of bank risk, measured by *Impaired Loans to Gross Loans ratio* (NPL) and *Loan loss provisions to Total loans ratio* (LLP), are negative and statistically significant, which suggest banks with a higher proportion of female among a bank's board members and having a chairwoman tend to have lower levels of *NPLs* and *Loan loss provisions*. Furthermore, a one standard deviation increase in the proportion of females among the members of the bank's board results in a decrease in *NPLs* by about 8.21 % and *Loan loss provisions* by about 3.13 % on average. The effect of *Chairwoman* is lower, producing a reduction of about 3.13 % in *NPLs* and 1.13 % in *Loan loss provisions on average*. In terms of bank stability, Models 9 and 10 in Table 2 indicate a positive, but not statistically significant coefficient for both indicators, *Female on board* and *Chairwoman.*

To check for robustness, we re-estimate Eq. (1) using a System Generalized Method of Moments (GMM) estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998).[3] This method allows us to control for endogeneity bias by including lagged values of the regressors (Andrieș and Nistor, 2018). The governance variables are considered endogenous, being instrumented with lagged differences from 1 to 2 in the level equation. The other regressors are considered exogenous and are instrumented with their level. The validity of the instrumental variables is tested by the *Hansen J statistic*, while the serial correlation between residuals is assessed using the *Arellano-Bond test.*[4] The results are presented in Table 3 Panel A.

3 Granger causality tests indicate no causal effect of governance on efficiency or vice-versa.

4 The null hypothesis of the *Arellano-Bond test* is that there is no serial correlation between the residuals.

Table 2. Female directors and Profitability, risk and stability of banks

	Model 1 ROE	Model 2 ROE	Model 3 ROA	Model 4 ROA	Model 5 NPL	Model 6 NPL	Model 7 LLP	Model 8 LLP	Model 9 Zscore	Model 10 Zscore
Females on board (%)	**21.1862****		**2.3907*****		**-8.2126***		**-3.1305*****		0.1540	
	(9.6225)		(0.8576)		(4.3744)		(1.1601)		(0.0996)	
Chairwoman		**9.5856*****		**0.9385*****		**-3.1346*****		**-1.1385*****		0.0048
		(3.1178)		(0.3205)		(0.8885)		(0.3561)		(0.0962)
Lag Dependent Variable	0.1090***	0.1109***	0.0925**	0.0912**	0.4994***	0.4997***	0.2426***	0.2441***	0.0100	0.0104
	(0.0384)	(0.0366)	(0.0406)	(0.0404)	(0.1078)	(0.1087)	(0.0652)	(0.0667)	(0.1077)	(0.0971)
Size	8.3333**	9.5612***	1.4753	1.6114*	-3.8916	-4.2165	-0.6342	-0.7981	0.0241	0.0294
	(3.6729)	(3.6205)	(0.9338)	(0.9415)	(2.7619)	(2.7591)	(0.6369)	(0.6474)	(0.0447)	(0.0485)
Capital structure	0.7130**	0.6520*	0.1738	0.1687	-0.0120	0.0149	-0.0327	-0.0247	-0.0016	-0.0011
	(0.3518)	(0.3502)	(0.1194)	(0.1211)	(0.2771)	(0.2803)	(0.0906)	(0.0923)	(0.0019)	(0.0021)
Asset structure	34.0491***	36.1522***	4.1224**	4.3766**	-8.2903	-9.1677	-5.0959**	-5.3785***	-0.0552	-0.0439
	(12.4889)	(12.5223)	(1.7941)	(1.7688)	(7.4911)	(7.3978)	(1.9853)	(2.0000)	(0.1325)	(0.1332)
Board size	2.5996	3.7349	0.3300	0.4629	0.9754	0.4686	-0.1566	-0.3219	0.0689*	0.0781**
	(4.2113)	(4.4050)	(0.5772)	(0.5954)	(2.4351)	(2.5614)	(0.7166)	(0.7405)	(0.0385)	(0.0370)
Bank concentration (%)	-0.3226*	-0.3076	-0.0189	-0.0173	-0.0043	-0.0153	0.0360*	0.0336*	-0.0000	0.0002
	(0.1898)	(0.1907)	(0.0142)	(0.0145)	(0.0560)	(0.0558)	(0.0184)	(0.0184)	(0.0021)	(0.0022)
Bank deposits to GDP (%)	0.1529	0.1656	-0.0605	-0.0589	0.1520	0.1247	-0.0012	-0.0037	0.0011	0.0011
	(0.2282)	(0.2252)	(0.0437)	(0.0433)	(0.1214)	(0.1266)	(0.0340)	(0.0342)	(0.0031)	(0.0030)
Net interest margin (%)	2.2125	2.2400	-0.1170	-0.1170	0.1895	0.1766	0.0324	0.0293	-0.0108	-0.0104
	(1.4104)	(1.4031)	(0.3301)	(0.3322)	(0.7245)	(0.7176)	(0.1935)	(0.1948)	(0.0107)	(0.0108)
GDP growth (annual %)	1.8179***	1.8441***	0.2099***	0.2129***	-0.3089***	-0.3302***	-0.2664***	-0.2705***	-0.0009	-0.0007
	(0.2721)	(0.2770)	(0.0467)	(0.0473)	(0.0710)	(0.0750)	(0.0386)	(0.0394)	(0.0011)	(0.0011)
Inflation rate	0.6706***	0.6636***	0.0686***	0.0679***	-0.0414	-0.0487	-0.0773***	-0.0772***	0.0025	0.0024
	(0.2283)	(0.2258)	(0.0241)	(0.0239)	(0.1058)	(0.1062)	(0.0294)	(0.0287)	(0.0024)	(0.0024)
Index of Regulation	25.7828***	25.5395***	1.8413***	1.8253***	-8.7746***	-8.7005***	-1.0555	-1.0537	0.0489	0.0589
	(7.1208)	(6.6463)	(0.5873)	(0.5537)	(3.2131)	(3.1814)	(0.9746)	(0.9045)	(0.0797)	(0.0795)
Constant	-169.4828***	-189.5360***	-23.9075*	-26.1550**	63.5687	70.7168	14.4086	17.1481*	-0.4749	-0.5880
	(54.3302)	(53.5080)	(13.0023)	(13.1508)	(44.0166)	(43.6650)	(8.8367)	(9.0675)	(0.6334)	(0.7173)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.4030	0.4067	0.2930	0.2940	0.5679	0.5692	0.4027	0.4031	0.0353	0.0316
N. of cases	835	835	838	838	580	580	811	811	557	557

***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

A possible concern about our empirical framework is that a bank's performance and risk could also affect the board's gender structure, as financial institutions operating at high performance might appoint more females in the supervisory boards and management levels. To address this reverse causality concern, the gender diversity indices are considered endogenous and instrumented by variables that are correlated with the share of females among the members of the boards, but uncorrelated with bank performance. The instruments that we employ are in consensus with the literature and aim to address the multi-faceted nature of gender-based disparities. The first instrument is the percentage of firms in the private sector of the country where firms have appointed females to positions in their top management. A high propensity to appoint females in top management in the private sector, should be positively associated with the presence of female in bank boards. This variable is obtained from the Enterprise Survey provided by the World Bank.

To stress the importance of informal social connections within networks, Adams and Ferreira (2009) use the ratio between male directors with board connections to female directors, as an instrument for the share of female in boards when assessing their impact on risk taking behavior. Similarly, in this paper, we employ a second instrument, *interlocks number,* which is a variable that accounts for whether a director serves as a board member in two or more companies. As argued in the corporate finance literature (Pfeffer, 1972), firms with more connections with other companies via board members are more likely to include females on their boards. Aldrich and Zimmer (1986) document the positive impact of networks on the female presence on boards via a more efficient dissemination of gender diversity issues. Our third instrument, *the Global gender gap index* (from the Global Gender reports of World Economic Forum), ranks countries according to gender imbalances in areas such as economic participation and opportunity of educational attainment, health, labor force, and political empowerment. This index takes values from 0 (female inequality) to 1 (equality or better for females). A business environment that promotes greater gender diversity should also encourage the appointment of more females on boards of directors in different industries. Finally, we use a proxy accounting for whether the banks have a specific corporate governance code for the empirical models including the interaction of gender diversity with governance. This variable is termed as The *Corporate governance dummy*. The latter variable takes the value 1 if there is a corporate governance code within the bank and 0 if does not. All estimations are conducted using the Two-Stage Least Squares (2SLS) method with robust standard errors. The validity of all instrumental variables is verified using the Hansen test, with the null hypothesis that the instruments are not correlated with the residuals. The results of the investigation are presented in Table 3 Panel B.

Table 3. Panel A System GMM regressions for profitability, risk and stability of banks

	Model 1 ROE	Model 2 ROE	Model 3 ROA	Model 4 ROA	Model 5 NPL	Model 6 NPL	Model 7 LLP	Model 8 LLP	Model 9 Zscore	Model 10 Zscore
Females on board (%)	**20.4324****		**1.3302***		**-7.7608***		**-3.3119****		**3.6480****	
	(8.6352)		(0.7478)		(4.1220)		(1.4161)		(1.5039)	
Chairwoman		**7.9426*****		**0.5756****		**-3.1127*****		**-1.0253****		0.5576
		(2.6064)		(0.2492)		(0.8402)		(0.4679)		(0.6939)
Lag Dependent Variable	0.3466**	0.3508**	0.7415**	0.7323**	0.8420***	0.8573***	0.2174**	0.2366**	-0.1781	-0.1865
	(0.1539)	(0.1571)	(0.2931)	(0.2938)	(0.2708)	(0.2670)	(0.0888)	(0.0910)	(0.2469)	(0.2467)
Size	6.8658*	7.9028*	0.1176	0.2074	-2.4717	-2.7528	-2.4049	-2.5418	1.6348*	1.8382**
	(4.0776)	(4.0395)	(0.6005)	(0.5980)	(2.2059)	(2.1403)	(1.7863)	(1.7747)	(0.8611)	(0.8849)
Capital structure	0.8253**	0.7763**	0.1049***	0.1019**	-0.0405	-0.0140	-0.1174	-0.1094	0.0768	0.0879
	(0.3253)	(0.3258)	(0.0389)	(0.0392)	(0.2346)	(0.2297)	(0.2281)	(0.2284)	(0.0599)	(0.0594)
Asset structure	18.1829	19.9732	-1.0667	-0.8744	1.3163	0.7712	-8.6350**	-8.7126**	2.1694	2.4875*
	(17.2318)	(17.4914)	(2.5029)	(2.5323)	(7.4678)	(7.3714)	(3.7110)	(3.6971)	(1.4120)	(1.4959)
Board size	-0.5568	-0.5663	-0.0146	-0.0158	0.0661	0.0863	0.0343	0.0320	0.0298	0.0038
	(0.6751)	(0.6584)	(0.0708)	(0.0692)	(0.4644)	(0.4580)	(0.1425)	(0.1396)	(0.0960)	(0.1016)
Bank concentration (%)	-0.2621	-0.2528	-0.0036	-0.0032	-0.0109	-0.0200	0.0367	0.0345	-0.0378	-0.0324
	(0.1638)	(0.1664)	(0.0134)	(0.0135)	(0.0550)	(0.0550)	(0.0223)	(0.0221)	(0.0270)	(0.0269)
Bank deposits to GDP (%)	0.1427	0.1516	-0.0012	-0.0010	0.2307	0.2101	0.0784	0.0794	-0.0140	-0.0146
	(0.2055)	(0.2034)	(0.0223)	(0.0219)	(0.1452)	(0.1448)	(0.0921)	(0.0920)	(0.0452)	(0.0486)
Net interest margin (%)	2.3488**	2.3798**	0.2266**	0.2280**	0.0996	0.0678	0.6074	0.5770	-0.4768**	-0.4617**
	(0.9725)	(0.9700)	(0.0928)	(0.0906)	(0.7542)	(0.7514)	(0.5382)	(0.5297)	(0.2030)	(0.2065)
GDP growth (annual %)	1.7236***	1.7543***	0.1677***	0.1695***	-0.3022***	-0.3242***	-0.3815***	-0.3874***	-0.0436	-0.0385
	(0.2463)	(0.2526)	(0.0244)	(0.0244)	(0.0878)	(0.0915)	(0.1053)	(0.1075)	(0.0349)	(0.0353)
Inflation rate	0.7277***	0.7195***	0.0485**	0.0481**	0.0160	0.0119	-0.1373***	-0.1381***	0.0901***	0.0879**
	(0.2205)	(0.2180)	(0.0221)	(0.0218)	(0.1339)	(0.1343)	(0.0479)	(0.0479)	(0.0342)	(0.0345)
Index of Regulation	27.2942***	27.0629***	2.2132***	2.1870***	-8.3680**	-8.2106**	-1.4358	-1.4659	1.4756	1.6291
	(6.4592)	(6.0028)	(0.6299)	(0.6036)	(3.7882)	(3.7489)	(1.3449)	(1.2973)	(1.0304)	(1.0532)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Hansen J statistic	5.3210	5.5494	4.5674	4.6817	0.4706	0.3915	0.0815	0.1822	0.0358	0.0411
Hansen J statistic (p value)	0.0211	0.0185	0.0326	0.0305	0.4927	0.5315	0.7753	0.6695	0.8498	0.8393
Arellano–Bond statistic	-0.1219	-0.0880	0.8803	0.8971	-0.0201	-0.0754	-1.3866	-1.2491	-2.3277	-2.3105
Arellano–Bond statistic (p value)	0.9030	0.9299	0.3787	0.3697	0.9840	0.9399	0.1656	0.2116	0.0199	0.0209
N. of cases	723	723	726	726	516	516	516	516	488	488

***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

Table 3. Panel B Instrumental variable regressions for profitability, risk and stability of banks

	Model 1 ROE	Model 2 ROE	Model 3 ROA	Model 4 ROA	Model 5 NPL	Model 6 NPL	Model 7 LLP	Model 8 LLP	Model 9 Zscore	Model 10 Zscore
Females on board (%)	**56.5008****		3.2496		4.4180		0.6120		0.0907	
	(27.8492)		(3.6179)		(9.1971)		(3.1525)		(0.2601)	
Chairwoman		**35.3631***		**5.3454***		4.3800		-0.4557		0.0410
		(20.3795)		(2.9539)		(6.9368)		(2.2133)		(0.1301)
Lag Dependent Variable	0.2291***	0.2502***	0.3629***	0.3361***	0.7758***	0.7771***	0.4231***	0.4201***	0.2586***	0.2443***
	(0.0281)	(0.0308)	(0.0331)	(0.0425)	(0.0360)	(0.0366)	(0.0307)	(0.0334)	(0.0530)	(0.0678)
Size	5.3456***	3.5612***	0.4938***	0.3401***	-0.7418**	-0.9130***	-0.1791*	-0.1837**	-0.0068	-0.0091
	(0.7914)	(0.8536)	(0.1016)	(0.1147)	(0.3211)	(0.3253)	(0.0937)	(0.0817)	(0.0076)	(0.0065)
Capital structure	0.6949***	0.4097*	0.1352***	0.0980***	-0.0520	-0.0751	-0.0618***	-0.0585**	-0.0010	-0.0011
	(0.1571)	(0.2429)	(0.0210)	(0.0327)	(0.0743)	(0.0881)	(0.0197)	(0.0247)	(0.0015)	(0.0016)
Asset structure	-7.6745	-6.3554	-0.1015	0.0910	-0.7339	-0.4061	-1.3090**	-1.3408**	0.0692	0.0677
	(4.7942)	(5.3541)	(0.6301)	(0.7585)	(2.1528)	(2.2118)	(0.6085)	(0.6326)	(0.0476)	(0.0481)
Board size	-9.1569***	-2.2984	-0.8665**	0.0361	1.2123	1.9200	0.2607	0.2144	0.0254	0.0333
	(2.7727)	(4.4768)	(0.3634)	(0.6305)	(1.1671)	(1.5432)	(0.3409)	(0.4492)	(0.0267)	(0.0347)
Bank concentration (%)	0.1112**	0.1323**	0.0141**	0.0185**	-0.0186	-0.0155	-0.0134**	-0.0136**	0.0003	0.0003
	(0.0497)	(0.0567)	(0.0066)	(0.0082)	(0.0216)	(0.0228)	(0.0061)	(0.0062)	(0.0005)	(0.0005)
Bank deposits to GDP (%)	0.2518***	0.2831***	0.0124	0.0174	-0.0707**	-0.0648**	-0.0360***	-0.0364***	0.0025***	0.0026***
	(0.0717)	(0.0803)	(0.0095)	(0.0115)	(0.0308)	(0.0319)	(0.0089)	(0.0091)	(0.0007)	(0.0007)
Net interest margin (%)	0.7614	1.4381**	-0.0422	0.0432	0.1161	0.2339	0.0701	0.0626	0.0054	0.0067
	(0.5804)	(0.7006)	(0.0757)	(0.0983)	(0.2395)	(0.3145)	(0.0702)	(0.0817)	(0.0053)	(0.0060)
GDP growth (annual %)	1.8905***	1.7747***	0.2343***	0.2175***	-0.4935***	-0.5169***	-0.2815***	-0.2799***	-0.0000	-0.0003
	(0.2037)	(0.2348)	(0.0267)	(0.0332)	(0.0774)	(0.0886)	(0.0248)	(0.0259)	(0.0018)	(0.0019)
Inflation rate	0.3702	0.3608	0.0589*	0.0476	0.0569	0.0587	-0.0416	-0.0381	-0.0003	-0.0001
	(0.2345)	(0.2621)	(0.0309)	(0.0371)	(0.0872)	(0.0874)	(0.0287)	(0.0289)	(0.0020)	(0.0020)
Index of Regulation	14.4426**	18.6834**	1.2464	1.8510*	-0.9872	-0.7376	-0.4560	-0.4555	-0.0631	-0.0603
	(6.3815)	(7.4286)	(0.8413)	(1.0523)	(2.6428)	(2.7304)	(0.7832)	(0.7813)	(0.0606)	(0.0612)
Constant	-98.0627***	-88.5377***	-9.6953***	-10.2959***	16.2292***	16.5247***	8.1792***	8.4978***	-0.0883	-0.0755
	(14.3737)	(13.6203)	(1.8555)	(2.0138)	(5.8494)	(5.3894)	(1.6628)	(1.5960)	(0.1357)	(0.1188)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Instrumental variable	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.3546	0.2739	0.3838	0.2398	0.6950	0.6819	0.6950	0.6819	0.1161	0.1145
N. of cases	723	723	726	726	516	516	516	516	488	488

Instruments: Firms with female top manager (% of firms), The Global Gender Gap Index, Corporate Governance Code; Number of interlocks for all members of bank's boards; and Crisis. ***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

Table 3. Panel C Alternative measures of gender diversity and profitability, risk and stability of banks

	Model 1 ROE	Model 2 ROE	Model 3 ROA	Model 4 ROA	Model 5 NPL	Model 6 NPL	Model 7 LLP	Model 8 LLP	Model 9 Zscore	Model 10 Zscore
Blau index	**11.9086***		0.2050		-3.2732		**-2.0401***		**2.6822****	
	(6.9971)		(0.3195)		(2.2019)		(1.0328)		(1.1132)	
Shannon index		7.2332		0.0842		-2.1694		**-1.1764***		**1.9267*****
		(4.8138)		(0.2182)		(1.4897)		(0.6411)		(0.7346)
Lag Dependent Variable	0.4256***	0.4258***	0.4252***	0.4253***	0.7306***	0.7308***	0.2352***	0.2354***	0.5634***	0.5634***
	(0.0553)	(0.0553)	(0.0386)	(0.0385)	(0.0559)	(0.0560)	(0.0501)	(0.0502)	(0.0452)	(0.0452)
Size	3.2080***	3.1979***	0.3067***	0.3054***	-0.6461	-0.6364	-0.3567*	-0.3535*	0.1201	0.1183
	(0.4986)	(0.4985)	(0.0448)	(0.0446)	(0.3929)	(0.3919)	(0.2082)	(0.2072)	(0.0895)	(0.0896)
Capital structure	0.5772***	0.5765***	0.0868***	0.0867***	-0.0152	-0.0143	-0.0815	-0.0813	0.0434**	0.0432**
	(0.1676)	(0.1677)	(0.0184)	(0.0184)	(0.1132)	(0.1133)	(0.1016)	(0.1016)	(0.0207)	(0.0207)
Asset structure	-3.8194	-3.8106	-0.3161	-0.3180	-2.9953	-2.9989	-3.7523**	-3.7505**	0.5414	0.5453
	(4.2593)	(4.2745)	(0.3632)	(0.3641)	(2.5326)	(2.5288)	(1.5737)	(1.5722)	(0.5697)	(0.5718)
Board size	-0.4842**	-0.4849**	-0.0273	-0.0269	0.2410	0.2437	-0.0115	-0.0117	0.0290	0.0289
	(0.2383)	(0.2373)	(0.0209)	(0.0208)	(0.1650)	(0.1661)	(0.0594)	(0.0591)	(0.0385)	(0.0386)
Bank concentration (%)	-0.2506	-0.2500	-0.0101	-0.0101	-0.0020	-0.0039	0.0373*	0.0370	-0.0301	-0.0300
	(0.1639)	(0.1640)	(0.0122)	(0.0122)	(0.0516)	(0.0513)	(0.0226)	(0.0227)	(0.0265)	(0.0266)
Bank deposits to GDP (%)	0.3286	0.3286	0.0050	0.0051	0.1379	0.1374	0.0324	0.0323	0.0040	0.0037
	(0.2127)	(0.2129)	(0.0196)	(0.0196)	(0.1102)	(0.1100)	(0.0698)	(0.0697)	(0.0430)	(0.0431)
Net interest margin (%)	2.7426***	2.7384***	0.2258***	0.2255***	-0.1704	-0.1643	0.5663	0.5673	-0.1425	-0.1427
	(0.9690)	(0.9681)	(0.0833)	(0.0832)	(0.7373)	(0.7376)	(0.5843)	(0.5846)	(0.1261)	(0.1261)
GDP growth (annual %)	1.7812***	1.7818***	0.1663***	0.1664***	-0.3682***	-0.3691***	-0.3999***	-0.4001***	0.0307	0.0308
	(0.2612)	(0.2614)	(0.0228)	(0.0229)	(0.0957)	(0.0961)	(0.1152)	(0.1153)	(0.0218)	(0.0218)
Inflation rate	0.6806***	0.6809***	0.0465**	0.0466**	0.0004	0.0001	-0.1339***	-0.1341***	0.0423*	0.0424*
	(0.2197)	(0.2198)	(0.0194)	(0.0194)	(0.1162)	(0.1164)	(0.0474)	(0.0474)	(0.0246)	(0.0247)
Index of Regulation	25.3812***	25.4045***	1.8632***	1.8668***	-7.9545**	-7.9945**	-1.2758	-1.2860	1.0819	1.0887
	(6.1279)	(6.1228)	(0.5094)	(0.5093)	(3.4123)	(3.4134)	(1.0587)	(1.0581)	(0.9854)	(0.9852)
Constant	-73.9908***	-73.8616***	-6.6865***	-6.6719***	13.7379	13.7682	5.2617*	5.2252*	0.6445	0.6771
	(14.9869)	(15.0101)	(1.2979)	(1.3008)	(10.8775)	(10.8665)	(2.9205)	(2.9208)	(4.1699)	(4.1709)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.4925	0.4924	0.5381	0.5379	0.6987	0.6987	0.3209	0.3208	0.5412	0.5410
N. of cases	835	835	838	838	580	580	811	811	557	557

***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

As can be seen from the findings presented in Table 3, these results confirm our base results discussed earlier in the paper.

To test for the robustness of our results, we use two alternative measures of gender diversity: the Blau index of heterogeneity and the Shannon index of diversity. Table 3 Panel C displays the results these new specifications. As the figures in this table suggest, a consistency exists for the estimated coefficients are concerned, across the results presented in panels A, B, and C. This suggests that our results are not vulnerable to modifications in the underlying specifications of the model, which confirms the strength of conclusions reached from our models and their structural validity. The outcomes can be linked with the evidence provided by Adams and Ferreira (2009) and Terjesen et al. (2009) who find higher performance for banks with better governance, as well as with the idea that a strong management structure is associated with better bank performance (Aebi et al. 2012, Andrieș/Brown, 2017).

4.2 The effects of financial crisis

Considering that the main results indicate significant lower profitability and higher risk outcome during the financial crisis, we further investigate the impact of the 2008 crisis on the relationship between female directors and gender diversity of boards and banks performance.

The empirical results presented in Table 4 confirm the evidence from the main regressions as suggested by the positive and statistically significant coefficients of *Female on board* and *Chairwoman*. The coefficient on the interaction terms *Chairwoman* × *Crisis* (19.69) is also positive and statistically significant (Model 1), which implies that during the global financial crisis, banks with a chairwoman demonstrate, a higher level of ROE on average.

Regarding the impact of female directors on bank risk (Table 4, Models 5 through 8), empirical findings provide evidence in favor of a higher proportion of females among members of banks boards, as suggested by the negative and significant coefficients of *Female on board* and *Chairwoman.* Our findings here illustrate that banks with a chairwoman (Model 6) recorded a lower average level of *Loan loss provisions,* and the interaction term *Chairwoman* × *Crisis* is negative and statistically significant (t = -2.85) during the financial crisis.

Examining the impact of female directors on bank stability, our results – using the interaction term *Female on board* × *Crisis* (0.21, Table 4, Model 9) – show that the higher proportion of females among a bank's board members, the higher the level of bank stability during the financial crisis.

Table 4. Female directors and profitability, risk and stability of banks during Systemic crises

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	ROE	ROE	ROA	ROA	NPL	NPL	LLP	LLP	Zscore	Zscore
Females on board (%)	**21.0311****		**2.3571*****		**-8.3171***		**-3.1183*****		0.1649	
	(9.6623)		(0.8559)		(4.3822)		(1.1651)		(0.1019)	
Females on board (%)×Systemic Crisis	10.3554		2.4015		3.6773		-0.6571		**0.2138****	
	(15.4086)		(1.6732)		(7.5450)		(2.0064)		(0.1072)	
Chairwoman		**9.2871*****		**0.9161*****		**-3.1331*****		**-1.0931*****		0.0044
		(3.0185)		(0.3199)		(0.8901)		(0.3439)		(0.0969)
Chairwoman × Systemic Crisis		**19.6927*****		1.4673		-0.3576		**-2.8568****		0.0167
		(5.1424)		(0.8942)		(1.7812)		(1.1845)		(0.0590)
Lag Dependent Variable	0.1091***	0.1101***	0.0908**	0.0912**	0.4991***	0.4996***	0.2427***	0.2436***	0.0077	0.0104
	(0.0383)	(0.0367)	(0.0409)	(0.0404)	(0.1080)	(0.1090)	(0.0653)	(0.0666)	(0.1069)	(0.0972)
Size	8.3821**	9.5733***	1.4864	1.6109*	-3.8699	-4.2174	-0.6362	-0.7965	0.0240	0.0294
	(3.6834)	(3.6210)	(0.9417)	(0.9409)	(2.7721)	(2.7630)	(0.6360)	(0.6457)	(0.0448)	(0.0486)
Capital structure	0.7205**	0.6719*	0.1754	0.1701	-0.0104	0.0144	-0.0332	-0.0275	-0.0019	-0.0011
	(0.3549)	(0.3515)	(0.1208)	(0.1213)	(0.2769)	(0.2816)	(0.0906)	(0.0924)	(0.0019)	(0.0021)
Asset structure	33.3944***	35.3422***	3.9823**	4.3126**	-8.6514	-9.1494	-5.0520**	-5.2566**	-0.0300	-0.0459
	(12.7840)	(12.8508)	(1.8246)	(1.7937)	(7.3111)	(7.4279)	(2.0659)	(2.0588)	(0.1333)	(0.1357)
Board size	2.4168	3.6444	0.2896	0.4558	0.9016	0.4737	-0.1438	-0.3068	0.0780*	0.0775**
	(4.2227)	(4.4262)	(0.5631)	(0.5966)	(2.4662)	(2.5724)	(0.7172)	(0.7432)	(0.0396)	(0.0372)
Bank concentration (%)	-0.3196*	-0.3009	-0.0182	-0.0168	-0.0040	-0.0152	0.0358*	0.0326*	-0.0002	0.0002
	(0.1899)	(0.1878)	(0.0142)	(0.0144)	(0.0564)	(0.0560)	(0.0184)	(0.0180)	(0.0021)	(0.0021)
Bank deposits to GDP (%)	0.1623	0.1724	-0.0582	-0.0583	0.1612	0.1241	-0.0019	-0.0049	0.0009	0.0011
	(0.2286)	(0.2243)	(0.0430)	(0.0432)	(0.1262)	(0.1272)	(0.0342)	(0.0340)	(0.0031)	(0.0030)
Net interest margin (%)	2.2206	2.1953	-0.1145	-0.1203	0.1844	0.1779	0.0315	0.0363	-0.0108	-0.0106
	(1.4069)	(1.3993)	(0.3286)	(0.3326)	(0.7268)	(0.7173)	(0.1942)	(0.1936)	(0.0106)	(0.0109)
GDP growth (annual %)	1.8364***	1.8614***	0.2141***	0.2142***	-0.2996***	-0.3308***	-0.2676***	-0.2732***	-0.0012	-0.0006
	(0.2783)	(0.2827)	(0.0481)	(0.0476)	(0.0765)	(0.0764)	(0.0391)	(0.0403)	(0.0012)	(0.0011)
Inflation rate	0.6392***	0.6363***	0.0613**	0.0659***	-0.0552	-0.0481	-0.0753***	-0.0732***	0.0033	0.0024
	(0.2263)	(0.2194)	(0.0238)	(0.0233)	(0.1099)	(0.1076)	(0.0281)	(0.0273)	(0.0027)	(0.0025)
Index of Regulation	25.5086***	25.1818***	1.7765***	1.7985***	-8.9450***	-8.6950***	-1.0392	-1.0031	0.0549	0.0589
	(7.0647)	(6.5547)	(0.5797)	(0.5482)	(3.2600)	(3.1862)	(0.9718)	(0.8926)	(0.0798)	(0.0796)
Constant	-169.8823***	-189.5060***	-24.0037*	-26.1300**	63.3509	70.7267	14.4192	17.1004*	-0.4947	-0.5857
	(54.4707)	(53.5374)	(13.0826)	(13.1396)	(44.1164)	(43.7210)	(8.8373)	(9.0394)	(0.6342)	(0.7199)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.4034	0.4093	0.2940	0.2948	0.5682	0.5692	0.4028	0.4059	0.0389	0.0316
N. of cases	835	835	838	838	580	580	811	811	557	557

***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

4.3 Regulatory framework

The impact of female directors on bank performance may arguably differ across countries with different levels and qualities of regulation frameworks. Regulation could be considered as a complementary, external governance force, which may be particularly relevant for banks with weak internal governance (Andrieș/Brown 2017). Previous studies suggest that bank risk-taking responds to changes in domestic regulation and supervision (Barth et al. 2004, Buch/DeLong 2008). When regulatory constraints are removed, the outcome may critically depend on the interaction between corporate governance and firm behavior, particularly if behavior is not primarily driven by value maximization and if the regulatory constraints have been designed to inhibit risk-taking (Illueca et al. 2014). Laeven and Levine (2009) show that the same regulation has different effects on bank risk-taking, depending upon the bank's corporate governance structure. Beltratti and Stulz (2012) show that differences in banking regulations across countries are generally uncorrelated with bank performance during a crisis, except that large banks from countries with more restrictions on bank activities performed better.

Table 5 presents a series of regression analyses where we test whether the regulatory framework in a host-country affects the relationship between board gender diversity and bank performance and risk. We include the interaction term of female directors' indicator with a proxy for the strength of the regulatory framework. We define each country as a country with lenient regulatory environment, if the value of *Regulatory index* for that country is lower than the median value of *Regulatory index* for the entire sample of countries. Using this approach, we are able to determine the quality of regulatory framework for all of the countries.

The estimated coefficients of the interaction terms with lenient regulatory environment are generally not statistically significant. A notable exception is the large and significant positive estimated coefficient for the interaction term *Chairwoman* × *Lax regulation* in Model 10. This result indicates that banks with a chairwoman (compared to banks without a chairwoman) demonstration higher stability if they were in a country with a lenient regulatory environment. Moreover, the estimated coefficient for the interaction term *Female on board* × *Lax regulation* in Models 1 and 3 are statistically and significantly positive. This result suggests that banks with a higher proportion of females among members of a bank's board demonstrate higher profitability if they were in a country with lax regulation.

Table 5. Female directors and Profitability, risk and stability of banks in countries with Lax regulatory framework

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	ROE	ROE	ROA	ROA	NPL	NPL	LLP	LLP	Zscore	Zscore
Females on board (%)	2.2355		0.0645		-4.2884		-1.3231		0.2126	
	(14.3510)		(1.2657)		(4.9170)		(1.3934)		(0.1814)	
Females on board (%) ×Lax Regulation	**36.6432****		**4.4812****		-8.3465		-3.6545		-0.0978	
	(18.4205)		(1.9685)		(7.6866)		(2.3159)		(0.2280)	
Chairwoman		**11.1275****		**0.8462***		**-3.6929*****		**-1.3510****		-0.1661
		(5.2268)		(0.4486)		(1.1775)		(0.5776)		(0.1236)
Chairwoman × Lax Regulation		-2.6535		0.1590		1.0818		0.3857		**0.3204***
		(6.4038)		(0.6497)		(1.7424)		(0.7217)		(0.1773)
Lag Dependent Variable	0.1036***	0.1110***	0.0883**	0.0910**	0.4986***	0.4990***	0.2377***	0.2446***	0.0084	0.0112
	(0.0386)	(0.0367)	(0.0395)	(0.0403)	(0.1074)	(0.1091)	(0.0646)	(0.0668)	(0.1081)	(0.0984)
Size	8.7074**	9.5661***	1.5090	1.6114*	-3.9005	-4.2443	-0.6642	-0.7964	0.0252	0.0308
	(3.6322)	(3.6288)	(0.9318)	(0.9422)	(2.7488)	(2.7673)	(0.6374)	(0.6475)	(0.0442)	(0.0458)
Capital structure	0.7045**	0.6605*	0.1720	0.1683	-0.0031	0.0123	-0.0315	-0.0259	-0.0015	-0.0021
	(0.3491)	(0.3525)	(0.1183)	(0.1219)	(0.2769)	(0.2812)	(0.0896)	(0.0930)	(0.0018)	(0.0019)
Asset structure	34.3044***	36.0570***	4.1368**	4.3830**	-8.6796	-9.0875	-5.1396**	-5.3639***	-0.0564	-0.0246
	(12.4412)	(12.5220)	(1.7832)	(1.7711)	(7.4329)	(7.4035)	(1.9774)	(2.0049)	(0.1309)	(0.1268)
Board size	2.4707	3.7106	0.3172	0.4648	1.1420	0.5089	-0.1702	-0.3095	0.0701*	0.0824**
	(4.3439)	(4.3896)	(0.5950)	(0.5938)	(2.3912)	(2.5572)	(0.7224)	(0.7372)	(0.0367)	(0.0377)
Bank concentration (%)	-0.2963	-0.3065	-0.0157	-0.0173	-0.0066	-0.0174	0.0337*	0.0334*	-0.0000	-0.0004
	(0.1852)	(0.1899)	(0.0138)	(0.0144)	(0.0549)	(0.0561)	(0.0184)	(0.0184)	(0.0021)	(0.0022)
Bank deposits to GDP (%)	0.1392	0.1690	-0.0619	-0.0591	0.1590	0.1216	-0.0007	-0.0039	0.0012	0.0007
	(0.2267)	(0.2271)	(0.0437)	(0.0432)	(0.1179)	(0.1274)	(0.0336)	(0.0343)	(0.0029)	(0.0030)
Net interest margin (%)	2.2383	2.2379	-0.1149	-0.1170	0.1757	0.1770	0.0399	0.0274	-0.0107	-0.0080
	(1.4336)	(1.4018)	(0.3302)	(0.3324)	(0.7272)	(0.7179)	(0.1965)	(0.1945)	(0.0107)	(0.0098)
GDP growth (annual %)	1.8044***	1.8428***	0.2081***	0.2130***	-0.3058***	-0.3299***	-0.2648***	-0.2703***	-0.0009	-0.0001
	(0.2772)	(0.2773)	(0.0466)	(0.0472)	(0.0734)	(0.0754)	(0.0392)	(0.0395)	(0.0011)	(0.0010)
Inflation rate	0.6575***	0.6692***	0.0671***	0.0676***	-0.0384	-0.0516	-0.0763**	-0.0780***	0.0026	0.0014
	(0.2266)	(0.2278)	(0.0239)	(0.0240)	(0.1055)	(0.1067)	(0.0297)	(0.0289)	(0.0025)	(0.0024)
Index of Regulation	25.9926***	25.3996***	1.8625***	1.8335***	-8.8319***	-8.6720***	-1.0655	-1.0340	0.0500	0.0585
	(7.1601)	(6.5498)	(0.6079)	(0.5585)	(3.2881)	(3.1882)	(0.9999)	(0.8962)	(0.0793)	(0.0795)
Constant	-175.3310***	-189.6919***	-24.4376*	-26.1499**	63.2446	71.2524	14.9451*	17.1143*	-0.5011	-0.5751
	(53.3532)	(53.6571)	(12.9601)	(13.1686)	(43.7591)	(43.8608)	(8.8130)	(9.0590)	(0.6093)	(0.6591)
Bank Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.4072	0.4069	0.2967	0.2941	0.5691	0.5693	0.4048	0.4033	0.0356	0.0740
N. of cases	835	835	838	838	580	580	811	811	557	557

***, **, * indicates significant at 1 %, 5 %, 10 % levels, respectively

5. Conclusions

The findings regarding the impact of gender diversification on bank performance are inconclusive (Reddy/Jadhav 2019). One reason that could explain this feature is that there is a nonlinear relationship between gender diversity on bank boards and bank performance (Owen/Temesvary 2018). This paper attempts to extend the current knowledge regarding this issue, and to identify the impact of females on bank boards on banks' business strategies, performance, and risk for a sample of banks from CEE countries and to detect the features of the board structure that could increase the performance and lower bank losses.

Overall, the empirical findings show that the presence of women on boards boosts the financial performance of banks from CEE countries. Our results are in line with the strand of literature considering that gender diversity could have a positive impact on bank performance (Mateos de Cabo et al. 2012, Pathan/Faff 2013, García-Meca et al. 2015). Our results suggest that the presence of women on a bank's board of directors improves governance, which causes the bank to be both more profitable and less risky. Our results may be consistent with several different perspectives. One is the risk attitude of female directors that would reduce a bank's risk appetite. An alternative interpretation of this result is that female directors are hardworking and have better communication skills than men, which contributes to the improved problem-solving and decision-making ability of the entire board (Robinson/Dechant 1997). Nevertheless, from our data, it is impossible to determine which one of these explanations is behind our results. Significant impact could be explained by the fact the mean percentage of female directors on bank boards (14.1 % in our study) is lower than in other studies and thus the marginal effect of female directors on bank boards might have a more detectable impact on bank performance.

Our study makes several contributions to the literature. First, while many of the previous studies have concentrated on the effects of gender diversity on the performance of non-financial firms, we focus on the banking industry. Because the governance of banks was decisive in shaping the 2008 financial crisis, it is interesting to investigate the influence of females in this process, considering that our sample includes pre- and post-global financial crisis periods. The empirical findings generally indicate that banks with a higher proportion of females on bank boards and banks with a chairwoman demonstrate a higher level of profitability. Our empirical results further suggest that banks with a chairwoman and a higher proportion of females on bank boards tend to have lower levels of credit risk.

The investigation of the impact of the 2008 global financial crisis on the relationship between female directors and bank performance provides evidence to suggest that during the crisis, banks with a chairwoman recorded, on average, a higher level of profitability. Additionally, the empirical results indicate that the

higher the proportion of females on bank boards, on average, the higher the level of bank stability during the systemic crisis.

Second, our sample is comprised of banks from CEE countries. The inclusion of these banks is interesting from a governance point of view, because they have carried out a transition from a communist system to a market economy with the adaptation of their old governance structures. We also examine whether the regulatory framework in the host-country affects the relationship between board gender diversity and bank performance and risk. This result implies that banks with a higher proportion of females on bank boards show higher profitability if the banks were in a country with a lenient regulatory environment.

The overall policy implication of the findings of this study is that the argument for equal managerial rewards and pay equity for female bank managers and board members is warranted, based on the effect of the managerial ability of female managers on bank performance. Our results underline the idea that board structure is an important determinant of bank performance. In this context, any regulatory policies aiming to improve board governance of the boards of CEE banks should take into consideration the boards' structure and gender diversity.

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