Gender quotas in bank boards: Evidence from post-communist countries

First draft please do not quote

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Abstract

We study risk and performance in banks in the context of boards of Central Europe, boasting a high share of female directors. Our sample covers over 170 commercial banks from 11 post-communist countries between 2007 and 2021. We find that having women on executive boards has important implications for both bank risk and performance. Executive boards with at least two women in the past three years have markedly lower credit risk and less volatile ROA, while reporting a significantly higher levels of ROA and ROE. Banks meeting the gender quota regulations for 40% of female directors in supervisory boards also show lower risk and higher profits, but the effects are smaller and less universal. Banks with 33% female directors in total boards report lower risk that is similar to banks with female executive directors, but the effect on profitability is not visible. Lastly, we also demonstrate that larger boards are associated with lower bank risk, both in terms of general bank stability and credit risk. The size effects do not change our main results on gender diversity.

Keywords: Bank, boards, gender diversity, performance, governance

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1. Introduction

Existing literature on boards has largely focused on non-financial companies. Empirical work pertaining to banks is much more narrow and mostly uses developed country samples. In this paper, we study whether the size and gender diversification within boards are related to bank risk and performance, using a sample of over 170 banks in 11 post-communist countries of Central Europe. We use a broad scope of risk and profitability indicators, to study various facets of risk and performance. We focus on two aspects of board functioning, board size and gender diversification. In our study we take advantage of the mostly 2-Tier corporate governance system in Central Europe. Hence, we are able to use executive boards, supervisory boards and total boards in the analysis, which enables to link our analysis to the proposed gender quotas in the EU.

First, we study whether the size of the board matters for bank risk. In the analysis we additionally control for bank size, which allows to identify the effect of the board size itself, which is not the consequence of size. Second, we focus on the role of gender in boards. This is particularly relevant for our sample including post-communist countries. In these countries, the participation of women in the workforce has been much higher than in other regions. As a result, our sample provides a perfect laboratory for checking whether gender affects the risk appetite of banks. We focus on female participation in executive boards, supervisory boards and total boards and study if a consistent, three year presence of women on these boards is linked to bank risk and performance.

We make several contributions to existing literature. The first contribution relates to the link between board size and risk-taking in Central and Eastern European banks. Existing research uses Asian countries (Abid et al., 2021; Hunjra et al., 2024; Luu, 2015) including China (Ding and Wei, 2023; Liang et al., 2013; Talavera et al., 2018). There are some studies on US banks (Altunbaş et al., 2020; Faleye and Krishnan, 2017; Minton et al., 2014; Pathan, 2009) and UK banks (Akbar et al., 2017; Lu and Boateng, 2018). A considerable group of analyses explores international samples (Basty et al., 2023; Birindelli et al., 2020; De Vita and Luo, 2018; Shabir et al., 2023; Vallascas et al., 2017). Some research has been done on European countries (Battaglia and Gallo, 2017; Farag and Mallin, 2017; Fernandes et al., 2021), including euro area banks (Brogi and Lagasio, 2022), but much less work is available

on Central and Eastern European countries (Andrieș et al., 2020).

Second, apart from board size, we account for executive board size. Taking advantage of our rich, hand-collected database, we can verify relationships not only between total board size and risk-taking, but also analyse the effects of changes in the executive statutory bodies and their link to the level of bank risk. This approach has been not frequently applied in the banking literature, which mostly focuses on total boards of directors. Among the few authors, Altunbaş et al. (2020) and Berger et al. (2014) refer to board size as the number of executives. In more detail,Farag and Mallin (2017) distinguish between the size of supervisory board, management board and the board of directors.

Third, despite significant advances in the literature on the role of gender, existing work still has limitations. Many studies pertain to one country only (Berger et al., 2014; Dong et al., 2014; Lu and Boateng, 2018; Menicucci and Paolucci, 2016; Skała and Weill, 2018) or to developed country samples (Birindelli et al., 2020; Gulamhussen and Santa, 2015; Fan et al., 2019; Palvia et al., 2015). The analyses on European banks are limited. Proença et al. (2020) use 19 euro area countries, while José García et al. (2022) examine 19 EU countries. The only similar work is Andrieș et al. (2020), who investigate banks from 17 Central and Eastern European countries.

The advantage of our work is to analyse the complex picture of bank risk, employing a wide set of measures, such as NPL, LLP, equity ratio, sd ROA and Z-score. It has been not a common practice in the empirical literature to account for a such diversified set of risk proxies. Andrieș et al. (2020) use a more narrow approach focusing on LLP, NPL and Z-score, which we are able to expand. Our results significantly contribute to the limited body of literature addressing the dynamics of changes in bank supervisors and their implications for bank risk (Berger et al., 2014; Bornemann et al., 2015; García-Marco and Robles-Fernandez, 2008; Hagendorff et al., 2021; Sarkar et al., 2019). In parallel, we account for several profitability indicators, studying various facets of performance. Furthermore, the results of our study contribute to the discussion on the efficiency of the governing structures of banks in the context of post-communist economies. Most studies predominantly focus on Western European countries (Berger et al., 2014; Bornemann et al., 2015; García-Marco and Robles-Fernandez, 2008; Hagendorff et al., 2021; Schaeck et al., 2012). We benefit from a rich hand-collected

dataset, which allows us to examine changes in governing structures in Central European post-communist countries, stretched over the 2007-2021 period.

Moreover, unlike existing studies that focus solely on CEO turnover (Hagendorff et al., 2021; Sarkar et al., 2019) or changes in bank boards (Berger et al., 2014; García-Marco and Robles-Fernandez, 2008), we adopt an approach more in line with gender quotas implemented by the EU from 2026. The EU regulations enforce a 40% quota on gender in supervisory boards or a 33% quota on total boards. We account for both of these quotas, but we focus on female participation in executive boards. Due to a generally high share of women in executive boards in Central European banks in relation to other banks, we are able to study the effects of female executive directors on bank risk and performance.

Our paper is organised as follows. In Section 2 we present the related literature. In Section 3 we show the data and empirical methodology, while Section 4 presents our results. Section 5 concludes.

2. Literature and main hypotheses

2.1. Board size and risk

Compared to manufacturing companies, banks typically maintain larger boards on average, associated with the heightened complexity of banks' organisational structure, numerous committees, and the regulatory constraints imposed on banks (Adams and Mehran, 2003). Size, defined as the number of board members, is one of the board characteristics that can influence its efficiency (Brogi and Lagasio, 2019) and the bank's performance. On the one hand, larger boards offer a more diverse environment, where varying attitudes and expertise can lead to enhanced monitoring and advisory of banks' operations. On the other hand, larger boards can be more challenging to coordinate and control, leading to potential inefficiencies in communication and decision-making (Adams and Mehran, 2003; Hermalin and Weisbach, 2003).

Empirical research of the relationship between the board size and bank performance primarily focuses on profitability (Andrieș et al., 2020; Mavrakana and Psillaki, 2019; Adams and Mehran, 2012; Aebi et al., 2012; Arnaboldi et al., 2020; García-Meca et al., 2015; Huang, 2010; Kick et al., 2017; Liang et al., 2013; Pathan and Faff, 2013; Staikouras et al., 2007;

Arouri et al., 2011; Owen and Temesvary, 2018), and risk-taking (Talavera et al., 2018; Brogi and Lagasio, 2019; De Vita and Luo, 2018; Birindelli et al., 2020; Fernandes et al., 2021; Vallascas et al., 2017).

In the latter stream of studies, while many articles have examined the relationship between board size and bank risk, the evidence is inconclusive and proves that there is no one-size-fits-all solution in case banks (Brogi and Lagasio, 2019). In particular, while some studies reveal that larger boards coincide with higher risk-taking (Brogi and Lagasio, 2019; De Vita and Luo, 2018; Elyasiani and Zhang, 2015; Farag and Mallin, 2017), other prove the opposite (Abid et al., 2021; Fernandes et al., 2021; Hunjra et al., 2024; Shabir et al., 2023). Finally, there are also studies that do not confirm a statistically significant link between board size and bank risk-taking (Altunbaş et al., 2020; Birindelli et al., 2020; Talavera et al., 2018; Ding and Wei, 2023).

This statement can be sustained regarding the banking risks analysed, i.e. credit and default risks. As far as default risk is concerned, a significant body of literature reveals that banks with larger boards than their peers exhibit higher bank insolvency risk reflected in the lower Z-score (Altunbaş et al., 2020; Battaglia and Gallo, 2017; Elyasiani and Zhang, 2015; Vallascas et al., 2017). Moreover, larger boards are associated with higher risk taking in times of more stringent macroprudential policies (Basty et al., 2023). The latter finding is suggests that more stringent regulations on the one side and government support on the other make larger boards more predispose to higher risk taking (Basty et al., 2023). On the contrary, other studies indicate that lower bank risk coincides with larger board sizes while employing the Z-score (Abid et al., 2021; Hunjra et al., 2024) or other insolvency risk measures, such as capital adequacy ratio (CAR) (Hunjra et al., 2024). Also, larger boards are able to mitigate the adverse effects of economic uncertainty and geopolitical risks on the bank default risk (Shabir et al., 2023). Furthermore, some studies reveal non-linear relationship between board size and bank default risk (Battaglia and Gallo, 2017), which suggests that adding more board members leads to improving Z-score measure (lowering), particularly in case of large and interconnected banking institutions (Battaglia and Gallo, 2017). Finally, several studies have not confirmed the link between board size the probability of default (Akbar et al., 2017; Talavera et al., 2018), including also the standard equity ratio and leverage levels measures

(Birindelli et al., 2020) as well as interbank liabilities (Ding and Wei, 2023).

Turning to credit risk, studies examining changes in NPL levels have not yielded conclusive results. Some research indicates that larger boards are associated with higher risk (De Vita and Luo 2018; Farag and Mallin 2017), also when accounting for distress at bank risk-taking in lending decisions (Faleye and Krishnan 2017), while others suggest that larger boards correspond to lower risk (Hunjra et al. 2024; Lu and Boateng 2018). Also, some studies have not confirmed the significance of board size for credit risk in terms of NPL (Birindelli et al. 2020; Ding and Wei 2023; Liang et al. 2013; Talavera et al. 2018). Lastly, when other risk measures are employed, larger boards are associated with lower credit risk in terms of loan loss provisions measures (Ding and Wei 2023; Lu and Boateng 2018).

In addition to credit and insolvency risk, other studies focus on total bank risk, primarily approximated by market risk measures, such as the annual standard deviation of daily stock prices (Fernandes et al. 2021; Minton et al. 2014; Pathan 2009). Generally, these studies suggest that larger boards reduce the volatility of stock returns and, consequently, bank risk-taking.

2.2. Gender and risk

In recent years, the composition of corporate governance bodies - management and supervisory boards, and, in particular, the inclusion of women in these boards have attracted considerable scientific interest and have become a public debate topic. Arguments in this discussion can be categorized into ethical and economic (Mateos de Cabo et al., 2012). In the first line of argumentation, board diversity becomes a fundamental objective of bringing equality to the boardroom (Mateos de Cabo et al., 2012). Thus, the lack of women in the governance bodies exemplifies the unfairness of excluding certain groups from corporate leadership based on non-performance related factors (Mateos de Cabo et al., 2012; Singh et al., 2001), such as gender or race. Systematic studies also indicate that higher gender diversity on boards enhances greater equality across other managerial levels as well as non-managerial positions (Kirsch, 2018). Therefore, the postulate of bringing more females on boards in a broader context aims for a more equitable society. Bearing in mind that the number of suitably qualified men is not unlimited (Burke and Mattis, 2013), the economic rationale within the second line of argumentation highlights that the systematic overlooking

of qualified female candidates by the governance bodies hinders the company's performance (Mateos de Cabo et al., 2012). Therefore, greater gender diversity can be associated with improved performance, which also seems to be present among banks (Zattoni et al., 2022). The growing public discussion on opening corporate governance bodies for females is also linked with the Global Financial Crisis of 2008. This crisis revealed deficiencies in bank monitoring and highlighted the need to put in place more enhanced prudential policies for managing bank risks. The existing composition of corporate governance bodies has been criticised, and women have been seen as the solution to risk management problems. Indeed, numerous studies on the general population, or following Croson and Gneezy (2009) university convenient population, confirm that females are more risk averse than males. Also, statements by some prominent figures in the financial world and the use of the rather catchy slogan 'Lehman sisters' have contributed to the growing interest in increasing the gender diversity of boards (Lagarde, 2010).

Certainly, the benefit that has resulted from this interest is, as it seems, the increasing number of women in senior positions, including on boards, in many countries. On the other hand, however, like any over-generalised statement, the fact that 'women have less appetite for risk' is also not entirely true. More systematic reviews of the literature taking into account (Nelson, 2014; Capelle-Blancard and Reberioux, 2021) suggest greater caution and the necessity of considering the study context while generalizing the results, as not every finding can be extrapolated to other decision domains of subgroups. It is worth noting that, according to the approach of Croson and Gneezy (2009), the differences in risk aversion are smaller or statistically insignificant in the population of managers and professionals. This finding is supported by the results of studies conducted on investment fund managers (Atkinson et al., 2003), or subsamples of managers (Johnson and Powell, 1994). Therefore, while there may be an expectation that 'risk-averse' women will automatically decrease bank risk should be approached with caution. Therefore, it is more reasonable to perceive a change in the functioning of the board through an increase in gender diversity and the inclusion in the board of persons (women) with high qualifications and experience, which consequently leads to an increase in the effectiveness of the board in monitoring banks' risks.

The vast majority of banking studies account for gender diversity through the ratio of female

directors (Bouteska and Mili, 2022; García Olalla et al., 2022; Pathan and Faff, 2013; Talavera et al., 2018) or simply through the presence of women on boards (Gulamhussen and Santa, 2015; Kinateder et al., 2021; Lu and Boateng, 2018). However, the concept of critical mass has theory gained the growing attention of researchers (Biswas et al., 2023; Kramer et al., 2006; Torchia et al., 2011). Authors state that the mere presence of women on boards may not to be sufficient to contribute to any changes in corporate governance (Charles et al., 2015), firm performance (Joecks et al., 2013; Liu et al., 2014) or women activity during board meetings (Schwartz-Ziv, 2017). The number of women appears to make a difference as noticed by Kanter (1977). The crucial role is being attributed to an increase in from one or two women (a few tokens) to at least three women (consistent minority) (Torchia et al., 2011). This process of reaching a certain threshold of women in the number of three reduces a limited impact of an inadequate number of women serving on the board and enables their critical mass to shape the content and board discussions more effectively (Kramer et al., 2006). Following this perspective, the empirical literature on bank boards also controls for at least three women concept (Abou-El-Sood, 2021; Birindelli et al., 2020; Fan et al., 2019; Hoang and Wu, 2023; Venturelli et al., 2024).

Despite the growing interest in the relationship between the presence of women in corporate governance bodies and the level of credit and insolvency risk, empirical studies have thus far provided inconclusive results. This lack of consensus underscores the need for further research, which our study aims to address.

Starting with insolvency risk, several studies associate increased gender diversity among leadership positions with lower Z-score (Baselga-Pascual and Vähämaa, 2021; Bouteska and Mili, 2022; Abou-El-Sood, 2019; Gulamhussen and Santa, 2015) and decreased capital ratio (Baselga-Pascual and Vähämaa, 2021) suggesting lower risk aversion of 'female' boards. Also, the higher presence of women on boards is associated with increased systemic risk, but only in the case of small banks (Díez-Esteban et al., 2021).

Conversely, other studies indicate that greater gender diversity can be linked to reduced default risk, as described by the same risk measure Z-score (Hoang and Wu, 2023; Menicucci and Paolucci, 2022). Enhanced bank stability and better monitoring of banks with females on boards were sustained during the 2008 financial crisis (Andrieș et al., 2020). Additionally,

banks led by female CEOs report increased capital adequacy ratios (Palvia et al., 2015) and equity-to-assets ratios compared to those led by male CEOs or with lower board gender diversity (Skała and Weill, 2018; Menicucci and Paolucci, 2022). Finally, some studies find no substantial relationship between gender diversity, distance to default, and the likelihood of bankruptcy for European banks (García Olalla et al., 2022).

As far as credit risk is concerned, several studies suggest that the presence of women on bank boards improves banks' loan quality, as indicated by lower NPL ratios (Andrieș et al., 2020; Dong et al., 2014; Farag and Mallin, 2017; Zigraiova, 2016), and reduces credit risk as measured by LLP (Andrieș et al., 2020; Hoang and Wu, 2023). Also, female-led banks, particularly those with high exposure to real estate, exhibit lower loan charge-offs and fewer non-accrual loans than similar male-led banks (Palvia et al., 2020). Thus, this stream of studies supports the view of enhanced monitoring of more diverse boards (Birindelli et al., 2020; Dong et al., 2014; Kinateder et al., 2021).

On the contrary, several studies reveal that a larger proportion of female board members is linked to a more significant percentage of non-performing loans (Fiador and Sarpong-Kumankoma, 2021; Mavrakana and Psillaki, 2019) and increased LLP values (Proença et al., 2020). These studies, therefore, imply that gender-diverse boards may be more inclined to take greater risks in loan loss provisioning than their male counterparts.

Finally, some studies have found no significant link between the gender diversity of bank boards and credit risk. For instance, the proportion of women in management or supervisory governance bodies is not associated with loan quality (Adams and Ragunathan, 2015; Birindelli et al., 2020; De Vita and Luo, 2018; Talavera et al., 2018), or the level of LLP (Khan et al., 2020). Likewise, female-led banks in terms of CEO positions do not coincide with the level of non-performing loans (Cardillo et al., 2021; Skała and Weill, 2018) or LLP (Menicucci and Paolucci, 2022; Skała and Weill, 2018). Moreover, the percentage of women on the audit committee does not influence LLP, as found by Gulamhussen and Santa (2015).

2.3. Gender and profitability

The topic of women's participation in bank boards has attracted significant scholarly attention, resulting in numerous studies examining the links between the presence of women in bank management and supervisory bodies and profitability (García-Meca et al., 2015; Pathan

and Faff, 2013; Setiyono and Tarazi, 2014; Stefanovic and Barjaktarovic, 2021). Most of these studies suggest a positive relationship. For instance, banks with more gender-diverse boards, including a higher proportion of female directors and a chairwoman, reveal higher levels of profitability measured by ROA and ROE compared to their counterparts with lower female participation (Andrieș et al., 2020). Additionally, the presence and percentage of female directors in boardrooms positively influence performance (Gulamhussen and Santa, 2015). Women-led banks also tend to have higher market-to-book ratios and greater profitability in terms of return on assets (ROA) and return on equity (ROE) (Bouteska and Mili, 2022). However, some studies suggest that positive effects may be weakened in times of crisis (Pathan and Faff, 2013).

On the contrary, other studies indicate opposite results and suggest that having women on bank boards does not notably improve the bank's value, as measured by the Tobin Q ratio (Ghosh, 2017). Moreover, in this latter study gender diversity in state-owned banks coincided with lower profitability in teams of ROA. Likewise, Proença et al. (2020) found that increased gender diversity among board members is connected to reduced profitability, as indicated by both ROA and ROE.

In summary, it is important to account for both risk and profitability, in order to present potential overall results of introducing gender quotas. Prior research provides contrasting findings on the gender diversity of boards and both risk and performance in banks. It highlights the issue's complexity and the need for ongoing research to deepen our understanding of the relationship and dynamics in different contexts and settings, such as Central and European banking systems. As a result, we are going to account for both risk and performance in our analysis.

3. Data and methodology

Our sample consists of over 170 Central European banks during years 2007-2021 from 11 countries. All of these countries are European Union members (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia). Bank-level data comes from Bankscope (2007–2014) and Orbis (2015–2021). Board structure data are hand-collected using banks' annual reports and other Internet sources. The source of

macroeconomic data is the World Bank database, namely World Development Indicators (WDI). In order to analyse the link between bank risk, performance and board variables, we estimate the following equation:

$$Bankrisk_{i,j,t} = \alpha + \beta_1 Board_{i,j,t} + \beta_2 BankControls_{i,j,t} + \beta_4 MacroControls_{j,t} + \gamma_t + \delta_i \quad (1)$$

$$Bankperformance_{i,j,t} = \alpha + \beta_1 Board_{i,j,t} + \beta_2 BankControls_{i,j,t} + \beta_4 MacroControls_{j,t} + \gamma_t + \delta_i \quad (2)$$

In this model, index i is attributed to a bank, index j refers to macroeconomic data, index t corresponds to a given year. Bank level data are retrieved form financial statements and reflect credit policy, equity level, cost effectiveness, profitability and bank size. All financial variables are winsorized at 1 percentile. Macroeconomic data compromises real GDP growth and inflation level. Our model is a static model for panel data. We use the fixed effects and random effects estimations, depending on the specification. We have included country and year fixed effects, where applicable, to account for unobservable, but specific characteristics of countries and years (Allen et al., 2017; Andrieș et al., 2020; Cardillo et al., 2021). In line with existing literature, we include all bank level control variables with one year lag to avoid collinearity, as by Klein (2013) and Vithessonthi (2016). Macroeconomic control variables are used in current periods. This is in line with such researchers as Chavan and Gambacorta (2019) and Us (2017).

3.1. Bank risk and performance measures

In this paper we take into account the general bank risk and the credit risk as the most common risks banks have to deal with during their regular activity. There are also the most typical risks for Central European banks focused on lending processes.

In an empirical setting, bank risk is approximated by several measures. One of them is the Z-score, which reflects the probability of bank failure (Agoraki et al., 2011; Barry et al., 2011; Baselga-Pascual and Vähämaa, 2021; Ghosh, 2017; Gulamhussen and Santa, 2015; Setiyono

and Tarazi, 2014; Zheng et al., 2017). At the same time, a decrease in Z-score suggests an insufficient level of bank capital to compensate for poor loan quality (Samet et al., 2018).

Other measures of bank risk exposure employed in literature are the capital adequacy ratio (Dong et al., 2014; Shehzad et al., 2010; Zhang et al., 2016) and the equity-to-assets ratio (Baselga-Pascual and Vähämaa, 2021; Mateos de Cabo et al., 2012). The former describes the level of equity a bank needs to compensate for loan losses. Thus, the capital adequacy ratio (CAR) measures default and credit risk (Dong et al., 2014; Mohsni and Otchere, 2014). The latter shows that a high equity/asset ratio indicates bank's safety and soundness, which stems from the fact that a bank's equity provides a financial buffer if the bank experiences losses. A strong capital base guarantees the continuation of the bank's activities and may even protect it from bankruptcy.

Moreover, some studies employ the standard deviation of ROA (Hoang and Wu, 2023; Abid et al., 2021). This ratio exhibits the volatility of returns on assets and captures bank's earnings stability. An increase in the ROA standard deviation indicates a higher level of bank risk and vice versa (Hoang and Wu, 2023). Also, a higher ROA volatility reflects a higher level of operational risk (Abid et al., 2021).

For the purpose of this study, we use the Z-score, the equity-to-assets ratio and the ROA standard deviation to measure the general bank risk.

Turning into another facet of bank's risk, the measurement of credit risk involves various proxies, Non-performing loans (NPLs) have been widely used to analyse bank risk in terms of asset quality through such indicatiors as share of non-performing loans in total loans (Anastasiou, 2017; Beck et al., 2015; Castro, 2013; Dimitrios et al., 2016; Dong et al., 2014; Farag and Mallin, 2017; Fiador and Sarpong-Kumankoma, 2021) or in total assets (Iyer et al., 2014; Vithessonthi, 2016). Moreover, bank risk attitude is frequently described by loan loss provisions (LLP) (Andrieș et al., 2020; Gulamhussen and Santa, 2015; Hoang and Wu, 2023; Khan et al., 2021; Lu and Boateng, 2018; Menicucci and Paolucci, 2016) and loan loss reserves (LLR) (Baselga-Pascual and Vähämaa, 2021; Messai and Jouini, 2013).

While LLR reflects banks' willingness to take risk (Messai and Jouini, 2013) and indicates adequate reserves to cover estimated loan losses (Baselga-Pascual et al., 2015), the LLP shows bank attitude to credit risk (Ghosh, 2015). The amount of LLP may determine banks'

profitability and capital and constitute a part of income smoothing (Quagliariello, 2007). The LLP measure, however, can differ between papers. Authors slightly modify the LLP ratio to account for the amount of loan losses banks need to bear. The most commonly used indicator is LLP to total loans (Abou-El-Sood, 2019; Andrieș et al., 2020; Lu and Boateng, 2018; Menicucci and Paolucci, 2016; Proença et al., 2020; Skała and Weill, 2018) or LLP to total assets (Athanasoglou et al., 2008; Haq and Heaney, 2012; Lassoued et al., 2016). Less frequently, the ratio of loan loss provision to net interest revenue (Gulamhussen and Santa, 2015) or to interest income (Hoang and Wu, 2023) is being employed.

Researchers state that LLP is a risk measure that assesses the frailty of banks' assets because an increase in its value implies greater risk through a higher NPLs share in the bank's loan portfolio (Hung et al., 2017; Proença et al., 2020; Yeyati and Micco, 2007). In other words, it means that LLP accounts for anticipated losses that are realised on defaulted loans (Lu and Boateng, 2018; Skała and Weill, 2018). More specifically, setting aside an expense such as LLP is to foresee and cover possible future credit losses. Thus, a higher level of LLP can be seen as an indicator of more risky assets held by the bank (Hoang and Wu, 2023). Its role for loan quality assessment is perceived to be essential (Liang et al., 2013). LLP also indicates the level of bank's aggressiveness in lending policy (Khan et al., 2017). Within the scope of this study we use NPL in relation to total loans and LLP in relation to total assets. For bank performance, we focus on the two primary indicators of performance, return on assets (ROA) and return on equity (ROE). Additionally, we include net interest margin (NIM), return on pre-provisioning profit to assets and loan growth. The supplementary indicators are meant to show potential underlying mechanisms which may drive profits of less and more diversified banks.

3.2. Board size

Taking advantage of our hand-collected database, we focus on several measures relating to bank boards. Firstly, we use the size of boards. In this approach, we account for both the size of the executive board and the size of the total board. In line with existing papers, we take the natural logarithm of size in both cases.

Bank board sizes differ between other papers. The vast majority of authors include all members of statutory bodies. On average, bank boards have about 9 members (Adams and

Ferreira, 2009; Bouteska and Mili, 2022; Khan et al., 2020; Lu and Boateng, 2018; Sila et al., 2016), 10 members (Hoang and Wu, 2023; Kinateder et al., 2021), 11 members (Birindelli et al., 2024; Venturelli et al., 2024), 12 members (Mateos de Cabo et al., 2012; García-Meca et al., 2015; Dong et al., 2017; Menicucci and Paolucci, 2016; Pathan and Faff, 2013) or 13 members (Birindelli et al., 2020; Fan et al., 2019; Ghosh, 2017; Liang et al., 2013; Owen and Temesvary, 2018). The most numerous bank boards include on average between 14 and almost 18 members (Adams and Mehran, 2012; Mateus and Belhaj, 2016; Del Prete and Stefani, 2021; Gulamhussen and Santa, 2015). In addition, Farag and Mallin (2017) distinguish between board of directors, supervisory board and management board and show their characteristics separately. According to these authors findings, management boards are the smallest bodies, supervisory boards double their mean size, and board of directors are the largest ones.

The most visible differences appear on the minimum and maximum number of total boards' members. In the analysed samples, bank boards have at the minimum from 1 member (Gulamhussen and Santa, 2015) to 8 members (Adams and Mehran, 2012) and at the most from 18 members (Menicucci and Paolucci, 2022) to 69 members (Mateos de Cabo et al., 2012). The descriptive statistics of bank boards used by other authors are presented in Table 16.

Table 16 here

3.3. Gender diversity

There are different measures of board gender diversity. Some studies employ the proportion of females among members of the banks' boards (Abou-El-Sood, 2019; Andrieș et al., 2020; Hoang and Wu, 2023; Khan et al., 2020; Proença et al., 2020) or focus on a specific threshold, such as 'pink quota' requiring at least forty percent of female representation (Menicucci and Paolucci, 2022). Sometimes, authors differentiate between the share of women on board of directors and the share of women on the supervisory board (Gulamhussen and Santa, 2015). The percentage of women on bank boards varies significantly between research, depending on the sample used. However, many of the papers reflect a marginal share of female members in bank statutory bodies. This share is very often below 10 percentages (Abou-El-Sood, 2019;

Adams and Ferreira, 2009; Alharbi et al., 2022; Mateus and Belhaj, 2016; Berger et al., 2014; Bouteska and Mili, 2022; Del Prete and Stefani, 2021; Dong et al., 2014, 2017; Ghosh, 2017; Gulamhussen and Santa, 2015; Khan et al., 2017; Mateos de Cabo et al., 2012; Pathan and Faff, 2013; Sila et al., 2016) or between 10 and 15 percentages (Abou-El-Sood, 2021; Andrieș et al., 2020; Fan et al., 2019; Farag and Mallin, 2017; García-Meca et al., 2015; Hoang and Wu, 2023; Kinateder et al., 2021; Liang et al., 2013; Owen and Temesvary, 2018; Talavera et al., 2018). The number of papers showing even higher share of women on boards is limited and varies from 15,5 to 32,4 percentages (Birindelli et al., 2020, 2024; García Olalla et al., 2022; Menicucci and Paolucci, 2022; Proença et al., 2020; Venturelli et al., 2024). The specific data on this issue have been provided in Table 17.

Table 17 here

When controlling for women presence on bank boards, other measures reflect women presence in terms of the specific number of women. In general, authors use a dummy variable that takes a value of 1 if there is at least one woman on the board (Abou-El-Sood, 2019; Alharbi et al., 2022; Bouteska and Mili, 2022; Del Prete and Stefani, 2021; Gulamhussen and Santa, 2015; Lu and Boateng, 2018). Much lower number of papers include a dummy variable that equals 1 if there are at least two (or even three) female directors in the bank board (Fan et al., 2019; Hoang and Wu, 2023; Kinateder et al., 2021). Abou-El-Sood (2021), Birindelli et al. (2020) and Venturelli et al. (2024) include a dummy variable that takes the value 1 if three or more female directors serve on the bank board.

With regard to our analysis, we account for female participation in bank boards in several different ways. Firstly, we account for both executive boards. We introduce a binary variable *Female EB* that equals one if there are minimum two women on the executive board. In our sample, we have relatively many boards that have three or four members. In such cases, our binary variable equals one if there is at least one woman on the board (accounting for at least 25% of women on an executive board). Secondly, we account for EU gender quotas. A binary variable *Female SB 40pc* equals one if there are minimum 40% female non-executive directors on the supervisory board, while *Female B 33pc* equals one if there are minimum 33% female directors in the total board (both executive and non-executive).

Importantly, we focus on a longer-term effect of female directors. In the banking literature there is no a common practice in terms of lagging the gender diversity variables. Some authors use one-year lagged female variables in order to assess the linkage between ex ante female variables and ex post riskiness (Birindelli et al., 2020; Palvia et al., 2015, 2020) or bank performance (Alharbi et al., 2022; Birindelli et al., 2024; Talavera et al., 2018). Additionally, Del Prete and Stefani (2021) use a two-year lag on gender diversity variables. According to researchers, the lagging of the independent variables should avoid endogeneity concerns arising from simultaneity problems. However, a bunch of papers do not include any time lags when accounting for bank board gender diversity and its relationship with banking activity outcomes (Adams and Ferreira, 2009; Andrieș et al., 2020; Fan et al., 2019; Hoang and Wu, 2023; Lu and Boateng, 2018; Menicucci and Paolucci, 2022; Pathan and Faff, 2013; Proença et al., 2020).

We choose a different approach. All of our gender diversity variables equal one only if the diversity is there in the current year, previous year and the year before that. This means we are able to see a better effect of gender diversity, as new directors need time to introduce changes that will be visible in bank results. In addition, we avoid accounting for diversity that is in place only in one or two years. Our aim is to focus on banks with more consistent diversity and compare them with less diversified peers.

4. Results

4.1. Bank size

The results from estimating our baseline equation, while accounting for bank size are shown in Tables 1 and 2. In general, we find that board size matters for bank risk and the relation is mostly negative.

Table 1 here

Larger boards are in general linked to lower bank risk. As far as executive boards are concerned, we find a statistically significant, positive relation with Z-score and a negative link with the fluctuations of profits, both implying higher stability for larger executive boards. In addition, larger executive boards also record lower credit risk, visible in both the NPL and

LLP levels. The link with equity levels is not statistically significant. The size of total boards shows similar relations to most risk proxies. The only difference is the link with equity, which is negative and implies that larger banks maintain lower levels of capital.

Some researchers stipulate that board size is in fact a proxy for bank size. We also see a considerable correlation between bank total assets and board size. In order to verify whether our findings are driven by bank size, or if a board size effect is present, we additionally control for bank size in the second set of regressions. The results are shown in Table 2.

Table 2 here

We largely confirm our findings from Table 1. Larger executive boards, while controlling for bank size, are linked with higher capital levels and lower credit risk. Larger total boards are associated with higher overall stability, visible in higher Z-score and lower ROA volatility, and lower credit risk, represented by both non-performing loans and loan loss provisions.

Last but not least, we account for bank performance. Results shown in Table 3 show that although board size matters for risk, it does not seem to be strongly linked to performance. We find some positive results for return on equity, but their statistical significance is relatively low and they are not very stable in alternative specifications. In addition, there are no links between board size and the return on assets. This may mean that the visible link is due to different levels of equity and not so much linked to profit generating activities.

Table 3 here

4.2. Female directors in executive boards

In the next step of our analysis, we focus on the role of female directors. First, we use our primary gender indicator *Female EB*. The results of the baseline regression are shown in Table 4. Overall, we find that banks with female directors are less risky. They have more stable earning streams, which is visible in a negative link to fluctuations of ROA. They have lower credit risk, visible both in the level of NPL and LLP. This is in line with existing studies, that have indicated that women have higher risk aversion and are more likely to bring stability to banks.

Table 4 here

In the next step, we focus on performance. The results of estimating Equation 2 are shown in Table 5. In general, we observe a strongly significant and economically sizeable positive link between female presence in executive boards and both *ROA* and *ROE*. At the same time, the coefficients of net interest margin, pre-provisioning profit and loan growth are statistically insignificant. This indicates that possibly better performance of diversified banks is linked with lower credit risk, which has been demostrated in Table 4.

Table 5 here

In the previous subsection, we have demonstrated that bank size is linked to risk. It is hence possible that our results for gender in fact reflect a different size of executive boards. We control for bank size in our gender regressions, but this may be insufficient to graps this effect. In consequence, we include an additional control variable of *EB size* into equations 1 and 2. The results for re-estimating these equations with gender diversity are presented in Table 6 and 7.

Table 6 here

Table 7 here

In general, results shown in Table 6 and 7 largely confirm our earlier findings. There is a negative link between gender diversity and risk, visible in lower profit fluctuations and lower credit risk (Table 6). In more diversified banks, return on assets and return on equity are higher, while the remaining profit indicators do not show a link with female directors (Table 7).

In our sample, we have both listed and unlisted banks. Previous literature indicates that there may be differences in risk and profitability of the two. Additionally, the gender quotas are introduced in the EU for listed companies. It is possible that there is a large difference in gender diversification policies between listed and unlisted banks that may drive some of our results. In consequence, we exclude listed banks from our sample and re-run the estimations. Results are shown in Tables 8 and 9.

Table 8 here

Table 9 here

For the sample of unlisted banks, we confirm our previous findings on risk (Table 8). There is a link between gender diversity and lower ROA fluctuations, as well as better quality of the loan portfolio (lower NPL). At the same time, we do not see such banks having lower loan loss provisions, despite lower NPL. In terms of performance (Table 9), we not only find a positive association with both ROA and ROE, but also find that more diversified banks have a positive link with pre-provisioning profit. As a result, in unlisted banks, the mecanism of generating higher profitability is not linked with creating lower LLP, but rather with a higher profit generation outside the reserve making area.

4.3. EU gender quotas

The EU is introducing gender quotas for boards of listed companies that are to be implemented starting from 2026. The quotas define a minimum participation of 40% of female (or male) non-executive directors in supervisory boards of listed companies. Alternatively, companies may have 33% of all female (or male) directors in total boards. As Central European banks have a high representation of women, we use these two thresholds to analyse the risk and profitability of banks that would pass the gender quotas. Results for supervisory boards are presented in Tables 10 and 11, while results for total boards are shown in Tables 12 and 13.

Table 10 here

Table 11 here

Table 12 here

Table 13 here

When we consider banks with a minimum of 40% of female directors, we find that they have better asset quality (lower NPL) than other banks. The remaining coefficients for risk are not statistically significant, apart from a weakly significant positive coefficient of equity levels (Table 10). In terms of performance, we find a positive link with ROA but not with ROE (Table 11, possibly due to a higher level of equity.

When we consider bank risk and boards that have a minimum of 33% of female directors in total (Table 12), we find very similar results to the ones obtained for executive boards. Bank risk is lower for better diversified banks, with lower ROA fluctuations, bettter asset quality and lower LLP. At the same time, we find no statistically significant links between bank performance and better gender diversification, as shown in Table 13.

4.4. Robustness

To verify the robustness of our primary results, we consider the fact that the primary indicator of gender diversity, *Female EB*, is in some sense also an indicator of stability. It equals one when the given participation of women is present in the three years (current year, previous year and year *t-2*). It is possible that the effect we are grasping is not that of gender, but rather of board stability. In order to verify this, we include an additional control variable to Equations 1 and 2. The variable *Stable EB* equals one if a minimum of 70% of all board members stay the same in the period under consideration. This takes out the element of board stability from our gender variable and we are able to better identify the gender element as such.

Table 14 here

Table 15 here

After we account for an additional variable of stability, our main results are sustained. We find a negative link between gender diversity and risk (Table 14) and a positive link for performance (Table 15). In consequence, our primary are not driven by stability of the boards, but rather by their more diversified nature and different approach to risk taking in the timeline analysed.

5. Conclusions

Summing up, we find that the size and gender diversification of bank boards matter for both risk and performance of banks in post-communist countries. Larger boards are linked with lower bank risk and the effect is sustained after controlling for bank size. Banks with female directors in the executive boards have both lower credit risk and ROA fluctuations, and higher

profitability. These links do not strongly change after accounting for board size. Unlisted banks show similar results, but higher profitability of more diversified banks is linked with better profit generation and not lower loan loss provisions, even though better quality of the loan portfolio is still observed.

When we account for EU gender quotas in banks in our sample, we find that some results are sustained. However, the results are much stronger when we account for diversification in executive boards than in supervisory boards or total boards. It is likely that directors in executive boards have much more influence over bank day-to-day policies and especially risk management. As a result, the potential effect of higher risk aversion of female directors is likely to materialise more when these directors are included in the executive, rather than (or in parallel to) non-executive boards. This implies that from the view of EU policies, quotas relating to total boards, which also include executive directors, are more likely to bring effects than the supervisory boards quotas.

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Table 1: Bank risk and board size

This table reports the results for panel regressions of bank size on bank risk. *EBsize* is the natural logarithm of executive board size. *Boardsize* is the natural logarithm of executive board size. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP	Zsc	sdR	Eq	NPL	LLP
EB size	0.277*	-0.187**	-0.546	-4.896***	-0.354***					
	(0.166)	(0.082)	(0.336)	(0.832)	(0.107)					
Board size						0.533**	-0.518***	-1.561***	-7.282***	-0.556***
						(0.211)	(0.104)	(0.434)	(1.070)	(0.137)
TL/A	0.004	-0.006***	-0.012	-0.043**	0.020***	0.003	-0.005***	-0.012	-0.044**	0.020***
	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)	(0.004)	(0.002)	(0.008)	(0.020)	(0.003)
Equity		-0.008		-0.073	-0.001		-0.010		-0.093	-0.003
		(0.006)		(0.061)	(0.008)		(0.006)		(0.061)	(0.008)
GDP	0.038*	-0.033***	0.005	-0.203**	-0.104***	0.036	-0.031***	0.005	-0.209**	-0.104***
	(0.022)	(0.010)	(0.032)	(0.083)	(0.012)	(0.022)	(0.010)	(0.032)	(0.083)	(0.012)
Inflation	-0.087	0.040*	-0.013	0.394*	0.068**	-0.085	0.040*	-0.021	0.320	0.063**
	(0.054)	(0.024)	(0.080)	(0.205)	(0.029)	(0.054)	(0.024)	(0.080)	(0.204)	(0.029)
No. of obs.	1,558	1,558	1,558	1,558	1,539	1,558	1,558	1,558	1,558	1,539
No. of banks	184	184	184	184	184	184	184	184	184	184

Table 2: Bank risk and board size, accounting for bank size

This table reports the results for panel regressions of bank size on bank risk. *EBsize* is the natural logarithm of executive board size. *Boardsize* is the natural logarithm of executive board size. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP	Zsc	sdR	Eq	NPL	LLP
EB size	0.219	0.011	0.759**	-3.239***	-0.243**					
	(0.196)	(0.093)	(0.335)	(0.884)	(0.119)					
Board size						0.574**	-0.339***	0.444	-5.084***	-0.448***
						(0.270)	(0.126)	(0.446)	(1.177)	(0.160)
TL/A	0.003	-0.004*	0.003	-0.027	0.021***	0.003	-0.004**	0.002	-0.029	0.021***
	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)
Equity		-0.015**		-0.153**	-0.005		-0.013**		-0.158**	-0.005
		(0.007)		(0.063)	(0.009)		(0.007)		(0.063)	(0.009)
Size	0.035	-0.137***	-2.099***	-1.869***	-0.086*	-0.017	-0.084**	-2.060***	-1.653***	-0.059
	(0.061)	(0.032)	(0.157)	(0.376)	(0.044)	(0.066)	(0.034)	(0.161)	(0.388)	(0.047)
GDP	0.037*	-0.031***	0.017	-0.194**	-0.103***	0.036	-0.030***	0.018	-0.198**	-0.103***
	(0.022)	(0.010)	(0.031)	(0.083)	(0.012)	(0.022)	(0.010)	(0.031)	(0.083)	(0.012)
Inflation	-0.087	0.041*	-0.001	0.402**	0.069**	-0.085	0.042*	0.009	0.349*	0.065**
	(0.054)	(0.024)	(0.075)	(0.204)	(0.029)	(0.054)	(0.024)	(0.075)	(0.203)	(0.029)
No. of obs.	1,558	1,558	1,558	1,558	1,539	1,558	1,558	1,558	1,558	1,539
No. of banks	184	184	184	184	184	184	184	184	184	184

Table 3: Bank performance and board size

This table reports the results for panel regressions of bank size on bank performance. *EBsize* is the natural logarithm of executive board size. *Boardsize* is the natural logarithm of executive board size. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr	ROA	ROE	NIM	preLLP	Lgr
EB size	0.194	2.941*	-0.055	-0.058	-0.503					
	(0.149)	(1.562)	(0.094)	(0.119)	(2.113)					
Board size						0.185	3.902*	0.024	-0.267*	-1.456
						(0.201)	(2.096)	(0.125)	(0.158)	(2.891)
TL/A	-0.011***	-0.169***	0.018***	0.007**	-0.194***	-0.011***	-0.169***	0.018***	0.007**	-0.197***
	(0.003)	(0.036)	(0.002)	(0.003)	(0.046)	(0.003)	(0.036)	(0.002)	(0.003)	(0.046)
Equity	0.026**	0.330***	0.063***	0.011	0.688***	0.027**	0.337***	0.062***	0.011	0.692***
	(0.011)	(0.111)	(0.007)	(0.009)	(0.152)	(0.011)	(0.111)	(0.007)	(0.008)	(0.152)
Size	0.336***	3.305***	-0.237***	0.312***	1.623**	0.339***	3.196***	-0.248***	0.342***	1.782**
	(0.056)	(0.607)	(0.056)	(0.054)	(0.696)	(0.059)	(0.634)	(0.057)	(0.055)	(0.749)
GDP	0.118***	1.281***	0.022***	0.026**	0.279	0.118***	1.285***	0.022***	0.026**	0.280
	(0.015)	(0.151)	(0.008)	(0.011)	(0.228)	(0.015)	(0.151)	(0.008)	(0.011)	(0.228)
Inflation	-0.052	-1.077***	0.022	0.028	-0.406	-0.048	-1.028***	0.021	0.027	-0.413
	(0.036)	(0.375)	(0.021)	(0.027)	(0.563)	(0.036)	(0.374)	(0.020)	(0.027)	(0.560)
No. of obs.	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550
No. of banks	182	182	182	182	182	182	182	182	182	182

Table 4: Bank risk and gender in management boards

This table reports the results for panel regressions of gender diversification in executive boards on bank risk. *FemaleEB* equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female EB	0.069	-0.253***	-0.187	-2.806***	-0.167**
	(0.131)	(0.059)	(0.199)	(0.529)	(0.073)
TL/A	0.001	-0.004*	0.000	-0.023	0.021***
	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)
Equity		-0.015**		-0.183***	-0.005
		(0.007)		(0.063)	(0.009)
Size	0.078	-0.155***	-1.874***	-2.610***	-0.146***
	(0.056)	(0.028)	(0.149)	(0.356)	(0.039)
GDP	0.038*	-0.033***	0.015	-0.223***	-0.106***
	(0.022)	(0.010)	(0.031)	(0.082)	(0.012)
Inflation	-0.076	0.047**	0.009	0.403**	0.062**
	(0.054)	(0.024)	(0.076)	(0.204)	(0.029)
No. of obs.	1,550	1,550	1,550	1,550	1,531
No. of banks	182	182	182	182	182

Table 5: Bank performance and gender in management boards

This table reports the results for panel regressions of gender diversification in executive boards on bank performance. *FemaleEB* equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female EB	0.308***	3.352***	-0.009	0.086	1.191
	(0.092)	(0.953)	(0.055)	(0.071)	(1.362)
TL/A	-0.011***	-0.172***	0.018***	0.007**	-0.194***
	(0.003)	(0.036)	(0.002)	(0.003)	(0.045)
Equity	0.028***	0.359***	0.062***	0.011	0.688***
	(0.011)	(0.111)	(0.007)	(0.008)	(0.151)
Size	0.386***	3.998***	-0.245***	0.308***	1.636***
	(0.051)	(0.553)	(0.055)	(0.051)	(0.605)
GDP	0.121***	1.316***	0.021***	0.026**	0.284
	(0.015)	(0.151)	(0.008)	(0.011)	(0.228)
Inflation	-0.053	-1.085***	0.021	0.026	-0.435
	(0.036)	(0.373)	(0.021)	(0.027)	(0.560)
No. of obs.	1,550	1,550	1,550	1,550	1,550
No. of banks	182	182	182	182	182

Table 6: Bank risk and gender in management boards, controlling for board size

This table reports the results for panel regressions of gender diversification in executive boards on bank risk. $FemaleEB$ equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female EB	0.067	-0.253***	-0.197	-2.767***	-0.164**
	(0.131)	(0.059)	(0.199)	(0.527)	(0.073)
TL/A	0.002	-0.004*	0.001	-0.028	0.020***
	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)
Equity		-0.016**		-0.163***	-0.003
		(0.007)		(0.063)	(0.009)
EB size	0.222	0.025	0.762**	-3.130***	-0.203*
	(0.201)	(0.093)	(0.336)	(0.879)	(0.118)
Size	0.041	-0.159***	-1.968***	-2.110***	-0.111**
	(0.065)	(0.032)	(0.156)	(0.382)	(0.044)
GDP	0.036*	-0.033***	0.014	-0.214***	-0.105***
	(0.022)	(0.010)	(0.031)	(0.082)	(0.012)
Inflation	-0.083	0.046*	0.001	0.446**	0.066**
	(0.054)	(0.024)	(0.076)	(0.203)	(0.029)
No. of obs.	1,550	1,550	1,550	1,550	1,531
No. of banks	182	182	182	182	182

Table 7: Bank profitability and gender in management boards, controlling for board size

This table reports the results for panel regressions of gender diversification in executive boards on bank performance. *FemaleEB* equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female EB	0.306***	3.318***	-0.008	0.086	1.197
	(0.092)	(0.952)	(0.055)	(0.071)	(1.362)
TL/A	-0.011***	-0.168***	0.018***	0.007**	-0.194***
	(0.003)	(0.036)	(0.002)	(0.003)	(0.046)
Equity	0.027**	0.338***	0.063***	0.011	0.692***
	(0.011)	(0.111)	(0.007)	(0.009)	(0.152)
Size	0.356***	3.529***	-0.237***	0.317***	1.723**
	(0.056)	(0.610)	(0.056)	(0.054)	(0.705)
EB size	0.184	2.846*	-0.055	-0.061	-0.547
	(0.149)	(1.557)	(0.094)	(0.119)	(2.116)
GDP	0.120***	1.306***	0.022***	0.026**	0.288
	(0.015)	(0.151)	(0.008)	(0.011)	(0.228)
Inflation	-0.057	-1.134***	0.022	0.026	-0.419
	(0.036)	(0.374)	(0.021)	(0.027)	(0.563)
No. of obs.	1,550	1,550	1,550	1,550	1,550
No. of banks	182	182	182	182	182

Table 8: Bank risk and gender in management boards - unlisted banks

This table reports the results for panel regressions of gender diversification in executive boards on bank risk. $FemaleEB$ equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female EB	-0.094	-0.168**	-0.118	-3.235***	-0.121
	(0.165)	(0.070)	(0.229)	(0.657)	(0.087)
TL/A	0.002	-0.004*	0.008	-0.033	0.020***
	(0.005)	(0.002)	(0.009)	(0.025)	(0.003)
Equity		-0.013*		-0.232***	-0.011
		(0.008)		(0.076)	(0.010)
Size	-0.012	-0.109***	-2.159***	-2.857***	-0.152***
	(0.070)	(0.034)	(0.176)	(0.444)	(0.051)
GDP	0.042	-0.037***	0.007	-0.302***	-0.130***
	(0.029)	(0.012)	(0.036)	(0.104)	(0.014)
Inflation	-0.053	0.030	0.042	0.310	0.056
	(0.068)	(0.028)	(0.086)	(0.249)	(0.034)
No. of obs.	1,137	1,137	1,137	1,137	1,120
No. of banks	146	146	146	146	146

Table 9: Bank risk and profitability in management boards - unlisted banks

This table reports the results for panel regressions of gender diversification in executive boards on bank performance. $FemaleEB$ equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female EB	0.382***	3.735***	0.038	0.168**	2.107
	(0.112)	(1.144)	(0.062)	(0.085)	(1.687)
TL/A	-0.008**	-0.151***	0.016***	0.006*	-0.161***
	(0.004)	(0.041)	(0.003)	(0.003)	(0.052)
Equity	0.022*	0.295**	0.041***	-0.011	0.743***
	(0.013)	(0.130)	(0.008)	(0.010)	(0.179)
Size	0.413***	4.141***	-0.344***	0.314***	1.844**
	(0.064)	(0.681)	(0.063)	(0.064)	(0.751)
GDP	0.138***	1.485***	0.015	0.020	0.379
	(0.018)	(0.185)	(0.010)	(0.013)	(0.293)
Inflation	-0.043	-1.202***	0.012	0.030	-0.495
	(0.043)	(0.442)	(0.023)	(0.032)	(0.693)
No. of obs.	1,137	1,137	1,137	1,137	1,137
No. of banks	146	146	146	146	146

Table 10: Bank risk and gender in supervisory boards: EU gender quotas

This table reports the results for panel regressions of gender diversification in supervisory boards on bank risk. *Female SB 40pc* equals one if there are minimum 40% women on the supervisory board. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female SB 40pc	0.030	-0.159	0.589*	-1.893**	-0.157
	(0.222)	(0.099)	(0.327)	(0.880)	(0.121)
TL/A	0.002	-0.004*	0.000	-0.025	0.021***
	(0.004)	(0.002)	(0.008)	(0.021)	(0.003)
Equity		-0.013**		-0.149**	-0.003
		(0.007)		(0.063)	(0.009)
Size	0.067	-0.132***	-1.837***	-2.352***	-0.134***
	(0.055)	(0.028)	(0.149)	(0.347)	(0.039)
GDP	0.038*	-0.031***	0.016	-0.197**	-0.104***
	(0.022)	(0.010)	(0.031)	(0.084)	(0.012)
Inflation	-0.078	0.045*	0.003	0.357*	0.059**
	(0.054)	(0.024)	(0.076)	(0.207)	(0.029)
No. of obs.	1,540	1,540	1,540	1,540	1,521
No. of banks	181	181	181	181	181

Table 11: Bank performance and gender in supervisory boards: EU gender quotas

This table reports the results for panel regressions of gender diversification in supervisory boards on bank performance. *Female SB 40pc* equals one if there are minimum 40% women on the supervisory board. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female SB 40pc	0.332**	1.703	-0.113	0.194*	2.493
	(0.152)	(1.582)	(0.089)	(0.116)	(2.310)
TL/A	-0.011***	-0.166***	0.018***	0.007**	-0.197***
	(0.003)	(0.035)	(0.002)	(0.003)	(0.046)
Equity	0.025**	0.322***	0.063***	0.009	0.689***
	(0.011)	(0.110)	(0.007)	(0.009)	(0.152)
Size	0.356***	3.505***	-0.254***	0.296***	1.662***
	(0.050)	(0.536)	(0.055)	(0.051)	(0.604)
GDP	0.118***	1.287***	0.021***	0.025**	0.270
	(0.015)	(0.152)	(0.008)	(0.011)	(0.228)
Inflation	-0.050	-1.063***	0.020	0.027	-0.416
	(0.036)	(0.376)	(0.021)	(0.027)	(0.562)
No. of obs.	1,540	1,540	1,540	1,540	1,540
No. of banks	181	181	181	181	181

Table 12: Bank risk and gender in total boards: EU gender quotas

This table reports the results for panel regressions of gender diversification in total boards on bank risk. *Female B 33pc* equals one if there are minimum 33% women among all executive and non-executive directors on all boards. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female B 33pc	0.088	-0.301***	-0.427	-2.697***	-0.173*
	(0.181)	(0.081)	(0.275)	(0.737)	(0.102)
TL/A	0.001	-0.004*	0.002	-0.021	0.021***
	(0.004)	(0.002)	(0.008)	(0.020)	(0.003)
Equity		-0.014**		-0.119**	0.003
		(0.006)		(0.061)	(0.008)
Size	0.085	-0.149***	-1.759***	-2.380***	-0.126***
	(0.054)	(0.027)	(0.142)	(0.342)	(0.037)
GDP	0.031	-0.030***	0.014	-0.230***	-0.101***
	(0.021)	(0.009)	(0.030)	(0.080)	(0.011)
Inflation	-0.041	0.020	0.059	0.359*	0.057**
	(0.048)	(0.021)	(0.069)	(0.187)	(0.027)
No. of obs.	1,679	1,679	1,679	1,679	1,658
No. of banks	196	196	196	196	196

Table 13: Bank performance and gender in total boards: EU gender quotas

This table reports the results for panel regressions of gender diversification in total boards on bank performance. *Female B 33pc* equals one if there are minimum 33% women among all executive and non-executive directors on all boards. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female B 33pc	0.176	1.421	0.088	-0.014	1.554
	(0.129)	(1.326)	(0.074)	(0.097)	(1.999)
TL/A	-0.011***	-0.166***	0.018***	0.008***	-0.245***
	(0.003)	(0.034)	(0.002)	(0.003)	(0.047)
Equity	0.017*	0.279***	0.062***	0.009	0.863***
	(0.010)	(0.106)	(0.006)	(0.008)	(0.152)
Size	0.365***	3.769***	-0.237***	0.309***	1.501**
	(0.048)	(0.527)	(0.052)	(0.048)	(0.626)
GDP	0.112***	1.220***	0.019**	0.024**	0.175
	(0.014)	(0.146)	(0.008)	(0.010)	(0.228)
Inflation	-0.021	-0.617*	0.041**	0.051**	-0.422
	(0.033)	(0.340)	(0.018)	(0.024)	(0.529)
No. of obs.	1,679	1,679	1,679	1,679	1,679
No. of banks	196	196	196	196	196

Table 14: Bank risk and gender: accounting for stability

This table reports the results for panel regressions of gender diversification in executive boards on bank risk. *Female EB* equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. *Stable EB* equals one if a minimum of 70% of executive board members remain unchanged in the periods of *t, t-1, t-2*. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	Zsc	sdR	Eq	NPL	LLP
Female EB	-0.000	-0.188***	-0.150	-2.436***	-0.081
	(0.140)	(0.060)	(0.203)	(0.554)	(0.069)
Stable EB	0.074	-0.132***	-0.301**	-1.131***	-0.054
	(0.111)	(0.047)	(0.150)	(0.414)	(0.053)
TL/A	0.000	-0.003	0.000	-0.007	0.019***
	(0.005)	(0.002)	(0.009)	(0.022)	(0.003)
Equity		-0.016**		-0.162**	0.009
		(0.007)		(0.068)	(0.008)
Size	0.070	-0.138***	-1.778***	-2.666***	-0.148***
	(0.062)	(0.029)	(0.157)	(0.371)	(0.038)
GDP	0.015	0.000	0.002	-0.173*	-0.040***
	(0.028)	(0.012)	(0.036)	(0.101)	(0.013)
Inflation	-0.057	0.036	-0.021	0.332	0.024
	(0.059)	(0.025)	(0.079)	(0.220)	(0.028)
No. of obs.	1,429	1,429	1,429	1,429	1,411
No. of banks	175	175	175	175	175

Table 15: Bank profitability and gender: accounting for stability

This table reports the results for panel regressions of gender diversification in executive boards on bank performance. *Female EB* equals one if there are minimum two women on the executive board, or one woman if the board has up to four members. *Stable EB* equals one if a minimum of 70% of executive board members remain unchanged in the periods of *t, t-1, t-2*. All specifications include bank and year fixed effects. ***, **, * indicate statistical significance at the 1, 5, and 10% levels, respectively.

	ROA	ROE	NIM	preLLP	Lgr
Female EB	0.231**	2.300**	0.000	0.097	1.492
	(0.092)	(0.938)	(0.055)	(0.073)	(1.421)
Stable EB	0.013	0.467	-0.061	-0.048	0.936
	(0.070)	(0.715)	(0.040)	(0.054)	(1.122)
TL/A	-0.012***	-0.180***	0.016***	0.003	-0.196***
	(0.003)	(0.035)	(0.002)	(0.003)	(0.048)
Equity	0.023**	0.232**	0.063***	0.012	0.663***
	(0.011)	(0.111)	(0.007)	(0.009)	(0.161)
Size	0.400***	3.960***	-0.256***	0.330***	2.004***
	(0.052)	(0.520)	(0.056)	(0.052)	(0.640)
GDP	0.060***	0.663***	0.023**	0.031**	-0.061
	(0.017)	(0.176)	(0.010)	(0.013)	(0.279)
Inflation	-0.047	-0.697*	0.020	0.010	0.030
	(0.037)	(0.381)	(0.021)	(0.029)	(0.600)
No. of obs.	1,429	1,429	1,429	1,429	1,429
No. of banks	175	175	175	175	175

Table 16: Board size characteristics

Authors	mean	median	sd	min	max	type of board
Adams and Ferreira (2009)	9.4	-	2.7	3	39	total board
Adams and Mehran (2012)	18.0	-	5.3	8	36	total board
Berger et al. (2014)	3.0	-	1.9	-	-	executive board
Birindelli et al. (2020)	13.0	-	3.8	5	28	board of directors
Birindelli et al. (2024)	11.8	-	4.1	-	-	total board
Bouteska and Mili (2022)	9.7	-	2.9	-	-	total board
Del Prete and Stefani (2021)	16.7	16	7.3	-	-	total board
Dong et al. (2017)	12.8	13	3.2	4	19	total board
Fan et al. (2019)	13.2	-	3.5	-	32	total board
Farag and Mallin (2017)	14.7	15	4.4	4	31	board of directors
	12.6	11	5.6	4	29	supervisory board
	5.3	4.5	2.8	2	16	management board
García-Meca et al. (2015)	12.8	-	3.87	-	-	total board
Ghosh (2017)	13.5	-	3.0	-	-	board of directors
Gulamhussen and Santa (2015)	14.8	-	8.9	1	51	total board
Hoang and Wu (2023)	10.7	11	3.8	2	25	total board
Khan et al. (2020)	9.8	-	3.2	0	21	total board (Islamic banks)
	10.1	-	2.6	4	22	total board (conventional banks)
Kinateder et al. (2021)	10.5	12	6.5	-	-	total board
Liang et al. (2013)	13.8	-	3.2	3	22	total board
Lu and Boateng (2018)	9.8	-	2.9	4	22	total board
Mateos de Cabo et al. (2012)	12.9	11	8.4	1	69	board of directors
Mateus and Belhaj (2016)	15.9	15	5.8	6	34	board of directors
Menicucci and Paolucci (2022)	12.8	-	3.2	7	18	total board
Owen and Temesvary (2018)	13.1	13	3.7	6	32	total board
Pathan and Faff (2013)	12.7	12	4.1	5	31	total board
Sila et al. (2016)	9.1	9	2.4	-	-	total board
Talavera et al. (2018)	13.8	14	3.4	-	-	total board
Venturelli et al. (2024)	11.8	12	3.4	5	21	total board

Table 17: Mean female share in boards

Authors	mean	type of board	years	countries
Abou-El-Sood (2019)	2.0%	total board	2000-2014	Gulf Cooperation Council countries
Abou-El-Sood (2021)	12.0%	total board	2002-2018	USA
Adams and Ferreira (2009)	8.5%	total board	1996-2003	USA
Alharbi et al. (2022)	6.9%	total board	2007-2017	12 the Middle East and Southern Asia countries
Andrieș et al. (2020)	14.1%	total board	2005-2012	17 Central and Eastern European countries
Berger et al. (2014)	1.0%	executive board	1994	Germany
	2.0%	executive board	1995-1997	Germany
	3.0%	executive board	1998-2007	Germany
Birindelli et al. (2020)	15.5%	board of directors	2008-2016	40 international countries
Birindelli et al. (2024)	26.5%	total board	2013-2020	15 European countries
Bouteska and Mili (2022)	4.6%	total board	2002-2018	10 ASEAN countries
Del Prete and Stefani (2021)	4.1%	total board	1995-2010	Italy
Dong et al. (2014)	9.8%	total board	2003-2011	China
Dong et al. (2017)	9.9%	total board	2003-2011	China
Fan et al. (2019)	12.5%	total board	2000-2014	USA
Farag and Mallin (2017)	10.0%	board of directors	2004-2012	17 European countries
	13.1%	supervisory board	2004-2012	17 European countries
	2.9%	management board	2004-2012	17 European countries
García-Meca et al. (2015)	10.0%	total board	2004-2010	9 international countries
García Olalla et al. (2022)	20.0%	total board	2002-2019	19 countries belonging to the EU
Ghosh (2017)	5.2%	board of directors	2003-2012	India
Gulamhussen and Santa (2015)	8.1%	board of directors	2006	24 OECD countries
	7.0%	supervisory board	2006	24 OECD countries
Hoang and Wu (2023)	13.0%	total board	2007-2016	18 developed and 21 developing countries
Khan et al. (2020)	4.0%	total board (Islamic banks)	2010-2017	11 Muslim countries
	5.0%	total board (conventional banks)	2010-2017	11 Muslim countries
Kinateder et al. (2021)	11.9%	total board	2006-2017	20 international countries
Liang et al. (2013)	11.0%	total board	2003-2010	China
Mateos de Cabo et al. (2012)	7.0%	board of directors	2006	20 European countries
Mateus and Belhaj (2016)	9.0%	board of directors	2002-2011	11 European countries
Menicucci and Paolucci (2022)	32.4%	total board	2015-2019	Italy
Owen and Temesvary (2018)	12.6%	total board	1999-2015	USA
Pathan and Faff (2013)	7.9%	total board	1997-2011	USA
Proença et al. (2020)	16.3%	total board	2013	19 countries that adopted the euro currency
	16.8%	total board	2014	19 countries that adopted the euro currency
	19.6%	total board	2015	19 countries that adopted the euro currency
	22.4%	total board	2016	19 countries that adopted the euro currency
	22.9%	total board	2017	19 countries that adopted the euro currency
Sila et al. (2016)	9.6%	total board	1996-2010	USA
Talavera et al. (2018)	11.0%	total board	2009-2013	China
Venturelli et al. (2024)	24.8%	board of directors	2017-2020	46 international countries
	29.0%	management board	2017-2020	46 international countries
	19.0%	executives	2017-2020	46 international countries