

Unveiling the association between the monitoring and demographic attributes of female directors and credit risk: evidence from an emerging country

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Abstract

Purpose – This research explores how the presence and characteristics of female directors affect the credit risk of the financial sector.

Design/methodology/approach – The research draws on hand-collected data from the annual reports of 53 publicly traded financial firms listed on the Dhaka Stock Exchange in Bangladesh, spanning the years 2016–2022. Ordinary least squares regression models are employed to assess the associations.

Findings – The study finds that having more females on corporate boards reduces credit risk. This effect remains significant even after considering their monitoring and demographic attributes. Independent female directors and those with working experience in the financial sector or foreign degrees have a stronger impact on lowering credit risk. Moreover, the findings of the study confirm the partially mediating role of female directors with independence, leadership roles, and higher education in the association between female directorship and credit risk of sample financial firms in Bangladesh. The study also highlights that female directorship is stronger in reducing credit risk when there are at least three female directors on the board.

Practical implications – The findings of this study could guide market regulators, shareholders, and policymakers on the importance of encouraging gender diversity in boardrooms. Additionally, it provides valuable insights into board composition, specifically regarding gender quotas and qualifications under corporate governance guidelines.

Originality/value – This study uniquely investigates the association between female directorship and credit risk, focusing on the mediating role of female directors' monitoring and demographic attributes in Bangladesh's financial sector. Additionally, it reshapes the understanding of human capital by highlighting the importance of education and experience in relation to female board participation.

Keywords Credit risk, Female directorship, Female attributes, Non-performing loans, Financial sector, Bangladesh

Paper type Research article

1. Introduction

Financial sectors are vital for driving economic growth and enhancing financial development, particularly in underdeveloped and developing countries where borrowers lack access to capital markets (Chowdhury *et al.*, 2023). The recent downturn in the financial system highlights the imperative for the financial sector to rigorously monitor its health and identify the determinants of financial uncertainty, which are intricately linked to both the banking system and the broader economy (Ari *et al.*, 2021). The global financial crisis of 2008



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demonstrated that, although bank lending is significantly influenced by the macroeconomic environment, banks must prioritize internal factors affecting profitability in their lending decisions, as they cannot control broader economic conditions (Gupta and Bansal, 2024). High credit risk can lead to significant loan losses, financial strain, and reduced profitability, potentially undermining a bank's stability, reputation, and customer confidence (Chowdhury et al., 2023). The rising trend of loan defaults is a significant indicator of credit risk, drawing substantial attention from policymakers, regulators, investors, and researchers (Gulamhussen and Santa, 2015; Kinatader et al., 2021; Nadeem et al., 2019).

An effective approach to credit risk management is to prioritize board composition, as the traits and qualities of directors significantly influence organizational outcomes and decision-making processes (Hasan et al., 2023; Das and Akter, 2025). The increasing presence of female participation and their positive influence on enhancing bank governance have attracted considerable interest from banking regulators (Liu et al., 2023). Having more women on the board can reduce credit risk through stringent scrutiny because women are typically more cautious and risk-averse when making choices (Huang et al., 2024) and more prepared for board meetings (Huse and Solberg, 2006) than men. However, the prior studies on female directorship and credit risk are not conclusive. Some studies report a negative (Dong et al., 2017; Nadeem et al., 2019; Kinatader et al., 2021; Huang et al., 2024), whereas other find the positive (Berger et al., 2014), or even non-significant (Sila et al., 2016) relationship between female directorship and credit risk. Therefore, the research question is: How does female directorship influence credit risk in the financial sector of Bangladesh?

The attributes of female directors are crucial for effective decision-making in the boardroom (Saleh and Maigoshi, 2024; Qaderi et al., 2024). Elnahass et al. (2024) argue that the monitoring and demographic attributes of female directors are pivotal in determining their impact on firms' credit risk. Furthermore, the potential effect of female directorship on firm risk is subject to firm-specific characteristics (Hussain et al., 2022) and mediated by human capital (Harjanto et al., 2022). Therefore, another pertinent research question is: How do the attributes of female directors mediate the association between woman directorship and credit risk?

Over the decade from 2010 to 2019, the banking industry in Bangladesh experienced a more than threefold increase in non-performing loans (NPLs) [1], indicative of declining credit quality and posing significant credit risk, thereby threatening the financial stability of banks and the broader economy (Ghosh et al., 2020). By the end of June 2023, the banking industry's NPLs ratio stood at 10.11% (Bangladesh Bank, 2023). The International Monetary Fund has emphasized that reducing NPLs is crucial for the disbursement of the \$1.0 billion tranche from the lending package (Kabir, 2024). One of the primary reasons for the high levels of NPLs is the weak corporate governance system in Bangladesh (Hasan, 2024). To manage NPLs effectively, there is a strong demand for the effective corporate governance, including board diversity (Alharbi et al., 2022). This study uniquely investigates the association between woman directorship and credit risk by analyzing how the specific attributes of female directors may serve as mediating factors.

Utilizing panel data from 365 firm-year observations of 53 distinct listed financial companies spanning the period from 2016 to 2022, the findings indicate that a higher proportion of females on corporate boards lowers credit risk. These inverse associations remain significant even after controlling for the monitoring and demographic attributes of the female board members. In terms of monitoring attributes, independent female directors have a stronger impact on minimizing the credit risk of sample firms compared to their leadership roles. In terms of demographic attributes, female directors with working experience in financial sector and foreign degrees have a stronger effect on curbing credit risk compared to those with higher education and majors in accounting and/or finance. Moreover, the results of the study confirm the partially mediating role of female directors with independence, leadership roles, and higher education in the association between female directorship and credit risk of sample financial firms in Bangladesh. Finally, the findings show that that when a

board has three or more female directors, as opposed to only one or two, female directorship has a greater impact on credit risk.

This research contributes to the existing body of knowledge on board gender diversity and credit risk through multiple avenues. First, prior studies on female directorship and credit risk are mixed. Some find an inverse association due to risk-averse attitudes (Lu and Boateng, 2018; Ngamvilaikorn *et al.*, 2024; Huang *et al.*, 2024; Kinateder *et al.*, 2021), while other find a positive (Berger *et al.*, 2014) or insignificant relationship (Khan *et al.*, 2020; Sila *et al.*, 2016). Moreover, prior research has predominantly examined the nexus between board gender diversity and credit risk in countries within institutional environments characterized by strong investor protection and rigorous enforcement, including the United States (Sila *et al.*, 2016), the United Kingdom (Lu and Boateng, 2018), and Germany (Berger *et al.*, 2014). In contrast, more recent studies have extended this inquiry to cross-country settings (Kinateder *et al.*, 2021; Khan *et al.*, 2020), offering broader insights into the role of institutional heterogeneity. From the standpoint of a developing economy such as Bangladesh, where credit risk in the financial sector remains a critical concern due to concentrated ownership structures, weak regulatory enforcement, and pervasive political influence, this study extends the literature by examining the role of female directors on credit risk.

Second, while earlier studies have focused on the attributes of female directors in relation to financial performance (Shafai *et al.*, 2024), integrated reporting (Qaderi *et al.*, 2024), and sustainability disclosure (Rahman *et al.*, 2024), this study fills gaps by examining their monitoring attributes (female independence and leadership roles) and demographic attributes (female with working experience in financial sector, higher education, foreign degrees, and majors in accounting and/or finance), as well as their numerical representation (tokenism and critical mass) on credit risk.

Finally, by examining the mediating effects of female directors' attributes, this study underscores the relationship between female directorship and credit risk. The findings emphasize the significance of effectively monitoring role of female directors and demonstrate how female directorship, through their attributes, can indirectly minimize credit risk and enhance credit quality.

The paper is organized as follows: Section 2 outlines the financial sector and credit risk in Bangladesh. The development of hypotheses and the theoretical framework are covered in Section 3. Section 4 details the sample, data, variables, and model specifications. Section 5 presents the results and analysis, while Section 6 addresses endogeneity concerns and robustness checks. Finally, Section 7 concludes with policy implications and future research directions.

2. Financial sectors and credit risk: Bangladeshi context

After gaining independence in 1971, Bangladesh's government initially adopted socialism by nationalizing all banks but began privatizing the financial sector in the early 1980s (Rashid, 2020). The Bangladesh Bank (BB) and the Bangladesh Securities and Exchange Commission (BSEC) regulate the market and issue corporate governance guidelines. To enhance governance practices, the BSEC introduced the Corporate Governance Code (CGC) in 2006, with subsequent revisions in 2012 and 2018. The latest revision includes the establishment of a nomination and remuneration committee responsible for devising board composition in terms of age, gender, nationality, ethnicity, work experience, and educational background (Rashid, 2020; Das and Hossain, 2025). So, the mere presence of female with their attributes is the concern in Bangladeshi corporate board.

The NPLs to gross loan for banks and non-bank financial institutions increased to 10.11 and 27.65%, respectively, as of June 30, 2023 (Bangladesh Bank, 2023) and the upward trajectory is causing concern among investors and policymakers regarding the financial system's stability. High levels of NPLs and governance issues have precipitated a liquidity crunch, regulatory capital management risks, and business stress, positioning Bangladesh as having the second-highest NPL rate in Asia and the 24th-highest globally (Islam, 2020).

The increasing volume of NPLs in Bangladesh threatens the economy by worsening the currency crisis and negatively impacting the entire credit system (Rahman *et al.*, 2023). Board diversity, particularly gender diversity, has emerged as a critical component of corporate governance, significantly impacting firm performance and risk management. Diverse boards contribute a variety of perspectives, experiences, and decision-making approaches, thereby enhancing oversight and improving credit risk management (Khan *et al.*, 2020; Elnahass *et al.*, 2024).

3. Theoretical framework and hypothesis development

The roles and responsibilities of boards of directors are explained through various theories, including agency theory, upper echelons theory, and resource dependence theory (Saleh and Mansour, 2024; Bennouri *et al.*, 2018; Elnahass *et al.*, 2024; Ittonen *et al.*, 2010). Agency theory, which posits that the board safeguards shareholders' interests by curbing managers' self-interest, emphasizes monitoring as a crucial function of the board (Saleh and Maigoshi, 2024; Fama, 2012). Board composition plays a pivotal role in corporate governance, as diversity in attributes such as education, professional experience, occupation, gender, and ethnicity can shape strategic decisions, influence shareholder value, and align managerial interests (Gulamhussen and Santa, 2015). Gender diversity has been studied from various angles, and it has been empirically documented that female oversight in monitoring arises from their meticulous attention to boardroom activities and discussions, including risk aversion and ethical awareness (Ben-Amar *et al.*, 2013; Saleh and Maigoshi, 2024; Ngamvilaikorn *et al.*, 2024). Moreover, their reduced propensity for risk-taking enhances their ability to perform effectively under challenging conditions, thereby mitigating potential financial disaster costs (Adams and Funk, 2012).

According to resource dependence theory, a board functions as a repository of resources, providing a variety of ideas and skills that support a firm's strategic choices, thereby boosting the firm's value (Akram and Abrar Ul Haq, 2022). Similarly, a board that is diverse in gender, education, and nationality can offer greater versatility (Das and Akter, 2025; Ramón-Llorens *et al.*, 2019). Women directors can introduce new financial and market resources, enhancing board functionality by connecting the firm with diverse perspectives (Saleh and Maigoshi, 2024). Their effective communication and capital resources can reduce transaction costs associated with uncertainty by providing timely and valuable information (Hillman and Dalziel, 2003) and leads to reduce credit risk (Ngamvilaikorn *et al.*, 2024).

The significance of directors' attributes is primarily described by upper echelon theory (Hambrick and Mason, 1984), which suggests that the backgrounds and experiences of decision-makers shape their interpretation and response to strategic decisions (Bennouri *et al.*, 2018). Drawing on this theory, gender diversity in top management positively influences the impact of ESG controversies on firm value (Al-Hiyari, 2024), green innovation (Mansour *et al.*, 2024), and firm performance (Saleh *et al.*, 2022). The attributes of female directors, including both monitoring roles as well as demographic characteristics, enable boards to evaluate the broader impacts of strategic decisions on all stakeholders (Qaderi *et al.*, 2024; Rahman *et al.*, 2024; Elnahass *et al.*, 2024). Therefore, drawing the lens of upper echelon theory, the attributes of female directors are likely to influence the association between board gender diversity and credit risk.

In addition, critical mass theory supports greater female board representation and explains board effectiveness levels (Konrad *et al.*, 2008). For example, Kinatader *et al.* (2021) have tested critical mass and find that having three or more female directors significantly reduces bank-specific risk. Similarly, Yarram and Adapa (2021) and Das *et al.* (2025) argue that female directors' effectiveness is enhanced when a corporate board has at least three women, promoting organizational dynamism, diversity, and monitoring roles. Hence, this critical mass of female directors is also important in credit risk management, as their presence can enhance oversight and decision-making processes.

3.1 Female board member and credit risk

The impact of female board representation on bank-specific credit risk is still unclear, but board decisions typically incorporate diverse perspectives through comprehensive discussions and democratic processes (Daily and Dalton, 1993). Using the worldwide evidence of banking sector, Elnahass *et al.* (2024) show that female directors have significant role in reducing the bank specific risks. Cardillo *et al.* (2021) also find that in a sample of European listed banks, greater gender diversity on the board reduces the likelihood of a bank bailout. Similarly, among Chinese companies, a greater percentage of female directorship is reduced credit risk (Dong *et al.*, 2017), stock crash risk (Jebran *et al.*, 2020), and bankruptcy risks (Cho *et al.*, 2021). Nadeem *et al.* (2019) and Lu and Boateng (2018) document that, among firms listed in the United Kingdom, greater female board representation is associated with lower firm risk and improved performance. However, Berger *et al.* (2014) report a significant positive association between female board representation and portfolio risk in German banks. In contrast, Sila *et al.* (2016) find no evidence of a relationship between board gender diversity and firm risk in the United States context. The study proposes the following hypothesis:

H1. Female representation on boards has a negative impact on bank-specific credit risk.

3.2 Female monitoring attributes and credit risk

Appointing independent directors to a board reflects the board's degree of independence in relation to the interests of various stakeholders (Das and Akter, 2025). One perspective highlights the incentives for independent directors to safeguard their reputation within the market for independent directorships in the banking sector. This motivation enhances their effectiveness in overseeing and disciplining managers, thereby reducing opportunistic costs and protecting shareholders' interests (Dong *et al.*, 2017) as well as enhance the quality of disclosure (Rahman *et al.*, 2024). Research in the banking sector appears to support this perspective, showing evidence of lower risk taking (Akbar *et al.*, 2017; Elnahass *et al.*, 2024; Pathan, 2009). Akbar *et al.* (2017) find an inverse correlation between the presence of directors independence and corporate risk-taking among financial firms of the United Kingdom from 2003 to 2012. Pathan (2009) has demonstrated that increased board independence is correlated with lower levels of risk in the United States bank holding companies. Analyzing a sample of banks from 12 developing countries, Elnahass *et al.* (2024) find that increased female independence on boards led to reduced credit, insolvency, and equity risk. In contrast, Shafai *et al.* (2024) report an insignificant influence of independent female directors on firm value in a sample of Malaysian firms.

Female leadership enhances board efficiency by guiding decisions and encouraging participation, leading to better management and oversight (Mansour *et al.*, 2024). Female chairs often use a participative and collaborative leadership style, whereas male chairs tend to be more task-focused and authoritative (Eagly and Carli, 2003). Similarly, Bennouri *et al.* (2018) find that female chairpersons enhance financial performance in French firms. In contrast, Alharbi *et al.* (2022) reveal no association of female leadership and firm value in context of Southern Asia and Middle East. Similarly, Elnahass *et al.* (2024) find no association of female leadership with bank risk using a sample of 12 developing countries.

The study anticipates independent female directors or female leadership to be linked to reduced bank risk.

H2a. A higher proportion of female independent directors is negatively associated with credit risk.

H2b. Female leadership on the board or its subcommittees is negatively associated with credit risk.

3.3 Female demographics attributes and credit risk

Resource dependence theory suggests that board expertise improves board effectiveness, which in turn boosts overall company performance (Johnson *et al.*, 2013). Moreover, board members with previous working expertise can more effectively evaluate how bank policies influence risk (Boadi *et al.*, 2023). Hiring qualified executives with relevant industry experience improve performance (Nguyen *et al.*, 2015), also supporting upper echelons theory. Similarly, Qaderi *et al.* (2024) and Rahman *et al.* (2024) find that female directors with working experience enhance nonfinancial disclosure in samples of firms from Malaysia and Pakistan, respectively. However, Elnahass *et al.* (2024) find that the presence of female board member with working experience increased the credit risk. Bennouri *et al.* (2018) also documented an inverse association between the business expertise of female director and firm performance.

Higher education levels among board members improve their cognitive abilities, leading to better decision-making and more effective use of resources (Issa *et al.*, 2021; Shafai *et al.*, 2024; Ullah *et al.*, 2020). Therefore, Qaderi *et al.* (2024) and Rahman *et al.* (2024) find that female directors with having higher education enhance nonfinancial disclosure in samples of firms from Malaysia and Pakistan, respectively. Similarly, Elnahass *et al.* (2024) find that female directors with higher education decreased banks' risks. As a result, executives with higher education positively influence decision-making (Berger *et al.*, 2014). In Chinese listed companies, Ullah *et al.* (2020) show that the educational level of board members positively influenced investments. Papadimitri *et al.* (2020) find that board members with higher qualifications have better credit ratings due to their cognitive skills, leading to better future predictions and decision-making. However, Bennouri *et al.* (2018) document an inverse association between the education level of female director and firm performance.

From a resource dependency viewpoint, individuals educated at prestigious institutions are generally more skilled and respected. Therefore, female directors with degrees from international universities enrich board discussions by leveraging their insights from international market experience and their knowledge about global customers, investors, and employees (Oxelheim *et al.*, 2013). Kuo *et al.* (2018) empirically find that directors with esteemed educational credentials greatly impact firms' investment choices, acknowledge to their distinctive intellectual capital. However, Elnahass *et al.* (2024) find a positive association between female graduates from foreign universities and bank risks.

An individual's educational background and achievements can shape their decision-making, career path, and overall quality of life. From a corporate perspective, the educational credentials of a firm's executives may indicate potential that is likely to develop and positively impact the firm's environmental performance (Issa *et al.*, 2021; García Martín and Herrero, 2020). From the context of developing countries, Elnahass *et al.* (2024) empirically find that female directors with accounting and finance qualifications showed strong signal of lowering equity and insolvency risk, with some testimony of lowering credit risk.

The study hypothesize are as follows:

- H3a. Female directors with prior experience in the financial sector are negatively associated with credit risk.
- H3b. Female directors with higher educational attainment are negatively associated with credit risk.
- H3c. Female directors who have earned degrees from foreign universities are negatively associated with credit risk.
- H3d. Female directors holding academic qualifications in accounting and/or finance are negatively associated with credit risk.

3.4 Female directorship and credit risk: the mediating role of their attributes

The extant literature on the impact of female representation on corporate boards in relation to credit risk remains inconclusive. Several studies have identified a negative association between gender diversity and credit risk (Bhatia *et al.*, 2023; Lu and Boateng, 2018; Ngamvilaikorn *et al.*, 2024; Huang *et al.*, 2024). In contrast, other research has reported a positive relationship (Berger *et al.*, 2014) or find no significant association (Sila *et al.*, 2016; Khan *et al.*, 2020) between these variables. Therefore, the influence of gender diversity on credit risk is contingent upon the specific characteristics of the company (Elnahass *et al.*, 2024; Gulamhussen and Santa, 2015) and human capital (Harjanto *et al.*, 2022). Johnson *et al.* (2013) posit that the attributes of female directors including their backgrounds, competencies, and demographic profiles, act as mediating variables that enhance the board's effectiveness in its advisory, oversight, and decision-making roles.

Harjanto *et al.* (2022) empirically document that the association between female directorship and credit risk is fully mediated by the level of education, based on data from 433 Indonesian rural banks from 2016 to 2019. They underscore the role of education in reinforcing inherent abilities, thereby enhancing the effectiveness of women on boards, which in turn improves the overall effectiveness of the board. Similarly, Bennouri *et al.* (2018) articulate that the attributes of woman directors significantly influence the relationship between female directorship and firm financial performance. They argue that the negative association between female directorship and firm financial performance becomes insignificant when controlling for their attributes, but only in the case of market measures. Therefore, the study proposes the following hypotheses:

- H4. The attributes of female directors (monitoring or demographics) mediate the association between female directorship and credit risk.

4. Research methodology

4.1 Sample and data

The study initially considers all financial firms listed on the Dhaka Stock Exchange (DSE) in Bangladesh, including both banks and non-bank financial institutions. Specifically, the financial sector encompasses 36 publicly listed banks and 23 publicly listed non-bank financial institutions [2]. The study covers the period from 2016 to 2022, a timeframe of particular significance due to the revision and implementation of updated credit risk management guidelines by Bangladesh Bank in 2016 for all banks (Bangladesh Bank, 2016). The final sample comprises 365 firm-year observations from 53 publicly listed financial firms, after excluding six banks listed after 2021 and six firm-year observations due to data unavailability. Further, the unavailability of directors' profiles in published annual reports reduces the sample to 358 firm-years for monitoring attributes and 328 firm-years for demographic attributes. Table 1 represents the sample selection of financial firms. Both financial and governance data were manually collected from the published annual reports of the respective firms.

4.2 Model specification

The study employs ordinary least squares (OLS) regression as the baseline model to test the hypotheses. The first equation examines the relationship between board gender diversity and credit risk. The second equation investigates the direct effect of female attributes (such as monitoring or demographics) on credit risk. Furthermore, the third and fourth equations articulate the mediating role of female attributes in the association between female participation and credit risk. The following models are used to predict these relationships:

Table 1. Sample selection

	Total	Banking	Non-bank financial institutions
<i>Panel A: Sample size</i>			
Total Listed firms	59	36	23
Less: Listed after 2021	6	6	0
<i>Total final sample firms</i>	53	30	23
Total firm-year observations	371	210	161
Less: Unavailability of data	6	0	6
<i>Final sample firm-year observations</i>	365	210 (58%)	155(42%)

Firm-year		Non-bank financial institutions	Total	Percent	Cum
Year	Banks				
<i>Panel B: Year-wise distribution</i>					
2016	30	23	53	14.52	14.52
2017	30	23	53	14.52	29.04
2018	30	23	53	14.52	43.56
2019	30	23	53	14.52	58.08
2020	30	22	52	14.25	72.33
2021	30	22	52	14.25	86.58
2022	30	19	49	13.42	100.00
<i>Total</i>	210	155	365		

$$\begin{aligned} NPL_{it} = & \beta_0 + \beta_1 FPBOD_{it} + \beta_2 INDP_{it} + \beta_3 BS_{it} + \beta_4 FSIZE_{it} + \beta_5 ROE_{it} + \beta_6 LEV_{it} \\ & + \beta_7 BM_{it} + \beta_8 DO_{it} + \beta_9 IO_{it} + \beta_{10} FO_{it} + \beta_{11} COVID19_{it} + \beta_{12} Year_{it} \\ & + \beta_{13} Industry_{it} + e_{it} \end{aligned} \tag{1}$$

$$\begin{aligned} NPL_{it} = & \beta_0 + \beta_1 Female\ attributes_{it} + \beta_2 INDP_{it} + \beta_3 BS_{it} + \beta_4 FSIZE_{it} + \beta_5 ROE_{it} \\ & + \beta_6 LEV_{it} + \beta_7 BM_{it} + \beta_8 DO_{it} + \beta_9 IO_{it} + \beta_{10} FO_{it} + \beta_{11} COVID19_{it} + \beta_{12} Year_{it} \\ & + \beta_{13} Industry_{it} + e_{it} \end{aligned} \tag{2}$$

$$\begin{aligned} Female\ attributes_{it} = & \beta_0 + \beta_1 FPBOD_{it} + \beta_2 INDP_{it} + \beta_3 BS_{it} + \beta_4 FSIZE_{it} + \beta_5 ROE_{it} \\ & + \beta_6 LEV_{it} + \beta_7 BM_{it} + \beta_8 DO_{it} + \beta_9 IO_{it} + \beta_{10} FO_{it} + \beta_{11} COVID19_{it} \\ & + \beta_{12} Year_{it} + \beta_{13} Industry_{it} + e_{it} \end{aligned} \tag{3}$$

$$\begin{aligned} NPL_{it} = & \beta_0 + \beta_1 FPBOD_{it} + \beta_2 Female\ attributes_{it} + \beta_3 INDP_{it} + \beta_4 BS_{it} + \beta_5 FSIZE_{it} \\ & + \beta_6 ROE_{it} + \beta_7 LEV_{it} + \beta_8 BM_{it} + \beta_9 DO_{it} + \beta_{10} IO_{it} + \beta_{11} FO_{it} + \beta_{12} COVID19_{it} \\ & + \beta_{13} Year_{it} + \beta_{14} Industry_{it} + e_{it} \end{aligned} \tag{4}$$

NPL is the non-performing loans ratio, which measures credit risk. FPBOD represents female participation on the corporate board. Female attributes are categorized into monitoring (FE_IND: independent female directors; FE_LED: females in leadership positions) or demographics (FE_EXP: working experience in financial sector of females; FE_HEDU: females with higher education; FE_FOREDU: females with foreign education; FE_ACFI: females majoring in accounting and/or finance). The control variables include board independence (INDP), board size (BS), firm size (FSIZE), profitability (ROE), leverage (LEV), board meetings (BM), director and/or sponsor ownership (DO), institutional ownership (IO), foreign ownership (FO), and the impact of COVID-19 (COVID19). Year represents year dummies, and Industry represents industry dummies. The error term is denoted by e . The coefficients of the variables are represented by β_1 to β_{14} . The subscripts i and t denote firm and time, respectively. The details of the measurement of all variables are described in [Appendix](#).

5. Results and analysis

5.1 Descriptive statistics

[Table 2](#) provides a summary of the descriptive statistics for all the variables. The NPL, which measures credit risk for all financial firms in Bangladesh, is 15.10%. On average, 13.70% of board directors in the sample are female (FPBOD), which exceeds the percentage reported by [Elnahass et al. \(2024\)](#) of 9.5% for twelve developing countries and the United Kingdom's 12.40% ([Nadeem et al., 2019](#)). These figures are broadly consistent with prior evidence on Bangladesh's financial sector, where [Das and Hossain \(2025\)](#), [Das et al. \(2025\)](#), and [Das and Aker \(2025\)](#) document average female representation of 13.70%, 13.90%, and 14.50%, respectively. On average, 1.60% of directors are independent females (FE_IND), whereas 15.60% of firm-years have females serving as chairpersons on the boards or subcommittees (FE_LED). To address the persistent underrepresentation of female independent directors, the BSEC has issued a directive in April 2024 requiring all listed firms to appoint at least one female independent director by April 29, 2025, later extended to December 31, 2025 [\[3\]](#).

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev	Min	Max
NPL	365	0.151	0.238	0.003	0.995
FPBOD	365	0.137	0.115	0	0.429
FE_IND	358	0.016	0.043	0	0.286
FE_LED	358	0.156	0.364	0	1
FE_EXP	328	0.055	0.084	0	0.375
FE_HEDU	328	0.1	0.108	0	0.429
FE_FOREDU	328	0.042	0.077	0	0.429
FE_ACFI	328	0.022	0.045	0	0.2
INDP	365	0.251	0.164	0	1
BS	365	11.203	3.873	4	20
FSIZE	365	9.945	0.514	8.434	11.005
ROE	365	0.076	0.4	-4.337	3.183
LEV	365	10.933	8.276	-23.791	62.165
BM	365	15.852	7.771	0	53
DO	365	0.395	0.148	0	0.87
IO	365	0.206	0.102	0	0.494
FO	365	0.03	0.077	0	0.435
COVID19	365	0.419	0.494	0	1

Note(s): The definitions of variables are given in [Appendix](#)

Source(s): Created by author

The presence of women in leadership roles exceeds the 3.5% cross-country average reported by Elnahass *et al.* (2024), as leadership in this study is defined to include female serving as board chair or chair of any subcommittee. The percentage of directors who are female with working experience in financial sector on the board (FE_EXP) is 5.50% which is broadly consistent with the 5% average reported by Issa *et al.* (2021) for female directors possessing finance and business experience relative to total board membership across eight Middle Eastern countries. Regarding education, 10% of directors are female with higher education (FE_HEDU), which exceeds the 2.20% average reported by Issa *et al.* (2021) for female directors holding advanced degrees (e.g. Master's or Ph.D.) relative to total board membership across eight Middle Eastern countries. In addition, 4.20% of directors are female graduates from foreign universities (FE_FOREDU). On average, 2.20% of directors are females who graduated with a major in accounting and/or finance (FE_ACFI).

Among the control variables, the average board size (BS) is 11 members, with 25.10% being independent (INDP). Firm size (FSIZE), measured as the logarithm of the market value of the firm, is 9.945. The average profitability (ROE) of the sample firms is 7.6%. Firms are highly leveraged, with a leverage ratio (LEV) of 10.93 times. The frequency of board meetings (BM) is about 16 per financial year. Director and/or sponsor ownership (DO) is 39.5%, institutional ownership (IO) is 20.6%, and foreign ownership (FO) is 3%. Additionally, 41.9% of firm-years are affected by COVID-19. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the effects of extreme outliers.

All Pearson pairwise correlations among explanatory variables in Table 3 are below the 0.80 threshold recommended by Gujarati (2004), indicating that multicollinearity is not an issue in the model. Additionally, the variance inflation factor (VIF) test (un-tabulated) corroborates this, as all VIF values for the explanatory variables are below 10.

5.2 Regression analysis

Column 1 of Table 4 demonstrates that the coefficients for FPBOD are negative and statistically significant in relation to NPL ($\beta = -0.252, p < 0.01$), thereby confirming Hypothesis 1. This outcome suggests that an increased presence of female directors on corporate boards is correlated with reduced credit risk, as indicated by lower NPL. This finding is consistent with the theoretical predictions of agency theory and resource dependency theory, as well as with most prior studies (Huang *et al.*, 2024; Ngamvilaikorn *et al.*, 2024; Elnahass *et al.*, 2024; Cardillo *et al.*, 2021; Lu and Boateng, 2018; Dong *et al.*, 2017). The risk-averse nature of female directors leads to enhanced monitoring, more cautious financial decision-making, and reduced overconfidence compared to their male counterparts, thereby contributing to more effective risk management and lower credit risk (Lu and Boateng, 2018). Female directors exercise stringent oversight and robust supervision in risk management (Elnahass *et al.*, 2024), preferring credit strategies that enhance profitability and cost efficiency while reducing credit risk (Dong *et al.*, 2017), thereby contributing to more effective and enhanced corporate governance. Similarly, the presence of female directors enriches firms' informational resources through their skills and competencies (Huang *et al.*, 2024). This focus on long-term and stakeholder-oriented perspectives enhances problem-solving capacity and overall strategic decision-making in credit risk management, thereby minimizing NPL and supporting resource dependency theory.

To underscore the direct monitoring role of female directors on credit risk, the regression outcomes in column 2 of Table 4 examine the independent role of female directors. The results reveal a significant negative relationship between the proportion of independent female directors (FE_IND) and credit risk, thereby supporting the hypothesis H2a. These findings suggest that the presence of independent female directors on bank boards is linked to a decrease in bank-specific credit risk. This aligns with agency theory, highlighting the effective monitoring role of female independent directors. This finding is consistent with Elnahass *et al.* (2024), who find that an increase in independent female directors correlates with lower bank

Table 3. Pearson pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) NPL	1.000																	
(2) FPBOD	-0.108**	1.000																
(3) FE_IND	-0.136**	0.363***	1.000															
(4) FE_LED	-0.139***	0.279***	0.386***	1.000														
(5) FE_EXP	-0.157***	0.623***	0.591***	0.333***	1.000													
(6) FE_HEDU	-0.188***	0.792***	0.496***	0.360***	0.634***	1.000												
(7) FE_FOREDU	-0.127**	0.546***	0.622***	0.271***	0.723***	0.697***	1.000											
(8) FE_ACFI	-0.143***	0.353***	0.348***	0.078	0.330***	0.475***	0.331***	1.000										
(9) INDP	0.609***	-0.037	0.123**	-0.033	0.040	-0.021	0.093*	-0.022	1.000									
(10) BS	-0.408***	-0.170***	-0.197***	0.015	-0.206***	-0.241***	-0.291***	-0.074	-0.420***	1.000								
(11) FSIZE	-0.626***	0.011	0.165***	0.096*	-0.016	0.040	0.065	0.149**	-0.432***	0.411***	1.000							
(12) ROE	-0.018	-0.029	0.068	-0.024	0.000	-0.010	-0.026	0.035	0.046	0.050	0.124**	1.000						
(13) LEV	-0.470***	-0.032	-0.069	-0.081	-0.083	-0.107*	-0.069	0.020	-0.301***	0.320***	0.411***	-0.400***	1.000					
(14) BM	-0.268***	-0.058	-0.062	-0.087*	-0.112**	0.036	-0.070	-0.046	-0.234***	0.241***	0.443***	0.067	0.322***	1.000				
(15) DO	-0.081	-0.130**	-0.070	-0.132**	-0.126**	-0.245***	-0.143***	-0.036	-0.074	0.052	0.176***	0.011	-0.165***	-0.273***	1.000			
(16) IO	0.058	0.231***	-0.120**	0.032	0.079	0.250***	0.028	-0.021	-0.010	0.000	-0.172***	-0.033	-0.042	0.085*	-0.283***	1.000		
(17) FO	-0.189***	0.130**	0.483***	0.168***	0.194***	0.236***	0.399***	0.092*	0.105**	0.012	0.340***	0.077	0.036	-0.068	0.103**	-0.246***	1.000	
(18) COVID19	0.138***	0.023	0.083	0.024	0.027	0.040	0.074	0.081	0.126**	-0.064	0.030	0.069	-0.019	-0.064	-0.016	0.099*	-0.093*	1.000

Note(s): ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

Source(s): Created by author

Table 4. Regression results of Female director and their attributes on credit risk

Variables	(1) Model 1 <i>Dependent variable = NPL</i>	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
<i>FPBOD</i>	−0.252*** (0.0707)						
<i>FE_IND</i>		−0.863*** (0.150)					
<i>FE_LED</i>			−0.0711*** (0.0158)				
<i>FE_EXP</i>				−0.528*** (0.0822)			
<i>FE_HEDU</i>					−0.489*** (0.0845)		
<i>FE_FOREDU</i>						−0.542*** (0.0934)	
<i>FE_ACFI</i>							−0.408*** (0.122)
<i>INDP</i>	0.445*** (0.0702)	0.474*** (0.0714)	0.464*** (0.0734)	0.657*** (0.0713)	0.616*** (0.0695)	0.647*** (0.0718)	0.665*** (0.0737)
<i>BS</i>	−0.00688*** (0.00214)	−0.00704*** (0.00220)	−0.00498** (0.00214)	−0.000700 (0.00148)	−0.00259* (0.00156)	−0.00215 (0.00161)	0.000324 (0.00169)
<i>FSIZE</i>	−0.244*** (0.0395)	−0.227*** (0.0394)	−0.229*** (0.0396)	−0.116*** (0.0376)	−0.112*** (0.0376)	−0.124*** (0.0390)	−0.129*** (0.0411)
<i>ROE</i>	−0.143** (0.0604)	−0.138** (0.0629)	−0.151** (0.0641)	−0.0973 (0.0670)	−0.119* (0.0670)	−0.115* (0.0692)	−0.0985 (0.0712)
<i>LEV</i>	−0.0127*** (0.00227)	−0.0127*** (0.00221)	−0.0131*** (0.00226)	−0.00657*** (0.00238)	−0.00797*** (0.00238)	−0.00730*** (0.00247)	−0.00682*** (0.00252)
<i>BM</i>	−0.000760 (0.00128)	−0.000533 (0.00127)	−0.000920 (0.00131)	0.000889 (0.00119)	0.00140 (0.00123)	0.00104 (0.00126)	0.000947 (0.00124)
<i>DO</i>	−0.0113 (0.0635)	−0.0384 (0.0671)	−0.0422 (0.0672)	−0.134** (0.0583)	−0.171*** (0.0556)	−0.131** (0.0593)	−0.0875 (0.0630)

(continued)

Table 4. Continued

Variables	(1) Model 1 <i>Dependent variable = NPL</i>	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
<i>IO</i>	−0.122 (0.112)	−0.201* (0.111)	−0.181 (0.110)	−0.0320 (0.0995)	0.0500 (0.102)	−0.0520 (0.101)	−0.0871 (0.105)
<i>FO</i>	−0.0680 (0.118)	0.0431 (0.107)	−0.113 (0.125)	−0.224** (0.105)	−0.129 (0.115)	−0.109 (0.115)	−0.316*** (0.114)
<i>COVID19</i>	0.105*** (0.0301)	0.112*** (0.0303)	0.104*** (0.0303)	0.0789*** (0.0268)	0.0829*** (0.0277)	0.0828*** (0.0279)	0.0824*** (0.0281)
Constant	2.801*** (0.405)	2.609*** (0.399)	2.626*** (0.400)	1.248*** (0.377)	1.273*** (0.373)	1.357*** (0.386)	1.353*** (0.405)
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	365	358	358	328	328	328	328
R-squared	0.666	0.670	0.665	0.701	0.706	0.691	0.674
Adj. R-squared	0.649	0.653	0.648	0.684	0.690	0.674	0.656
F-statistic	38.55***	40.43***	34.52***	33.78***	35.36***	32.79***	28.66***

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

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risk. Moreover, [Akbar et al. \(2017\)](#) find that the existence of independent directors, irrespective of gender, decreases firms' risk-taking. These directors can implement effective banking governance and are deemed optimal for mitigating the risk of bad loans by ensuring proper investigation before sanctioning loans. Moreover, [Rahman et al. \(2024\)](#) find that independent female directors are likely to exhibit heightened vigilance and critical assessment, enabling them to effectively articulate concerns regarding managerial policies and decisions that may implicitly or explicitly compromise stakeholders' interests. [Das and Akter \(2025\)](#) also argue that the presence of female independent directors enhances the sustainability reporting by strengthening governance mechanisms through greater transparency, accountability, and board diversity.

The association between female leadership roles and the credit risk of banks is presented in column 3 of [Table 4](#). The variable FE_LED is found to be significant and negatively correlated with NPL ($\beta = -0.0711, p < 0.01$), thereby confirming hypothesis [H2b](#). This suggests that an increased presence of females in leadership positions can play a vital role in minimizing credit risk. [Bennouri et al. \(2018\)](#) find that female directors may enhance financial performance within a sample of French companies, arguing that a female chairperson positively influences the board's decision-making efficacy. In the Asian context, [Mansour et al. \(2024\)](#) also reveals that female leadership positively enhances firm sustainability through eco-innovation. However, [Elnahass et al. \(2024\)](#) do not find a significant association between female chairpersons and firm risk in their sample of 12 developing countries.

To assess the demographic attributes of females on corporate boards, the study considers four distinct attributes in relation to credit risk. Column 4 of [Table 4](#) shows that female working experience in financial sector is significantly and negatively associated with credit risk in the financial sector of Bangladesh, supporting hypothesis [H3a](#). The coefficient of FE_EXP is negative and statistically significant ($\beta = -0.528, p < 0.01$), indicating that the working experience of female directors in financial sector is inversely correlated with bank-specific credit risk. [Nguyen et al. \(2015\)](#) also find that previous experience in functional roles as a top executive provides the appointee with the essential expertise and skills needed to create the wealth of shareholders. Moreover, [Rahman et al. \(2024\)](#) find that female directors with financial expertise may enhance sustainability disclosure, based on a sample of 300 non-financial firms in Pakistan. In contrast, [Elnahass et al. \(2024\)](#) document a positive and significant association between female expertise and firm risk.

Columns 5–7 of [Table 4](#) report the association between female education attributes, namely holding a higher degree, earning a degree from a foreign institution, and majoring in accounting and/or finance, and bank credit risk. Females with higher degrees (FE_HEDU), degrees from foreign institutions (FE_FOREDU), and female directors with majors in accounting and/finance (FE_ACFI) show a significant and negative association with NPL at the 1% level and confirm hypotheses [H3b](#), [H3c](#) and [H3d](#). Overall, these outcomes support the upper echelon theory and resource dependency theory and suggest that the educational background of female directors, particularly those with higher education, degrees from foreign institutions and a major in accounting and/or finance, may influence board decisions on approving credit proposals and ensuring the quality of the sanctioned credit portfolio. For instance, banks that select board members with high educational qualifications and with foreign degree are better equipped to grasp sophisticated risk management techniques, assessment methods, and the implications of bank policies on risk ([Berger et al., 2014](#)). [Shafai et al. \(2024\)](#) reveal that the competence of females, as measured by their level of education, is pivotal in enhancing the overall performance of businesses within the context of Malaysian firms. Similarly, [Qaderi et al. \(2024\)](#) find that females with cognitive capabilities derived from higher levels of education are better equipped to make appropriate decisions and effectively solve problems. Nevertheless, [Elnahass et al. \(2024\)](#) reveal a positive association between female with foreign degree and bank risks. Finally, female directors with academic qualifications in accounting or finance are also negatively associated with credit risk. The cognitive capabilities and analytical rigor cultivated through relevant business education

enhance directors' monitoring and advisory functions. Consistent with recent findings, [Elnahass et al. \(2024\)](#) argue that female directors possessing such qualifications are uniquely positioned to contribute differentiated perspectives and deliver innovative governance solutions, thereby improving board effectiveness and mitigating bank risks.

Among the control variables, board size (BS), firm size (FSIZE), profitability (ROE), leverage (LEV), director ownership (DO), institutional ownership (IO), and foreign ownership (FO) are negatively associated with NPL. In contrast, board independence (INDP) and the COVID-19 pandemic (COVID19) are positively associated with NPL, while board meetings (BM) are insignificant.

To investigate whether the attributes of female directors mediate the relationship between female directorship and credit risk, this study employed the methodology proposed by [Baron and Kenny \(1986\)](#). To evaluate the role of the mediating variable, the study examined the results of the OLS regression analyses for [Equations \(1–4\)](#). [Baron and Kenny \(1986\)](#) delineate a methodological framework for estimating the mediating effect, which necessitates the fulfillment of several conditions. First, the independent variable (FPBOD) must have a significant influence on the dependent variable (NPL), as indicated in [Equation \(1\)](#). Second, the mediator (female attributes) must significantly affect the dependent variable (NPL), as shown in [Equation \(2\)](#). Third, the independent variable (FPBOD) must significantly affect the mediator (female attributes), as shown in [Equation \(3\)](#). Finally, if these conditions are satisfied and the effect of female participation (FPBOD) on credit risk (NPL) in [Equation \(4\)](#) is attenuated or rendered insignificant compared to its effect in [Equation \(1\)](#), this provides evidence of partial or full mediation.

In column 1 of [Table 4](#), FPBOD is negatively associated with NPL and is statistically significant, thereby fulfilling the first condition. In columns 2 through 7 of [Table 4](#), all female attributes (FE_IND, FE_LED, FE_EXP, FE_HEDU, FE_FOREDU, and FE_ACFI) are also negatively associated with NPL and statistically significant, thus satisfying the second condition. FPBOD is also positively correlated and statistically significant with all female attributes in columns 1 through 6 of [Table 5](#), thereby confirming the third condition. When comparing the coefficient or significance level of FPBOD in column 1 of [Table 4](#) with those of FPBOD in columns 7–12 of [Table 5](#), the coefficients of FPBOD weaken and the significance level of FPBOD changes from 1% to 5% when controlled by female independence (FE_IND) and female higher education (FE_HEDU) in columns 7 and 10 of [Table 5](#), respectively. Additionally, the coefficient weakens from -0.252 (Column 1 of [Table 4](#)) to -0.210 (Column 8 of [Table 5](#)) when controlled by female leadership (FE_LED). Therefore, female independence, females having higher education, and female leadership positions may partially mediate the relationship between female directorship and credit risk. To examine the significance of the mediation effects, the Sobel, Aroian, and Goodman tests were conducted and justify these results.

5.3 Entropy balancing analysis

The presence of female directors is not a result of exogenous variation; rather, they are endogenously selected by firms, reflecting observable heterogeneity among these firms ([Sila et al., 2016](#); [Das and Hossain, 2025](#); [Das and Akter, 2025](#)). Despite various model specifications and controls, the study cannot fully eliminate potential observable heterogeneity across firms, which may bias the estimates. To address this, the study employs the entropy balancing approach ([Hainmueller and Xu, 2013](#)). The study classifies the sample into treatment and control groups based on female participation in the boardroom. Firms with at least one female director are designated as the treatment group, while firms without female directors constitute the control group. Panel A of [Table 6](#) presents descriptive statistics before and after applying entropy balancing, highlighting the differences in mean values between the two groups prior to balancing. After balancing, the differences in mean values for all firm-level covariates between the treatment and control groups are nearly eliminated. The results in Panel B of [Table 6](#) are qualitatively similar to the findings in [Tables 4 and 5](#).

Table 5. Regression results of the mediation effect of female attributes on female directorship and credit risk

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Dependent variable</i>	Model 1 <i>FE_IND</i>	Model 2 <i>FE_LED</i>	Model 3 <i>FE_EXP</i>	Model 4 <i>FE_HEDU</i>	Model 5 <i>FE_FOREDU</i>	Model 6 <i>FE_ACFI</i>	Model 7 <i>Dependent variable = NPL</i>	Model 8	Model 9	Model 10	Model 11	Model 12
<i>FPBOD</i>	0.105*** (0.0183)	8.003*** (1.515)	0.422*** (0.0405)	0.651*** (0.0432)	0.290*** (0.0332)	0.134*** (0.0252)	−0.179** (0.0769)	−0.210*** (0.0710)	−0.263*** (0.0752)	−0.192** (0.0897)	−0.314*** (0.0728)	−0.383*** (0.0722)
<i>FE_IND</i>							−0.681*** (0.168)					
<i>FE_LED</i>								−0.0562*** (0.0153)				
<i>FE_EXP</i>									−0.314*** (0.0917)			
<i>FE_HEDU</i>										−0.312*** (0.120)		
<i>FE_FOREDU</i>											−0.280*** (0.0978)	
<i>FE_ACFI</i>												−0.0963 (0.131)
Constant	−0.185*** (0.0680)	−19.14*** (5.806)	−0.305*** (0.153)	−0.226* (0.132)	−0.128 (0.144)	−0.248** (0.106)	2.670*** (0.398)	2.689*** (0.397)	1.267*** (0.373)	1.292*** (0.375)	1.326*** (0.377)	1.338*** (0.386)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358	358	328	328	328	328	358	358	328	328	328	328
R-squared	0.403		0.453	0.727	0.484	0.182	0.675	0.673	0.711	0.710	0.708	0.704
Adj. R-squared	0.373		0.423	0.712	0.456	0.137	0.658	0.655	0.694	0.693	0.691	0.686
F-statistic	8.432***		14.03***	75.42***	14.22***	3.478***	41.41***	37.20***	35.26***	34.91***	35.51***	34.08***
Pseudo R2		0.2508										
Chi-squared		59.67***										
Sobel Test (z statistics)							−2.668***	−2.153**	−2.802***	−2.594***	−2.184**	−0.567
Aroian Test (z statistics)							−2.642***	−2.111**	−2.794***	−2.591**	−2.174**	−0.560
GoodmanTest (z statistics)							−2.696***	−2.197**	−2.810***	−2.597***	−2.195**	−0.575

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

Source(s): Created by author

Table 6. Entropy balancing analysis

Panel A: Sample descriptive analysis before and after entropy balancing

	Before entropy balancing				After entropy balancing			
	Treatment		Control		Treatment		Control	
	Mean	Variance	Mean	Variance	Mean	Variance	Mean	Variance
<i>INDP</i>	0.232	0.010	0.305	0.071	0.232	0.010	0.232	0.029
<i>BS</i>	11.22	11.70	11.15	24.22	11.22	11.70	11.22	21.11
<i>FISZE</i>	9.951	0.221	9.931	0.373	9.951	0.221	9.951	0.368
<i>ROE</i>	0.067	0.070	0.108	0.095	0.067	0.070	0.067	0.036
<i>LEV</i>	10.98	44.56	10.71	78.57	10.98	44.56	10.98	59.67
<i>BM</i>	16.01	66.120	15.31	32.22	16.01	66.12	16.01	30.88
<i>DO</i>	0.378	0.017	0.443	0.031	0.378	0.017	0.378	0.026
<i>IO</i>	0.219	0.009	0.171	0.013	0.219	0.009	0.219	0.015
<i>FO</i>	0.032	0.007	0.025	0.003	0.032	0.007	0.032	0.004
<i>COVID19</i>	0.407	0.242	0.454	0.250	0.407	0.242	0.407	0.244

Panel B: Regression using entropy balancing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	<i>Dependent variable = NPL</i>						
<i>FPBOD</i>	−0.361*** (0.0931)	−0.280*** (0.100)	−0.296*** (0.0934)	−0.342*** (0.0961)	−0.240** (0.105)	−0.373*** (0.0959)	−0.473*** (0.0966)
<i>FE_IND</i>		−0.695*** (0.215)					
<i>FE_LED</i>			−0.0629*** (0.0177)				
<i>FE_EXP</i>				−0.345*** (0.113)			
<i>FE_HEDU</i>					−0.341*** (0.131)		
<i>FE_FOREDU</i>						−0.360*** (0.119)	
<i>FE_ACFI</i>							−0.101 (0.177)
Constant	2.479*** (0.486)	2.404*** (0.483)	2.391*** (0.477)	1.523*** (0.569)	1.499*** (0.560)	1.546*** (0.567)	1.564*** (0.578)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	365	358	358	328	328	328	328
R-squared	0.677	0.684	0.683	0.711	0.710	0.710	0.706
Adj.	0.661	0.667	0.666	0.694	0.693	0.693	0.689
R-squared							
F-statistic	14.43***	14.70***	14.07***	12.76***	12.67***	12.91***	12.67***

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

Source(s): Created by author

5.4 Two-stage least squares regression results

To address potential endogeneity arising from reverse causality, the study employs the two-stage least squares (2SLS) regression technique. Drawing on prior research regarding female directorship in boardrooms ([Usman et al., 2019](#); [Das et al., 2025](#)), the study utilizes a one-year lag in female participation as an instrumental variable (LAGFPBOD). [Table 7](#) presents the

Table 7. Two-stage least squares (2SLS) regression results

Variables	(1) Model 1 FPBOD	(2) Model 2 <i>Dependent variable = NPL</i>	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8
<i>LAGFPBOD</i>	0.881 ^{***} (0.0311)							
<i>FPBOD</i>		−0.266 ^{***} (0.0824)	−0.179 ^{**} (0.0890)	−0.213 ^{**} (0.0841)	−0.296 ^{***} (0.0960)	−0.306 ^{**} (0.134)	−0.366 ^{***} (0.0903)	−0.405 ^{***} (0.0817)
<i>FE_IND</i>			−0.775 ^{***} (0.182)					
<i>FE_LED</i>				−0.0615 ^{***} (0.0177)				
<i>FE_EXP</i>					−0.310 ^{**} (0.122)			
<i>FE_HEDU</i>						−0.191 (0.168)		
<i>FE_FOREDU</i>							−0.221 (0.153)	
<i>FE_ACFI</i>								−0.138 (0.164)
Constant	−0.124 (0.120)	2.781 ^{***} (0.380)	2.627 ^{***} (0.374)	2.651 ^{***} (0.374)	1.462 ^{***} (0.359)	1.505 ^{***} (0.367)	1.538 ^{***} (0.362)	1.514 ^{***} (0.376)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	312	312	306	306	281	281	281	281
<i>R</i> -squared	0.791	0.690	0.701	0.697	0.729	0.725	0.724	0.721
Adj. <i>R</i> -squared	0.780	0.673	0.683	0.679	0.711	0.707	0.706	0.703
<i>F</i> -statistic	89.49 ^{***}	45.83 ^{***}	50.15 ^{***}	44.29 ^{***}	44.84 ^{***}	43.55 ^{***}	44.52 ^{***}	43.61 ^{***}
LR statistic (underidentification test)		430.94 ^{***}	401.59 ^{***}	413.59 ^{***}	323.07 ^{***}	245.35 ^{***}	356.17 ^{***}	392.07 ^{***}
Cragg-Donald <i>F</i> statistic (weak identification test)		879.01 ^{***}	781.94 ^{***}	824.75 ^{***}	567.36 ^{***}	366.73 ^{***}	671.19 ^{***}	798.48 ^{***}
Note(s): Numbers in parentheses are robust standard error. Superscripts ^{***} , ^{**} , and [*] denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in Appendix								
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2SLS regression results, showing a positive and significant correlation between LAGFPBOD and FPBOD in column 1, with the LR statistic and Cragg-Donald F statistic validating the instrument. The results reported in [Table 7](#) are qualitatively consistent with those presented in [Tables 4 and 5](#)

5.5 Heckman selection model

The supply-side argument suggests that female directors may opt for less risky firms, whereas the demand-side argument posits that riskier firms appoint more female directors to enhance board monitoring ([Sila et al., 2016](#)), raising concerns about sample selection bias. Therefore, the study also utilizes the two-stage Heckman method ([Heckman, 1979](#)). First, the study identifies female board presence (FDBOD) using a dummy variable (1 if there is at least one female member, 0 otherwise). Control variables from the baseline model are included as explanatory variables in a probit regression. Additionally, industry average gender diversity (INDGEN) is incorporated to satisfy the “exclusion restrictions” criterion, based on the assumption that firms in gender-equal industries are more likely to have diverse boards ([Usman et al., 2019](#)). The inverse mills ratio (IMR) is included in the second stage, based on calculations from the first stage. [Table 8](#) presents the outcomes of the Heckman selection model, justifying the inclusion of INDGEN as it is statistically significant. Meanwhile, IMR is not significant across the models, suggesting that the results may not be influenced by self-selection bias. The outcomes in [Table 8](#) similar to qualitatively like the findings in [Tables 4 and 5](#)

6. Robustness checks and Additional analyses

6.1 Alternative measure of credit risk

The alternative proxy of credit risk is calculated by dividing the provision for non-performing loans and advances by the total loans and advances and denoted as *Pro_NPL*. This metric assesses the risk linked to the loan portfolio, encompassing both the historical performance of the existing loans and the projected future performance ([Elnahass et al., 2024](#); [Khan et al., 2020](#)). The results reported in [Table 9](#) are qualitatively consistent with those presented in [Tables 4 and 5](#)

6.2 Alternative measure of female representation

To enhance the robustness of the findings, the study also utilizes the alternative measure of female board diversity: the Blau Index (*BLAU*) (see [Appendix](#) for variable definition). The Blau index, extensively employed in prior gender diversity research (e.g. [Nadeem et al., 2019](#); [Elnahass et al., 2024](#); [Das and Hossain, 2025](#); [Das et al., 2025](#)), quantifies the degree of heterogeneity within the board of directors, with a specific emphasis on gender. The outcomes in [Table 10](#) are qualitatively similar to the findings in [Tables 4 and 5](#)

6.3 Implication of Tokenism and critical mass theory

The critical mass theory, building on the token status theory, suggests that having one woman on a board is tokenism, two women signify presence, and three women provide a voice ([Konrad et al., 2008](#)). This study also seeks to examine the application of tokenism and critical mass theory in the context of female director representation in the financial sector in Bangladesh. The variable of interest, female board representation, is quantified using two dummy variables: GD1/2, which denotes the presence of one or two female directors ([Usman et al., 2019](#)) and GD3/3+, which signifies the presence of three or more female directors on the board ([Kinader et al., 2021](#); [Das and Akter, 2025](#); [Das et al., 2025](#)) (Please see [Appendix](#) for variable definitions).

[Table 11](#) presents the regression results examining the intensity of female board representation on credit risk. The findings indicate that the coefficients for GD3/3+ with both

Table 8. Heckman selection model

Variables	(1) Model 1 <i>FDBOD</i>	(2) Model 2 <i>Dependent variable = NPL</i>	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8
<i>FPBOD</i>		−0.252*** (0.0725)	−0.180** (0.0782)	−0.210*** (0.0731)	−0.264*** (0.0748)	−0.189** (0.0899)	−0.314*** (0.0733)	−0.385*** (0.0718)
<i>INDP</i>	−2.265*** (0.547)	0.452** (0.180)	0.479*** (0.185)	0.442** (0.186)	0.563*** (0.191)	0.515*** (0.191)	0.543*** (0.192)	0.555*** (0.194)
<i>BS</i>	−0.0267 (0.0254)	−0.00683*** (0.00210)	−0.00786*** (0.00216)	−0.00662*** (0.00208)	−0.00176 (0.00157)	−0.00287* (0.00169)	−0.00270 (0.00166)	−0.00153 (0.00160)
<i>FSIZE</i>	0.166 (0.260)	−0.245*** (0.0389)	−0.230*** (0.0387)	−0.230*** (0.0386)	−0.112*** (0.0366)	−0.111*** (0.0371)	−0.115*** (0.0372)	−0.120*** (0.0381)
<i>ROE</i>	−0.528 (0.335)	−0.141** (0.0649)	−0.137** (0.0687)	−0.153** (0.0695)	−0.112 (0.0827)	−0.131 (0.0836)	−0.123 (0.0848)	−0.113 (0.0849)
<i>LEV</i>	−0.0268* (0.0139)	−0.0126*** (0.00276)	−0.0126*** (0.00278)	−0.0132*** (0.00285)	−0.00707** (0.00295)	−0.00825*** (0.00309)	−0.00752** (0.00303)	−0.00712** (0.00303)
<i>BM</i>	−0.0120 (0.0114)	−0.000735 (0.00144)	−0.000800 (0.00142)	−0.00127 (0.00148)	0.000502 (0.00135)	0.000819 (0.00139)	0.000512 (0.00140)	0.000543 (0.00139)
<i>DO</i>	−2.148*** (0.617)	−0.00573 (0.141)	−0.0254 (0.147)	−0.0515 (0.150)	−0.207 (0.150)	−0.245* (0.149)	−0.218 (0.152)	−0.192 (0.152)
<i>IO</i>	2.424*** (0.849)	−0.129 (0.146)	−0.172 (0.148)	−0.123 (0.146)	0.101 (0.145)	0.158 (0.144)	0.114 (0.146)	0.109 (0.152)
<i>FO</i>	2.322*** (1.070)	−0.0754 (0.195)	0.0303 (0.200)	−0.0577 (0.202)	−0.105 (0.204)	−0.0315 (0.203)	−0.0254 (0.210)	−0.119 (0.213)
<i>COVID19</i>	−0.267 (0.320)	0.00435 (0.0261)	0.0649** (0.0328)	0.0645* (0.0333)	0.0311 (0.0234)	0.0305 (0.0235)	0.0323 (0.0233)	0.0308 (0.0242)
<i>IMR</i>		−0.00546 (0.111)	−0.0200 (0.114)	−0.000521 (0.115)	0.0601 (0.124)	0.0798 (0.121)	0.0697 (0.124)	0.0635 (0.126)
<i>INDGEN</i>	10.92* (6.388)							
<i>FE_IND</i>			−0.683*** (0.167)					

(continued)

Table 8. Continued

Variables	(1) Model 1 <i>FDBOD</i>	(2) Model 2 <i>Dependent variable = NPL</i>	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8
<i>FE_LED</i>				−0.0561*** (0.0155)				
<i>FE_EXP</i>					−0.311*** (0.0905)			
<i>FE_HEDU</i>						−0.316*** (0.119)		
<i>FE_FOREDU</i>							−0.280*** (0.0972)	
<i>FE_ACFI</i>								−0.0773 (0.133)
Constant	−0.613 (2.775)	2.653*** (0.376)	2.540*** (0.370)	2.549*** (0.369)	1.263*** (0.347)	1.276*** (0.349)	1.308*** (0.350)	1.324*** (0.361)
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	365	365	358	358	328	328	328	328
Pseudo <i>R</i> -squared/ <i>R</i> -squared	0.133	0.666	0.675	0.673	0.712	0.711	0.709	0.704
Log-likelihood	−183.3							
Chi-squared	55.07***							
Adj. <i>R</i> -squared		0.648	0.657	0.654	0.694	0.693	0.691	0.686
<i>F</i> -statistic		36.23***	38.77***	35.13***	33.90***	33.93***	34.29***	32.77***
Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in Appendix Source(s): Created by author								

Table 9. Regression result using alternative measure of credit risk

Variables	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
<i>Dependent variable = Pro_NPL</i>							
FPBOD	−0.206*** (0.0599)	−0.173*** (0.0646)	−0.183*** (0.0613)	−0.219*** (0.0624)	−0.0732 (0.0699)	−0.236*** (0.0618)	−0.286*** (0.0628)
FE_IND		−0.313** (0.124)					
FE_LED			−0.0305*** (0.0104)				
FE_EXP				−0.146** (0.0603)			
FE_HEDU					−0.319*** (0.0908)		
FE_ FOREDU						−0.153** (0.0708)	
FE_ACFI							0.0415 (0.0911)
Constant	1.017*** (0.260)	0.953*** (0.264)	0.880*** (0.240)	0.497 (0.307)	0.470 (0.290)	0.522* (0.304)	0.552* (0.313)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	365	358	358	328	328	328	328
R-squared	0.535	0.541	0.540	0.554	0.566	0.553	0.550
Adj.	0.513	0.516	0.516	0.528	0.541	0.527	0.524
R-squared							
F-statistic	6.682***	6.502***	6.421***	4.504***	4.554***	4.478***	4.422***

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

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NPL and Pro_NPL are stronger compared to those for GD1/2, suggesting a more pronounced monitoring role for female directors when the board comprises at least three female members. These findings are consistent with the critical mass theory. Consequently, these results advocate for the appointment of three or more female directors to ensure their effective participation in decision-making processes, thereby mitigating credit risk in the financial sector of Bangladesh. Similar evidence is reported by [Kinatered et al. \(2021\)](#) and [Sbai and Ed-Dafali \(2023\)](#) in their cross-country analyses of the relationship between gender diversity and risk-taking.

7. Discussion and conclusion

7.1 Implication to theory

Previous studies examining the relationship between female directors and the credit risk of financial institutions have predominantly focused on developed countries or cross-country comparisons ([Elnahass et al., 2024](#); [Gulamhussen and Santa, 2015](#); [Khan et al., 2020](#); [Kinatered et al., 2021](#); [Nadeem et al., 2019](#)). This study contributes to the existing literature on female directorship and credit risk by examining how the attributes of female directors influence the mitigation of credit risk and the mediating role of monitoring and demographic characteristics in this relationship. It pioneers the investigation of various attributes of female directors and their impact on credit risk within Bangladesh's financial sector.

Table 10. Regression result using alternative measure of female representation

Variables	(1) Model 1 <i>Dependent variable = NPL</i>	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7
<i>BLAU</i>	−0.213*** (0.0543)	−0.160*** (0.0595)	−0.180*** (0.0557)	−0.226*** (0.0581)	−0.195*** (0.0719)	−0.258*** (0.0558)	−0.307*** (0.0557)
<i>FE_IND</i>		−0.627*** (0.170)					
<i>FE_LED</i>			−0.0507*** (0.0156)				
<i>FE_EXP</i>				−0.278*** (0.0916)			
<i>FE_HEDU</i>					−0.243** (0.123)		
<i>FE_FOREDU</i>						−0.247** (0.0959)	
<i>FE_ACFI</i>							−0.0321 (0.130)
Constant	2.805*** (0.402)	2.684*** (0.395)	2.563*** (0.368)	1.271*** (0.367)	1.301*** (0.370)	1.324*** (0.370)	1.348*** (0.378)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	365	358	358	328	328	328	328
R-squared	0.670	0.678	0.676	0.715	0.713	0.713	0.709
Adj. R-squared	0.654	0.661	0.658	0.699	0.696	0.696	0.692
F-statistic	40.49***	42.69***	38.66***	36.68***	36.01***	36.74***	35.45***

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

Source(s): Created by author

Table 11. Regression result using the intensity of female representation

Variables	(1) Model 1 <i>Dependent variable = NPL</i>	(2) Model 2	(3) Model 3 <i>Dependent variable = Pro_NPL</i>	(4) Model 4
GD1/2	−0.0387** (0.0164)		−0.0288** (0.0114)	
GD3/3+		−0.0451*** (0.0126)		−0.0321*** (0.00978)
Constant	2.852*** (0.392)	2.693*** (0.407)	1.052*** (0.260)	0.935*** (0.259)
All controls	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Industry fixed	Yes	Yes	Yes	Yes
Observations	365	365	365	365
R-squared	0.659	0.659	0.522	0.521
Adj. R-squared	0.642	0.642	0.499	0.497
F-statistic	35.38***	34.03***	6.556***	6.617***

Note(s): Numbers in parentheses are robust standard error. Superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The definitions of variables are given in [Appendix](#)

Source(s): Created by author

The study's findings strongly indicate that female directors significantly reduce credit risk. These results remain robust even after accounting for the incremental effects of various monitoring and demographic attributes of female board members. In terms of monitoring attributes, independent female directors have a stronger impact on minimizing the credit risk of sample firms compared to their leadership roles. In terms of demographic attributes, female directors with working experience in financial sector and foreign degrees have a stronger effect on curbing credit risk compared to those with higher education and majors in accounting and/or finance. These results align with the theoretical predictions of agency, resource dependence, and upper echelon theory, providing insights for enhancing the effectiveness of corporate governance and contributing to the corporate governance literature.

While prior research has uncovered the direct effect of the attributes of female directors on firm performance (Shafai *et al.*, 2024), integrated reporting (Qaderi *et al.*, 2024), and the quality of sustainability disclosures (Rahman *et al.*, 2024), the current study sheds light on the mediating role of these attributes in the association between female directorship and credit risk. The findings of the study confirm the partially mediating role of female directors with independence, leadership roles, and higher education in the association between female directorship and credit risk of sample financial firms in Bangladesh. These results provide evidence supporting agency, resource dependence, and upper echelon theories, highlighting the importance of effective monitoring of female directorship, and demonstrating how female directorship, indirectly through their attributes, can minimize credit risk and enhance the quality of credit.

Finally, aligned with the critical mass theory, the results show that female directorship has a stronger effect on credit risk when the board comprises at least three female directors, rather than just one or two.

7.2 Implications to policy

The findings have several policy implications for ensuring sound governance practices relevant to regulators, shareholders and other stakeholders. The study's implications extend well beyond the mere representation of women on corporate boards. It underscores the significance of monitoring and demographic attributes such as independence, leadership, financial expertise, and educational background among female directors. This insight advocates for the formulation and implementation of regulations that foster such diversity, thereby enhancing board dynamics, mitigating credit risk, and improving the quality of credit within financial institutions.

While the Corporate Governance Code - 2018 of Bangladesh prioritizes board independence and the involvement of external directors, similar to global regulations, it rarely addresses gender diversity within the boardroom. Aligning with one of the primary objectives of the Sustainable Development Goals, specifically gender equality (SDG-5), this study advocates for the active participation of women on corporate boards as crucial for ensuring financial sustainability. The study recommends that regulators and legislators develop the regulations on gender quotas and consider the diverse attributes of women when appointing board members.

The findings of the study may assist shareholders in prioritizing the inclusion and retention of female directors within the credit management process, thereby ensuring a better return on their investment. The results indicate that increasing gender diversity on boards, particularly by attaining a critical mass of at least three female directors, can enhance oversight and promote long-term financial stability in banks, specifically by minimizing credit risk within the financial sector.

7.3 Limitations and future research direction

The outcomes of this study should be interpreted with caution for several reasons, which also present opportunities for future research. First, the study exclusively examined

financial companies listed on the DSE in Bangladesh. Consequently, the study's conclusions cannot be generalized to other countries due to socio-cultural and regulatory differences. Future research is recommended to explore the association across different countries. Second, the impact of female directors on credit risk may extend beyond the identified attributes, suggesting that other characteristics also enhance the credit risk management process. Third, the findings may be influenced by non-disclosure of demographics attributes of directors in annual report or other sources such as LinkedIn. Future research may investigate how attribute of females influence credit risk based on primary data through questionnaire or interview. Finally, the measurement of credit risk, among other financial variables, is based on accounting numbers, which may be subject to manipulation. Further studies may consider different and independent measures of credit risk in various contexts.

Appendix

Table A1. Variable definitions and acronyms

Variables	Description
<i>Dependent variables</i>	
<i>NPL</i>	The proportion of nonperforming loans to total loans in a year
<i>Pro_NPL</i>	The proportion of cumulative provision on nonperforming loans to total loans in a year
<i>Independent variables</i>	
<i>FPBOD</i>	The proportion of female board members to all directors on a board
<i>BLAU</i>	$1 - \sum_{i=1}^n P_i^2$, P_i refers to the fraction of board members in each category of given attribute; n is the number of groups of a given trait
<i>GD1/2</i>	The dummy variable is set equal to one if a firm in a year has one or two females and zero otherwise
<i>GD3/3+</i>	The dummy variable is set equal to one if a firm in a year has three or more females; otherwise, it is zero
<i>FE_IND</i>	The proportion of female independent to total directors
<i>FE_LED</i>	The dummy variable is set equal to one if a firm in a year has a female having chairman either the board or any subcommittee; otherwise, it is zero
<i>FE_EXP</i>	The proportion of female directors with financial expertise, holding either executive or non-executive roles in any financial sector, relative to the total number of directors
<i>FE_HEDU</i>	The proportion of female directors who hold a master's degree (e.g. MA, MSc, or MBA) or higher degrees (including PhD) relative to the total number of directors
<i>FE_FOREDU</i>	The proportion of female directors who have graduated from a foreign university relative to the total number of directors
<i>FE_ACFI</i>	The proportion of female directors having degree major in accounting and/or finance to total directors
<i>Control variables</i>	
<i>INDP</i>	The fraction of independent directors to the total board of directors in a year
<i>BS</i>	The total number of board of directors
<i>FSIZE</i>	The log of the market value of the equity
<i>ROE</i>	Net income scaled by shareholder equity
<i>LEV</i>	The proportion of total debt to total equity
<i>BM</i>	The total board meeting in a year
<i>DO</i>	The proportion of shares a sponsor and/or director holds to all shares held
<i>IO</i>	The proportion of shares held by institutions to all shares held
<i>FO</i>	The proportion of shares held by foreigners to all shares held
<i>COVID19</i>	The dummy variable is set equal to one if a firm in a year has after Covid-19 (e.g. 2020, 2021, 2022) otherwise, it is zero
<i>INDGEN</i>	The average female directors in the industry by year

Notes

1. A loan is classified as non-performing when the repayment of principal and/or interest is overdue by 90 days or more.
2. *Sector wise Company List | Dhaka Stock Exchange*. https://www.dsebd.org/by_industrylisting.php. Accessed on July 25, 2024.
3. See the notification https://sec.gov.bd/slaws/Notification_29.07.2025.pdf

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