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Article

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Effectiveness of Internal Corporate Governance Mechanisms in Controlling Non-Performing Loans of an Emerging Economy

Mohammad Kamal Hossain · Fazlur Rahman · Uttam Golder · Humayun Kabir

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Abstract This study examines the effectiveness of internal corporate governance mechanisms (ICGMs) in managing non-performing loans (NPLs) in listed banks within an emerging economy, specifically Bangladesh. We focus on addressing dynamic endogenous bias, which has often been overlooked in prior studies. Using a panel dataset of 29 Dhaka Stock Exchange (DSE)-listed banks and 261 bank-year observations spanning from 2013 to 2021, we apply the system generalized method of moments (GMM) model to correct for potential endogeneity in estimating the impact of ICGMs on NPL management. Our results reveal that certain governance mechanisms, including board meetings and size of audit committee, play a significant role in controlling NPLs, while others, such as board size, board independence, and audit committee meetings, are found to have no meaningful effect. These findings suggest that reforms to the Code of Corporate Governance in Bangladesh are needed to enhance the effectiveness of credit risk management and improve accountability and transparency. By addressing dynamic endogeneity bias, this study contributes new insights into the effects of ICGMs on NPLs in the context of listed banks in Bangladesh. However, a key limitation of the study is the exclusion of non-

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listed banks, which also play a substantial role in the accumulation of NPLs in the country.

Keywords Internal corporate governance mechanisms · Non-performing loans · Dynamic endogenous bias · System GMM

JEL Classification C61, G21, G34

1 Introduction

The banking sector of Bangladesh plays a critical role in its predominantly bank-based economy, where banks are central to economic growth and stability (Salas et al. 2024; Molla et al. 2021). However, the sector faces several unique challenges that make it an ideal setting for this study. As of September 2024, Bangladesh has the highest NPL ratio in its region, with 16.9% of total loans classified as non-performing, significantly higher than the international benchmark of 2% (CEIC 2024; Islam 2020b). This rise in NPLs is largely driven by weak regulatory frameworks, inadequate financial risk management, and substantial political interference (Hossain and Golder 2022). Furthermore, factors such as moral hazard, poor monitoring, insufficient collateral, and nepotism have exacerbated the problem, leading to significant loan defaults (Ghosh et al. 2020). A notable portion of NPLs stems from influential individuals with political or social connections, suggesting that these loans often arise from an unwillingness to pay, rather than an inability to pay, making them akin to white-collar crime (Uddin et al. 2023).

In addition to these issues, ineffective enforcement of regulations and a sluggish judicial system further hinder the resolution of NPLs (Thrikawala et al. 2017). These challenges underscore the importance of strengthening internal corporate governance mechanisms (ICGMs) to address governance inefficiencies that external regulations fail to mitigate. Weak governance structures reduce firm performance and increase the vulnerability of banks to financial instability (Alam et al. 2024). Given these pressing challenges, Bangladesh presents a compelling case for examining how ICGMs can play a key role in managing NPLs and improving the resilience of the banking sector. Strengthening corporate governance is essential for fostering a more stable financial environment, particularly in emerging economies like Bangladesh (Ullah et al. 2024).

A high volume of NPLs threatens global banking stability by weakening balance sheets, reducing lending capacity, raising borrowing costs, and potentially causing a credit crunch that slows economic activity (Goyal et al. 2023). NPLs create internal turmoil in banks by reflecting credit risk and directly impacting the entire banking system (Anita et al. 2022). They negatively affect a bank's performance by increasing provisions for loan losses and reducing interest income (Boussaada et al. 2023), leading to liquidity risk, regulatory capital management risk, and business risk, along with stress in areas like investment and managerial efficiency (Ghosh et al. 2020). This financial strain often results in "churning," a term used to describe organizational instability caused by unpaid loans, which forces management to re-

structure, cut costs, or adjust strategies (Hoti et al. 2024). Such instability can also lead to operational disruptions and reduced employee morale, creating an uncertain work environment.

The relationship between internal churn and corporate governance lies in the ability of governance practices to effectively manage financial risks. Strong corporate governance—characterized by transparent decision-making, robust risk management, and clear accountability—can help mitigate the impact of NPLs. By ensuring sound risk oversight and proactive management, good corporate governance can prevent or reduce internal churn, providing stability even during periods of financial strain (Rahman and Howlader 2025). Weak governance, on the other hand, may exacerbate churn by delaying necessary restructuring or failing to identify and address emerging risks promptly, further destabilizing the organization.

To combat the growing problem of NPLs and improve lending discipline, the Government of Bangladesh introduced several regulations, such as the Bangladesh Bank Order (1972) and the Bankruptcy Act (1997). Since 2000, Bangladesh Bank's reforms have pressured banks to reduce NPLs, including allowing the write-off of 5-year-old bad loans with full provisions (Amin et al. 2019). Additionally, Bangladesh Bank implemented measures like the Credit Risk Grading (CRG) manual and restrictions on lending to bank directors and their families. The Bangladesh Securities and Exchange Commission (BSEC) also introduced a Code of Corporate Governance in 2006 (amended in 2012 and 2018) for listed corporations, including banks. The code emphasizes board composition, sub-committee structures (audit, nomination, remuneration committees), and corporate accountability, fairness, and transparency. Despite these measures, NPLs and loan scandals have persisted, leading to the hypothesis that weak internal corporate governance mechanisms in the country's banking sector contribute significantly to the high volume of NPLs. This raises a policy question: Are the current ICGMs effective in controlling NPLs in Bangladeshi-listed banks?

While prudential norms and regulatory actions are critical in stabilizing the financial sector, they often fail to address the root causes of Non-Performing Loans (NPLs) in Bangladesh, primarily due to weak enforcement, political interference, and systemic governance issues. Despite improvements in regulatory frameworks, challenges such as ineffective loan recovery systems, political influence in lending decisions, and poor credit risk management continue to undermine the stability of the banking sector (Boachie 2023). For example, banks in Bangladesh have sometimes evaded or ignored regulatory measures, particularly when regulatory bodies lack the power or capacity to enforce them effectively (Hossain and Golder 2022). As a result, regulatory measures alone are insufficient to tackle the rise in NPLs, and it becomes necessary for individual banks to improve their internal governance structures.

In this context, Internal Corporate Governance Mechanisms (ICGMs) play a critical role in mitigating NPL accumulation by addressing internal governance weaknesses that drive risky lending practices. In Bangladesh, where external regulation and enforcement often fall short (Akter et al. 2021), strong ICGMs act as an internal safeguard (Hoti et al. 2024). These mechanisms—such as independent boards, regular internal audits, and CEO and board member renewal—ensure that lending

practices align with risk management protocols and regulatory requirements (Tron et al. 2023). For instance, independent boards are more likely to scrutinize management's decisions, reducing the risk of unethical lending practices and minimizing the chances of loans turning non-performing (Fiador and Sarpong-Kumankoma 2021; Alam et al. 2025). Internal audits ensure that lending criteria are strictly adhered to, preventing the approval of high-risk loans (Akter et al. 2021).

ICGMs also foster a culture of responsibility and ethical decision-making, promoting transparency and accountability in the loan approval process. By ensuring that decision-makers are held accountable, these mechanisms can detect early signs of credit risk, making it easier to prevent loans from going bad in the first place. In Bangladesh, where political interference and moral hazards are prevalent (Ghosh et al. 2020), a strong internal governance framework is essential to protect the bank from these external pressures (Hoti et al. 2024). As evidenced during the pandemic, when credit risk and liquidity risk increased, consistent improvements in corporate governance helped mitigate some of these challenges (Surwanti and Wardana 2024).

The issue of Non-Performing Loans (NPLs) is a pervasive challenge, particularly in emerging economies, and is not unique to Bangladesh. Similar patterns of rising NPLs driven by governance weaknesses have been observed in other developing regions, including Africa, Southeast Asia, and Latin America, where inadequate regulatory frameworks and poor governance practices contribute to banking instability (Rahman and Howlader 2025). For instance, countries like India and Nigeria have faced similar challenges, with governance mechanisms such as board independence, internal audits, and risk management practices shown to be effective in mitigating NPL levels and improving overall banking stability (Ali 2018; Abubakar et al. 2015; Adegboye et al. 2020). In fact, across 73 countries, good governance has been identified as one of the most economically significant factors in reducing NPLs (Rahman and Howlader 2025). These global lessons highlight the importance of ICGMs in reducing NPLs and enhancing financial stability. Bangladesh's experience can thus provide valuable insights into how ICGMs function in environments with insufficient external regulatory frameworks and can inform strategies for addressing NPLs in other regions with similar challenges.

Research on ICGMs in the Bangladeshi banking sector has gained considerable attention. Previous studies have explored various variables influencing NPLs, including bank-specific, political, and macroeconomic factors. For instance, Akhter (2023), Khanam et al. (2021), Ghosh et al. (2020), and Al Masud and Hossain (2020) examined bank-specific determinants of NPLs, while Uddin et al. (2023) analyzed the effects of politically controlled boards on loan performance. Amin et al. (2019) studied regulations and governance in NPL resolution but did not address the impacts of ICGMs. In contrast, Akter et al. (2021) focused on the effects of audit committee attributes, and Hasan et al. (2019), Khatun and Ghosh (2019), Saha and Ghosh (2019), and Kamruzzaman and Ullah (2022) examined the effectiveness of ICGMs in reducing NPLs.

However, past studies assessing the effectiveness of ICGMs in controlling NPLs in Bangladesh often used inadequate models. For example, Hasan et al. (2019) and Kamruzzaman and Ullah (2022) relied on descriptive statistics, while Saha and Ghosh (2019), Akter et al. (2021), and Khatun and Ghosh (2019) employed panel

data regression models like pooled OLS and random-effects GLS regressions. These commonly used models can address endogeneity bias caused by omitted variables, simultaneity, and measurement errors (Thrikawala et al. 2017; Hossain and Golder 2022). However, they are inadequate for handling dynamic endogeneity bias, which can result in biased and inconsistent estimations (Wooldridge 2019; Ullah et al. 2018).

We argue, following Khatib (2024), Hermalin and Weisbach (1998), and Harris and Raviv (2008), that there is a dynamic endogenous relationship between ICGMs and NPLs, with current ICGMs being influenced by the NPLs of previous years. According to Hermalin and Weisbach (1998), companies may adjust their governance mechanisms in response to historical financial performance patterns, reflecting a dynamic relationship that evolves over time. In the context of ICGMs and NPLs, if NPLs rise in the previous year, the bank may respond by increasing the current board size to strengthen governance, oversight, and decision-making (Khatib 2024). This change in governance structure could, in turn, affect future NPL levels, creating a dynamic and endogenous feedback loop between governance changes and loan performance (Hermalin and Weisbach 1998). Similarly, factors such as the bank's information environment and independent directors' opportunity costs are influenced by prior NPL volumes, which can impact board structure and audit committee activities (Harris and Raviv 2008). Also, if past year's NPLs increase, the current audit committee may meet more frequently to address the rising volume of NPLs. This increase in meeting frequency could enhance oversight and decision-making regarding loan performance, potentially influencing the future trajectory of NPLs. This dynamic relationship introduces a bias that violates the exogeneity assumption in random-effects models (Arellano and Bond 1991). Previous studies (Akter et al. 2021; Hasan et al. 2019; Khatun and Ghosh 2019; Saha and Ghosh 2019; Kamruzzaman and Ullah 2022) have overlooked this dynamic endogeneity issue, raising concerns about the reliability of their findings. This oversight casts doubt on the reliability of the estimates in prior studies and reveals a research gap.

This study contributes to the literature on ICGMs and NPLs in Bangladesh by addressing the dynamic endogeneity bias often overlooked in previous research. Using the system generalized method of moments (GMM) model, it examines the effectiveness of ICGMs in controlling NPLs in banks listed on the Dhaka Stock Exchange (DSE). The study provides a deeper understanding of the dynamic relationship between ICGMs and NPLs, where past NPL levels influence current governance practices, and identifies weaknesses in Bangladesh's banking sector. By refining governance models and offering actionable insights, this research helps inform the development of more effective internal governance frameworks to reduce NPLs. Additionally, it bridges a gap in the literature by directly linking ICGMs to NPL outcomes, offering valuable evidence for policymakers in Bangladesh and similar emerging economies.

The rest of the paper is organized as follows: Section 2 reviews the literature and develops hypotheses; Section 3 describes the study's methodology; Section 4 presents and discusses the results; and Section 5 concludes the study.

2 Literature Review and Hypotheses Development

Effective corporate governance practices are crucial for controlling NPLs by ensuring a well-managed, transparent, and accountable banking system (Adegboye et al. 2020). Research on NPLs has found that corporate governance mechanisms are essential to credit risk management. This literature review critically evaluates the theoretical and empirical evidence on how various corporate governance mechanisms affect NPLs.

2.1 Board Size and NPLs

The relationship between board size and NPLs in banks is a critical area of research, particularly in the context of corporate governance. However, the impact of board size on NPLs remains debated in the literature, with differing views. Agency theory suggests that larger boards improve monitoring, reducing NPL risks, while smaller boards may offer more flexibility but could lead to less oversight, increasing NPLs (Jensen 1993). Resource dependency theory argues that larger boards bring diverse expertise, helping to mitigate risks and curb NPLs (Pfeffer and Salancik 2011).

Empirical studies generally support the negative effect of board size on NPLs. Fiador and Sarpong-Kumankoma (2021) found this association in Ghanaian banks, while Aslam et al. (2021) identified a similar trend in 129 Islamic banks across 29 countries. Maria et al. (2016) revealed that larger boards in Pakistani banks fostered prudent policies, leading to lower NPLs. Research from Sri Lanka (Sameera and Wijesena 2018), the USA (Islam 2020a), and Bangladesh (Ali 2018) also supports this negative effect. However, some studies suggest that smaller boards may also reduce NPLs. Shan and Xu (2012), Hasan et al. (2019), and Khatun and Ghosh (2019) argue that smaller boards improve communication and decision-making, enhancing risk management. Tarchouna et al. (2017, 2022) reported mixed results, with board size positively affecting NPLs in small and large US banks but negatively in medium-sized banks, highlighting the contextual factors that influence this relationship. Given these mixed findings, further research is needed, particularly in emerging economies. Based on the reviewed literature, we hypothesize:

H₁ Larger board size reduces NPLs in listed banks in Bangladesh.

2.2 Board Meetings and NPLs

Board meetings play a crucial role in corporate governance, providing a platform for directors to oversee and guide banks' operations, including lending policies and risk management (Brick and Chidambaran 2010). Effective communication, transparency, and accountability during these meetings help identify potential credit risks early and shape banks' risk management strategies, potentially reducing NPLs. Literature suggests that more frequent board meetings enhance board monitoring and effectiveness, leading to lower NPLs (Islam 2020a).

Agency theory supports the idea that frequent audit committee meetings allow board members to discuss credit assessments and monitor loan distribution, im-

proving credit quality and mitigating NPLs (Kartika et al. 2022). Empirical studies generally support the positive impact of frequent meetings on risk management. For instance, Balagobei (2019) found a negative correlation between the frequency of board meetings and NPLs in Sri Lankan banks, indicating enhanced board oversight and improved management. Similarly, Islam (2020a) found that US banks with more frequent board meetings had lower NPLs, suggesting that active boards are better at monitoring loan portfolios. However, some studies present contrasting views. Tahir et al. (2020) and Aslam et al. (2021) discovered that in 18 Pakistani banks and 129 Islamic banks, a lower frequency of board meetings was associated with better loan quality, challenging the assumption that more meetings always lead to better outcomes. These mixed results highlight the importance of contextual factors—such as bank size, regulatory environment, and cultural differences—in shaping the effect of board meeting frequency on NPLs. Based on the literature, we hypothesize:

H₂ Frequent board meetings reduce NPLs in listed banks in Bangladesh.

2.3 Independent Non-Executive Directors and NPLs

Independent directors are crucial in mitigating risks and ensuring sound corporate governance on a bank's board. Their presence enhances oversight by limiting management's risk-taking behaviors, thus potentially reducing Non-Performing Loans (NPLs) (Switzer and Wang 2013). According to agency theory, independent directors increase accountability and reduce management's risk appetite, which lowers NPLs. Additionally, stakeholder theory suggests that independent directors align their decisions with the interests of shareholders, depositors, borrowers, and regulators. Signaling theory further posits that their presence signals commitment to responsible governance, promoting trust and reducing NPLs.

Several studies suggest that a higher proportion of independent directors is beneficial for controlling NPLs. For instance, Sadaa et al. (2023) and Aslam et al. (2021) found that more independent directors correlated with lower NPL levels in banks, particularly in Islamic banks. Similarly, Fiador and Sarpong-Kumankoma (2021) and Tarchouna et al. (2017) demonstrated that increased board independence led to better risk management and improved loan quality in Ghanaian and US banks. Research from Sameera and Wijesena (2018), Al Zobi et al. (2019), and Islam (2020a) corroborated these findings in the USA, Jordan, and Sri Lanka.

However, Tarchouna et al. (2022) reported mixed results, noting that while independent directors improved loan quality in US banks overall, their impact was less effective in larger banks, where their influence on NPLs was positively significant. Moreover, in smaller banks, independent directors were ineffective in overseeing the lending process, leading to more poor loans. Hasan et al. (2019) and Ali (2018) found similar trends in Bangladesh, Pakistan, and India, with independent directors contributing to better governance and reduced NPLs, yet some studies (Sadaa et al. 2023; Maria et al. 2016; Khatun and Ghosh 2019) argue that independent directors in certain regions focus on short-term performance, increasing credit risk over time. The reason for this is that independent directors might lack a thorough understanding of the bank's unique characteristics, which could prevent them from making the

best decisions regarding credit risk (Nguyen et al. 2022). These conflicting findings underscore the need for further investigation into the contextual factors that influence the effectiveness of independent directors in managing NPLs. Based on the literature, we hypothesize:

H₃ A high proportion of independent directors on boards reduces NPLs in listed banks in Bangladesh.

2.4 Size of the Audit Committee and NPLs

Audit committees play a crucial role in ensuring financial reporting quality, regulatory compliance, and internal controls, which are vital for controlling Non-Performing Loans (NPLs) (Dixon and Coy 2007). According to agency theory, larger audit committees provide enhanced oversight, reducing management's influence and mitigating NPL risks. Resource dependence theory suggests that larger committees bring more resources, including expertise, contributing to lower NPL risks. Poudel and Hovey (2012) argued that larger committees with diverse financial expertise can improve bank efficiency and reduce NPLs.

Abubakar et al. (2015) confirmed that in Nigerian banks, larger audit committees (2009–2013) were associated with lower discretionary loan loss provisions, enhancing oversight and reducing NPLs. These findings align with the theoretical assumption that larger committees enhance governance and risk management. However, the literature is not entirely consistent. While some studies show the positive impact of larger audit committees, others suggest that very large committees may become inefficient due to coordination issues or diluted accountability. Furthermore, the effectiveness of audit committees can vary depending on factors like bank size and regulatory environment, which need further exploration. Based on the literature, we hypothesize:

H₄ Larger audit committees reduce NPLs in listed banks in Bangladesh.

2.5 Independent Audit Committee and NPLs

Independent audit committees are believed to improve transparency and reduce loan defaults through high-quality financial disclosures. Stewardship theory suggests that independent directors on the audit committee enhance resource utilization, corporate governance, and stakeholder relationships, which can reduce NPLs. Resource dependency theory also posits that a higher proportion of independent directors strengthens financial reporting and enhances a bank's reputation, thereby lowering NPLs. Studies such as Al Zobi et al. (2019) found a negative effect of the proportion of independent directors on audit committees on NPLs in Jordanian banks, while Akter et al. (2021) and Sen et al. (2022) observed similar results in Bangladeshi banks. Ali (2018) confirmed this in a study of 86 banks across Pakistan, India, and Bangladesh from 2006 to 2016. These findings support stewardship and resource dependency theories, indicating that independent directors provide expertise and objective oversight, improving financial reporting and mitigating NPL risks.

However, not all studies align with this view. Khatun and Ghosh (2019) found that having an independent audit committee chairperson was linked to higher NPLs, suggesting that independent oversight may not always result in better loan management. Given these mixed findings, further investigation is needed to understand the conditions under which independent audit committees effectively reduce NPLs. Based on the literature, we hypothesize:

H₅ A higher proportion of independent directors on audit committees lowers NPLs in listed banks in Bangladesh.

2.6 Audit Committee Meetings and NPLs

Regular audit committee meetings play a crucial role in good governance, enabling banks to monitor internal controls, identify fraud risks, and establish anti-fraud policies, which can reduce NPLs stemming from poor client selection and political influence (Akter et al. 2021). Al Zobi et al. (2019) found that frequent audit committee meetings were associated with lower NPL volumes in Jordanian banks from 2009 to 2016, highlighting the importance of active committee involvement in risk management. Similarly, Akter et al. (2021) observed that regular meetings led to reduced NPL levels in Bangladeshi banks. Aslam et al. (2021) supported the importance of qualified, experienced audit committees that meet regularly to manage NPL risks, based on a sample of 129 Islamic banks from 2008 to 2017. Amin et al. (2019) further noted that a 1% increase in annual audit committee meetings was correlated with a decrease in NPLs in Bangladeshi banks, from 1.7% in 2000 to 0.99% in 2012. However, the effect of audit committee meeting frequency on NPLs is not always straightforward. Some studies may overlook potential factors such as the quality of the meetings or the specific roles of committee members. Further research is needed to explore these variables. Based on the existing literature, we hypothesize:

H₆ Frequent audit committee meetings reduce NPLs in listed banks in Bangladesh.

3 Methodology

3.1 Sample and Data

The study sample included 29 of 35 banks listed on the Dhaka Stock Exchange (DSE) as of December 31, 2022 (DSE—Dhaka Stock Exchange 2022). Six banks were excluded: five due to recent listings and one because of data unavailability. Spanning nine years from 2013 to 2021, the study resulted in a dataset comprising 261 bank-year observations. Data on internal corporate governance mechanisms, non-performing loans, and bank-specific factors were obtained from the annual reports of the sample banks, while data on GDP growth, unemployment, and interest rates were sourced from the CEIC Data Global Database (CEIC 2024).

3.2 Variable Description

Table 1 presents a list of dependent, independent, and control variables along with their measurement bases.

3.2.1 Independent Variables

The study employs internal corporate governance mechanisms (ICGMs) as independent variables, including board size, board meetings, independent non-executive directors, audit committee size, independent audit committees, and audit committee meetings. Operationalization was based on previous studies, as detailed in Table 1.

3.2.2 Dependent Variables

The dependent variable is non-performing loans (NPLs). NPLs are financial assets that remain unpaid, meaning banks do not receive the scheduled principal or interest payments (Anita et al. 2022). The IMF (2005) defines loans as NPLs when they fail to generate principal or interest payments for a minimum of 90 days. NPLs are classified as substandard, doubtful, or bad/loss based on standardized criteria (Bangladesh Bank 2019). According to the Bangladesh Bank's (2019) guidelines, a loan is substandard when overdue for three to nine months, doubtful when overdue for nine to 12 months, and bad/loss when overdue for 12 months or more.

3.2.3 Control Variables

Control variables include institutional shareholdings, bank age, bank size, provisions for loan losses, diversification opportunities, GDP growth, unemployment, and real interest rate.

3.3 Model Specification

We employed static panel data regression models, including fixed effects and random-effects models. To derive more reliable estimates of the effectiveness of internal corporate governance mechanisms (ICGMs) in controlling non-performing loans (NPLs), we also used a dynamic panel data regression model, specifically the two-step system Generalized Method of Moments (GMM).

3.3.1 Static Panel Data Regression Models

Static panel data regression models, such as fixed-effects and random-effects models, are commonly used in corporate governance research. These models are relatively simple, capture long-term effects, and are easy to interpret. They provide a solid foundation for understanding the relationships between governance mechanisms and firm performance, particularly when focusing on cross-sectional or aggregate effects.

Table 1 Variables and measurements

Variables	Labels	Measurements
Dependent variable		
Non-performing loans	NPLs	Ratio of non-performing loans to total loans at the end of the financial year (Tarchouna et al. 2017; Akter et al. 2021)
Independent variables		
Board size	BdSize	Total number of directors serving on a bank's board at the end of its financial year (Muttakin and Ullah 2012; Hossain 2020)
Board meetings	BdMeet	Total number of meetings held by the board of a bank in each financial year (Muttakin and Ullah 2012; Hossain 2020)
Independent non-executive directors	INEDs	The proportion of independent non-executive directors serving on the board of a bank at the end of its financial year (Muttakin and Ullah 2012; Minton et al. 2014)
Size of audit committee	SizeaudC	Number of audit committee members serving on a bank's audit committee at the end of its financial year (Muttakin and Ullah 2012)
Independent audit committee	InaudC	The proportion of independent directors serving on the audit committee of a bank at the end of its financial year (Akter et al. 2021)
Audit committee meetings	AudeM	Total number of meetings held by the audit committee of a bank in each financial year (Muttakin and Ullah 2012; Akter et al. 2021)
Control variables		
Institutional shareholdings	InstSh	Proportion of ordinary shares held by institutional investors at the end of the financial year (Hossain 2020)
Bank age	BkAge	Years a bank has been listed on Dhaka Stock Exchange (Muttakin and Ullah 2012; Hossain 2020)
Bank size	BkSize- <i>ln</i>	Natural log of the total assets of a bank at the end of the financial year (Muttakin and Ullah 2012; Hossain 2020)
Provisions for loan losses	PLL	Proportion of loan loss provisions to total loans of a bank at the end of the financial year (Nikolaidou and Vogiazas 2014; Tarchouna et al. 2017)
Diversification opportunities	DivOp	Ratio of non-interest income to total income at the end of the financial year (Alhassan et al. 2014; Tarchouna et al. 2017; Chaibi and Fiti 2015)
GDP growth	Gdpg	Difference between current and previous fiscal year GDP rates is divided by the previous fiscal year GDP rate (Akter et al. 2021)
Unemployment	Unemply	The unemployment rate at the end of the financial year (Tarchouna et al. 2017)
Real interest rate	Intrate	The real interest rate at the end of the financial year is the difference between the long-term interest rate and the inflation rate (Chaibi and Fiti 2015; Tarchouna et al. 2017)

We first employed the fixed-effects regression model to assess the efficacy of each individual ICGM in controlling NPLs, as specified below:

$$NPLs_{it} = \beta_0 + \beta_i ICGM_{it} + \sum_{n=1}^n \beta_i Controls_{it} + u_i + e_{it} \quad (1)$$

where

- NPLs = Non-performing loans

- β_0 = Constant term
- ICGM = Internal corporate governance mechanism
- Controls = Control variables include institutional ownership (InstSh), bank age (BkAge), the natural log of bank size (BkSize-*ln*), provisions for loan losses (Pll), diversification opportunities (DivOp), gross domestic product growth (Gdpg), unemployment (Unemply), and real interest rates (Intrate).
- u_i = Within-entity error term
- e_{it} = Overall error term.

Second, we used the fixed-effects regression model to examine the collective effectiveness of ICGMs in controlling NPLs, as outlined in the following model:

$$NPLS_{it} = \beta_0 + \beta_1 BdSize_{it} + \beta_2 BdMeet_{it} + \beta_3 INEDs_{it} + \beta_4 Sizeaud_{it} + \beta_5 InaudC_{it} + \beta_6 AudcM_{it} + \sum_{n=1}^n \beta_i Controls_{it} + u_i + e_{it} \quad (2)$$

where

- NPLs = Non-performing loans
- β_0 = Intercept or constant term
- β 's = Slope parameters or regression coefficients
- BdSize = Board size
- BdMeet = Board meetings
- INEDs = Independent non-executive directors
- SizeaudC = Size of the audit committee
- InaudC = Independent audit committee
- AudcM = Audit committee meetings.

Finally, we employed a random-effects regression model to examine the efficacy of ICGMs in controlling NPLs, using the following specification:

$$NPLS_{it} = \beta_0 + \beta_1 BdSize_{it} + \beta_2 BdMeet_{it} + \beta_3 INEDs_{it} + \beta_4 Sizeaud_{it} + \beta_5 InaudC_{it} + \beta_6 AudcM_{it} + \sum_{n=1}^n \beta_i Controls_{it} + v_i \quad (3)$$

where v_{it} denotes composite error terms ($u_i + e_{it}$).

We chose the best-fitting static panel regression model for this study based on the *F*-test, Breusch and Pagan's Lagrange Multiplier test (B-P LM), and Hausman's specification test. Diagnostic checks, including the Breusch-Pagan/Cook-Weisberg test (χ^2) for heteroscedasticity, the Modified Wald test for group-wise heteroscedasticity (χ^2), the Wooldridge test for autocorrelation, and the Pesaran's test for cross-sectional independence, were conducted for better estimations.

3.3.2 System Generalized Method of Moments (GMM) and Its Rationale

Endogeneity, resulting from omitted variables, simultaneity, and measurement errors, is a common challenge in corporate governance research (Khatib 2024). This issue

arises due to the complex relationships between governance mechanisms and firm performance (Khatib 2024; Lee et al. 2019; Chowdhury and Rasid 2016). Traditional models like pooled OLS, fixed-effects, and random-effects do not fully address all forms of endogeneity (Ullah et al. 2018).

In this study, we assumed a dynamic endogenous relationship between internal corporate governance mechanisms (ICGMs) and non-performing loans (NPLs), where past NPLs influence current ICGMs. This dynamic endogeneity violates the strict exogeneity assumption in fixed- and random-effects models, leading to biased estimates (Arellano and Bond 1991; Nickell 1981).

To address this issue, we employed the system generalized method of moments (GMM), a widely used technique in governance research (Orazalin and Mahmood 2021). System GMM effectively controls for endogeneity, including omitted variables, simultaneity, measurement errors, and dynamic endogeneity, and provides consistent estimates (Arellano and Bond 1991; Blundell and Bond 1998; Wintoki et al. 2012; Khatib 2024). While instrumental variables (IV) also address endogeneity, GMM is preferred in the presence of heteroscedasticity as it offers more consistent and efficient estimates (Baum et al. 2002).

System GMM works by ‘internally transforming’ the data, subtracting the lagged value of a variable from its current value (Roodman 2009). We used a one-year lag of NPLs (NPL_{sit-1}) as an internal instrument to control for dynamic endogeneity. This method is particularly effective for handling dynamic panel bias, which is relevant in this study of corporate governance and NPLs. It is well-suited for small T, large N panels (Roodman 2009), a condition applicable to our study ($T=9, N=29$). System GMM precisely handles non-strictly exogenous variables, fixed individual effects, heteroscedasticity, and autocorrelation, as confirmed in this study. Therefore, we tested our hypotheses using the following system GMM regression model:

$$\begin{aligned}
 NPL_{sit} = & a_0 + \beta_1 NPL_{sit-1} + \beta_2 BdSize_{it} + \beta_3 BdMeet_{it} + \beta_4 INED_{sit} \\
 & + \beta_5 Sizeaud_{it} + \beta_6 InaudC_{it} + \beta_7 AudcM_{it} + \sum_{n=1}^n \beta_i Controls_{it} \quad (4) \\
 & + u_{it} + \varepsilon_{it}
 \end{aligned}$$

Where

- NPL_{sit-1} = One-year lagged non-performing loans
- u_{it} = Firm-specific fixed effects
- ε_{it} = Error term.

To ensure the validity of our GMM model, we also conducted two post-estimation tests. First, the Hansen test of over-identification restrictions was conducted to confirm that the instruments included in the model are exogenous. A significant p -value rejects the null hypothesis, indicating invalid instruments (Baum et al. 2002). If $p > 0.05$, the instruments are exogenous, with the ideal p -value range being $0.05 \leq p(\chi^2) < 0.8$, preferably $0.1 \leq p(\chi^2) < 0.25$ (Labra and Torrecillas 2018). If $p(\chi^2) > 0.8$, it indicates over-identification and requires instrument adjustments (Roodman 2009). Second, the Arellano-Bond test for first-order autocorrelation (AR(1)) and second-

Table 2 Descriptive statistics

Variables	Obs.	Mean (\bar{x})	Std. Dev. (σ)	Min (\wedge)	Max (\vee)
Non-performing Loans (NPLs), %	261	5.45	2.68	0.70	14.20
Board Size (BdSize)	261	13.69	3.86	6	22
Board Meetings (BdMeet)	261	19.46	5.68	7	34
Independent Non-executive Directors (INEDs), %	261	19.04	7.69	0.00	44.0
Size of Audit Committee (SizeaudC)	261	4.26	0.93	3	6
Independent Audit Committee (IndaudC), %	261	46.07	15.54	0.00	100.0
Audit Committee Meetings (AudcM)	261	9.32	4.49	3	25
Institutional Shareholders (InstSh), %	261	19.71	11.11	0.00	58.90
Bank Age (BkAge), year	261	19.79	9.22	5	38
Bank Size (BkSize- <i>ln</i>)	261	12.44	0.62	8.60	13.59
Provision for Loan Losses (PLL), %	261	2.16	1.42	0.032	5.97
Diversification Opportunities (DivOp), %	261	0.40	0.18	0.07	0.90
Gross Domestic Product Growth (Gdpg), %	261	6.44	1.20	3.45	7.88
Unemployment (Unemply), %	261	4.60	0.39	4.35	5.41
Real Interest Rate (Intrate), %	261	2.86	5.95	-13.64	6.88

order autocorrelation (AR(2)) was performed to check that the lagged NPLs is not correlated with the error terms (AR(1) and AR(2)) in the ICGMs-NPLs model (i.e., no autocorrelation). Autocorrelation is absent if AR(1) is significant ($p < 0.05$) and AR(2) is insignificant ($p > 0.05$), rejecting the null hypothesis of no autocorrelation (Arellano and Bond 1991).

4 Results

4.1 Descriptive Statistics

The descriptive statistics in Table 2 provide an overview of the governance and financial characteristics of 29 banks listed on the Dhaka Stock Exchange. On average, these banks have a non-performing loan (NPL) ratio of 5.45%, with considerable variation ($\sigma = 2.68\%$), suggesting a range of loan performance outcomes. This average is lower than the national average of 16.9% in 2024 (CEIC 2024), as the study excluded high NPLs of non-listed banks such as Agrani Bank, Sonali Bank, Janata Bank, BASIC Bank, and Farmers' Bank. Board size averages around 14 members, and boards meet an average of 20 times per year, although these values show consid-

erable variation across banks. Independent non-executive directors (INEDs) make up 19.04% of board members, with a range from 0 to 44%, reflecting differences in governance practices. Audit committees, averaging 4 members with 46.07% independent, follow the Corporate Governance Code of Bangladesh.

Financial indicators show that provisions for loan losses average 2.16%, while institutional shareholders hold an average of 19.71%. Banks are, on average, about 20 years old, with sizes ranging from smaller to larger institutions (with the average bank size in log terms being 12.44). Economic factors, such as GDP growth (mean of 6.44%) and unemployment (mean of 4.60%), show moderate variability. Real interest rates, however, display a broader range, from -13.64 to 6.88%, reflecting different interest rate environments across banks. These descriptive statistics provide a comprehensive foundation for analyzing the relationship between governance structures, financial performance, and broader economic conditions in the banking sector.

4.2 Pairwise Correlation and Multicollinearity

Table 3 shows that several ICGMs (e.g., BdSize, BdMeet, INEDs, SizeaudC, BkAge, BkSize-*ln*, PLL, and Unemploy) are significantly correlated with NPLs. Notably, Unemploy and Gdpg exhibit a strong correlation of 0.62, but the value remains below 0.80, indicating no multicollinearity concerns (Gujarati 2016). Additionally, Table 3 confirms the absence of multicollinearity, with the highest variance inflation factor (VIF) being 2.55 in the multiple regression analysis.

4.3 Results of Model Fit and Adequacy Tests

Table 4 presents the results of the model fit and adequacy tests performed to select the best model for the study. Insignificant estimation of the Hausman specification test ($\chi^2 = 19.81$) suggests that the random effects (RE) model is suitable. However, this model does not account for several important issues. Pesaran's test for cross-sectional dependence ($CD = 2.82^{***}$) shows significant correlations across units, indicating that random effects may not fully capture the dependencies in the data. Additionally, the Wooldridge test for autocorrelation ($F = 369.14^{***}$) reveals that residuals are correlated over time within each bank, further complicating the random effects model. The BP-LM test for heteroscedasticity ($\chi^2 = 411.01^{***}$) indicates unobserved heterogeneity across entities, which requires a more flexible model like GMM (Goyal et al. 2023). The Shapiro-Wilk test for normality ($Z = 4.94^{***}$) highlights that residuals significantly deviate from normality, challenging the assumptions of the random effects model. Both the Nickell bias ($t = 16.18^{***}$) and the lagged NPLs on random effects ($Z = 32.59^{***}$) show dynamic panel bias, necessitating the use of GMM. Furthermore, GMM effectively handles dynamic endogeneity ($t = 3.71^{***}$), as shown by the dynamic endogeneity test, offering a more robust and reliable solution for the panel data. The Ramsey RESET test suggests the presence of omitted variable bias ($p < 0.01$), indicating potential endogeneity concerns, while the Delgado and Manteiga test indicates no measurement error ($CvM p = 0.084$). Addressing potential endogeneity concerns can be achieved using the GMM (Ullah

Table 3 Estimations of Pairwise correlation and multicollinearity test

	VIF	NPLs	BdSize	BdMeet	INEDs	SizeaudC	IndaudC	AudcM	InstSh	BkAge	BkSize- <i>ln</i>	PLL	DivOp	Gdpg	Unemploy
NPLs		1													
BdSize	1.88	-0.15**	1												
BdMeet	1.61	0.13**	-0.03	1											
INEDs	1.74	-0.23***	-0.31***	-0.12**	1										
SizeaudC	1.91	-0.17***	0.56***	0.25***	-0.30***	1									
IndaudC	1.59	-0.05	-0.22***	-0.19***	0.50***	-0.41***	1								
AudcM	1.44	-0.05	0.11*	0.44***	0.03	0.16***	-0.08	1							
InstSh	1.21	-0.02	-0.05	0.15**	0.19***	-0.04	0.13**	-0.04	1						
BkAge	1.67	0.53***	0.02	0.24***	-0.19***	0.02	-0.04	0.19***	0.03	1					
BkSize- <i>ln</i>	2.01	0.31***	0.16**	-0.08	0.18***	-0.03	0.05	0.04	0.06	0.50***	1				
PLL	1.23	0.36***	-0.14**	0.14**	0.01	-0.03	0.02	0.01	-0.12*	0.15**	0.19***	1			
DivOp	1.22	0.01	-0.04	0.01	-0.05	0.09	0.10	-0.13**	0.15**	0.11*	-0.21***	-0.12*	1		
Gdpg	2.07	-0.02	0.02	0.16**	0.02	0.05	0.05	0.02	-0.03	-0.01	-0.04	0.10	-0.11*	1	
Unemploy	2.55	0.36***	0.01	-0.15**	-0.01	-0.11*	0.04	-0.15**	0.15**	0.20***	0.45***	0.12*	0.03	-0.62***	1
Intrate	1.07	0.01	-0.05	-0.02	-0.01	-0.05	-0.02	-0.03	0.04	0.02	0.01	-0.03	0.03	-0.20***	0.12*

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 4 Estimations of model fit and adequacy tests

Tests	Estimations	Decision
Hausman specification test	$\chi^2 = 19.81$	Random effects (RE) model is appropriate
Time fixed-effects (Year dummies)	$\chi^2 = 19.73^{***}$	Time specific dummies improve the RE model fit
Pesaran's test for Cross-sectional dependency	CD = 2.82 ^{***}	Cross-sectional dependence is present in residuals
Wooldridge test for autocorrelation	F = 369.14 ^{***}	The residuals are correlated across time within each bank
BP-LM test for heteroscedasticity	$\chi^2 = 411.01^{***}$	RE model is required to account for unobserved heterogeneity across entities
Shapiro-Wilk test for normality	Z = 4.94 ^{***}	Residuals significantly deviate from normality
Nickell bias (Lagged NPLs on Fixed effects)	t = 16.18 ^{***}	Dynamic panel bias exists and require GMM (Nickell 1981)
Lagged NPLs on Random effects model	Z = 32.59 ^{***}	Dynamic panel bias exists and require GMM
Dynamic endogeneity (Lagged NPLs in GMM)	t = 3.71 ^{***}	GMM captures dynamic endogeneity (Arelano and Bond 1991)
Ramsey RESER test for omitted variable bias	F = 9.06 ^{***}	Had omitted variable bias
Delgado and Manteiga test for measurement error	CvM $p = 0.08$	No measurement error

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

et al. 2018; Khatib 2024), which corrects for dynamic endogeneity in variables. Considering these findings, GMM is the most suitable method for addressing these issues and providing robust and unbiased parameter estimates. Therefore, despite the initial appropriateness of the RE model, the diagnostic results suggest that GMM should be used in this study for more accurate estimation.

4.4 Results of Static Panel Data Regression Models

Table 5 presents estimations of the efficacy of ICGMs in controlling NPLs using static panel data regression models. First, model 1 in Table 5 presents estimations of the individual effect of ICGMs on NPLs, using the fixed-effects model. The results show that BdMeet, SizeaudC, and AudcM are negatively and statistically significantly related to NPLs ($p < 0.05$, $p < 0.01$, and $p < 0.01$, respectively), thus failing to reject H_2 , H_4 , and H_6 , respectively. Concerning the control variables, BkAge, BkSizeIn, PLL, and Unemply—are positively and significantly related to NPLs. In contrast, DivOp is found to be negative and significantly related to NPLs.

Second, the efficacy of the combined multiple ICGMs in controlling NPLs is estimated using a fixed-effects model in Model 2, presented in Table 5. The results show that BdSize and SizeaudC are negatively and statistically significantly related to NPLs ($p < 0.05$ and $p < 0.01$, respectively), thus failing to reject H_1 and H_4 , respectively. As expected, one control variable, InstSh, is negatively and statistically significantly related to NPLs ($p < 0.01$). In contrast, BkAge is positively and signifi-

Table 5 Estimations of static panel data regression models

Regressors	Model 1: Fixed effects model (Individual effect of ICGM on NPLs)			Model 2: Fixed-effects model (Collective effect of ICGM on NPLs)			Model 3: Random-ef- fects model		
	Coef. (β)	Std. Err.	$p > t$	Coef. (β)	Robust Std. Err.	$p > t$	Coef. (β)	Robust Std. Err.	$p >$ lzl
Intercept	–	–	–	–5.371	3.141	0.089	–62.834	13.129	0.000
BdSize	–0.073	0.074	0.326	–0.111	0.049	0.026	–0.113	0.080	0.154
BdMeet	–0.076	0.030	0.013	–0.015	0.020	0.445	–0.011	0.015	0.478
INEDs	–0.025	0.025	0.308	–0.026	0.019	0.160	–0.030	0.018	0.091
SizeAudC	–0.920	0.182	<0.01	–0.363	0.126	0.004	–0.373	0.215	0.083
IndAudC	0.013	0.010	0.200	–0.011	0.007	0.116	–0.012	0.009	0.164
AudcM	–0.157	0.034	<0.01	0.003	0.024	0.903	–0.002	0.032	0.953
InstSh	0.027	0.017	0.118	–0.040	0.012	<0.01	–0.037	0.022	0.092
BkAge	0.499	0.026	<0.01	0.430	0.069	<0.01	0.114	0.043	0.008
BkSize- <i>ln</i>	2.087	0.188	<0.01	0.346	0.257	0.179	0.283	0.192	0.141
PLL	0.426	0.092	<0.01	0.031	0.063	0.620	0.031	0.077	0.689
DivOp	–2.415	1.153	0.037	–0.065	0.736	0.930	–0.016	0.575	0.978
Gdpg	–0.039	0.091	0.666	0.132	0.098	0.181	1.481	0.319	0.000
Unemploy	2.444	0.227	<0.01	0.487	0.441	0.270	10.066	2.207	0.000
IntRate	0.001	0.018	0.945	0.002	0.011	0.877	2.103	0.540	0.000
Year Dummy	No			No (F=0.50, $p > 0.05$)			Yes (F=19.73, $p < 0.01$)		

cantly related to NPLs ($p < 0.01$). Finally, model 3 in Table 5 presents estimates from the random-effects model, which provide evidence that INEDs and SizeaudC have a negative and statistically significant impact on NPLs ($p < 0.10$). These results support H_3 and H_4 , respectively. Four control variables—BkAge, Gdpg, Unemploy, and Intrate—are positively and significantly related to NPLs, while InstSh has a negative and statistically significant impact on NPLs.

4.5 Results of System Generalized Method of Moments (GMM)

Table 6 presents estimates of the efficacy of ICGMs in controlling NPLs, using the system GMM model as specified in Model 4. The results reveal a statistically significant positive effect of NPLs_lag1 on NPLs ($\beta = 0.7962$, $p \leq 0.01$), confirming the dynamic endogenous relationship between ICGMs and NPLs. Consequently, we rely on the system GMM model results rather than the fixed- and random-effects models, as the latter are deemed inconsistent and inefficient.

Table 6 reveals a statistically significant negative regression weight for BdMeet on NPLs ($\beta = -0.0799$, $p < 0.05$), supporting H_2 . This result implies that a unit increase in BdMeet leads to a 0.0799 decrease in bank NPLs. The regression weight of SizeaudC on NPLs is also negative and statistically significant ($\beta = -0.4107$, $p < 0.05$), supporting H_4 and indicating that a one-unit increase in SizeaudC results in a 0.4107 decrease in bank NPLs. None of the other ICGMs under study (e.g., BdSize, INEDs, IndaudC, and AudcM) are significantly related to NPLs ($p > 0.10$).

Table 6 Estimations of system GMM

	Coef. (β)	Corrected Std. Err.	<i>t</i>	<i>P</i> > <i>t</i>
NPLs_lag1	0.7962	0.2144	3.71	0.001
BdSize	-0.0092	0.0774	-0.12	0.906
BdMeet	-0.0799	0.0350	-2.28	0.030
INEDs	0.0177	0.0238	0.75	0.462
SizeaudC	-0.4107	0.1997	-2.06	0.049
IndaudC	-0.0080	0.0123	-0.65	0.519
AudcM	-0.0553	0.0407	-1.36	0.185
InstSh	-0.0323	0.0163	-1.98	0.058
BkAge	0.2392	0.0946	2.53	0.017
BkSize- <i>ln</i>	-0.2383	0.8271	-0.29	0.775
PLL	-0.2683	0.2126	-1.26	0.217
DivOp	1.4318	2.1985	0.65	0.520
Intrate	-0.2737	0.0892	-3.07	0.005
_cons	0.7374	7.6788	0.1	0.924
Number of obs.			260	
<i>F</i> (20, 28)			13.03***	
Number of groups/instruments			29/27	
Arellano-Bond test for AR(1) (<i>p</i> -value)			0.021	
Arellano-Bond test for AR(2) (<i>p</i> -value)			0.094	
Hansen test (χ^2) of overid. restrictions (<i>p</i> -value)			0.239	

Gdp_g and Unemploy variables were dropped due to collinearity

****p*<0.01

Among the control variables, InstSh has a negative and statistically significant effect on NPLs ($\beta = -0.0422$, $p < 0.05$), implying that bank NPLs fall by 0.0422 for every unit increase in InstSh. Additionally, Intrate is negatively and statistically significantly related to NPLs ($\beta = -0.2737$, $p < 0.01$), indicating that a one-unit increase in Intrate results in a 0.2737 decrease in bank NPLs. However, BkAge is found to affect NPLs positively and significantly ($\beta = 0.2392$, $p < 0.05$), suggesting that a one-unit increase in BkAge leads to a 0.2392 increase in bank NPLs. The remaining control variables, such as BkSize-*ln*, PLL, DivOp, and Gdp_g, show statistically insignificant coefficients for NPLs.

The post-estimation tests in Table 6 provide strong evidence of the GMM model's validity and robustness. The Hansen test is statistically insignificant ($p > 0.05$), with the *p*-value falling within the optimal range ($0.1 \leq \chi^2 < 0.25$), confirming the validity of the instruments. This indicates that the instruments are uncorrelated with the error term and not endogenous. The Arellano-Bond test for AR(1) is statistically significant ($p < 0.05$), while the AR(2) test is not ($p > 0.05$), suggesting no second-order serial autocorrelation. These results from the Hansen and Arellano-Bond tests validate the GMM model and ensure the consistency and efficiency of the findings.

5 Discussion

We assessed the effectiveness of ICGMs in controlling non-performing loans (NPLs) in the Bangladeshi banking sector. The discussion is based on the results of the GMM model, which addresses dynamic endogeneity bias and provides reliable results. Our study found that all listed banks in the investigation adhered to the required board size. They also conducted frequent board meetings and maintained the mandated number or percentage of independent directors, as recommended by the Bangladesh Securities and Exchange Commission (BSEC).

Board meetings proved to be an effective corporate governance mechanism for controlling NPLs, as expected. This suggests that higher board meeting frequency helped reduce NPLs in listed banks in Bangladesh. A potential reason for this is that effective communication, transparency, and accountability during board meetings enable the early identification of credit risks and support the development of proactive risk management strategies, which, in turn, help reduce NPLs. This result supports the tenets of agency theory, which suggest that frequent audit committee meetings enable board members to discuss credit assessments and monitor loan distribution, thereby improving credit quality and mitigating NPLs. These findings are consistent with the empirical results of Balagobei (2019) and Islam (2020a). However, a critical question arises regarding the temporal effect of board meeting frequency on NPLs: it remains unclear whether banks held frequent board meetings before or after experiencing a surge in NPLs. If the meetings occurred beforehand, directors may have implemented preventive measures, such as monitoring credit activity, increasing board oversight, improving management quality, and assessing loan risks, which could have led to a reduction in NPLs. On the other hand, if the meetings took place after the rise in NPLs, the board might have convened to identify the causes and implement corrective actions, explaining the subsequent reduction in NPLs. Regardless of the timing, board meetings appear to help control NPLs. The negative effect of board meetings on NPLs supports agency theory, as frequent meetings may reduce NPL risk by carefully reviewing the loan portfolio and ensuring prudent lending practices.

Contrary to expectations and prior studies by Fiador and Sarpong-Kumankoma (2021), Aslam et al. (2021), Maria et al. (2016), Sameera and Wijesena (2018), Islam (2020a), and Ali (2018), board size failed to control the NPLs in listed Bangladeshi banks. This result suggests that board size does not ensure accountability or transparency in credit activities. One possible explanation is that board members may lack the competence or experience to detect and manage credit risk issues, making NPLs uncontrollable. This result contradicts both resource dependence and agency theories.

The lack of expertise or strategy among bank boards could be linked to deficiencies in the country's Corporate Governance Code. While the code addresses the role of independent directors, the Bangladesh Securities and Exchange Commission (BSEC) provides little guidance on the qualifications and skills of other board members. Circular No. 11 of the Banking Regulation and Policy Department (2013) stresses the need for competent board members. However, it lacks a clear definition, which may allow underqualified individuals to serve on boards.

Board composition in the banking sector is heavily influenced by sponsor families who prioritize loyalty over professional expertise (Ahmed 2010; Hossain 2020). This focus on loyalty over qualifications may result in a board that lacks the professional expertise needed for effective governance. As a result, the governance of commercial banks may suffer, hindering the oversight of credit strategies and management of non-performing loans.

Contrary to Sadaa et al. (2023), Aslam et al. (2021), Fiador and Sarpong-Kumankoma (2021), Tarchouna et al. (2017), Sameera and Wijesena (2018), Al Zobi et al. (2019), and Islam (2020a), independent non-executive directors have proven ineffective in controlling NPLs. This result contradicts agency, stakeholder, and signaling theories. It suggests that independent directors failed to mitigate management's risky behavior, oversee loan demand risk appraisal, and signal the banks' commitment to responsible governance. Several factors may explain the ineffectiveness of independent directors. One possible reason is the failure to appoint qualified individuals to these positions. Additionally, unattractive financial incentives and potential conflicts of interest between independent directors and shareholders in the Bangladeshi banking sector may be contributing factors. Independent directors may also be ineffective due to their limited engagement, lack of expertise, and reduced autonomy within the board. In the Bangladeshi banking sector, concentrated ownership and sponsor-director influence often lead to the selection of highly loyal but less independent directors. This compromises their ability to fulfill their responsibilities. Political affiliations, especially in state-owned banks, can further influence the appointment of directors. Political interests may be prioritized over stakeholder interests. As a result, independent directors may focus on political concerns, potentially overlooking minority shareholders and innovative ideas.

As expected, and consistent with the findings of Poudel and Hovey (2012) and Abubakar et al. (2015), our study finds that the size of the audit committee significantly reduces NPLs in the sample banks. Larger audit committees are associated with better oversight and control of NPLs, likely due to enhanced risk detection and greater accountability in lending practices. The presence of more members, particularly those with financial expertise, enhances the committee's ability to identify and mitigate potential credit risks, thereby reducing the factors that contribute to NPLs. This finding aligns with the principles of agency theory and resource-dependence theory.

In contrast, audit committee independence and audit committee meetings were found to be ineffective in controlling the NPLs of the sample banks. These findings contradict those of Akter et al. (2021), Sen et al. (2022), and Amin et al. (2019), who reported a positive impact of audit committee independence and meetings on NPL control in listed banks in Bangladesh. The differences in results may be explained by our approach to addressing the dynamic endogeneity problem arising from the relationship between ICGMs and NPLs.

The result related to audit committee independence suggests that the committee faces constraints on its autonomy. These constraints may include limited authority or resources. Deficiencies in the corporate governance structure in Bangladesh could have contributed to the ineffectiveness of audit committee independence within the banking sector. Since a subcommittee is appointed by a board controlled by sponsor-

directors, the committee's independence is questionable. Committee members, chosen by and reporting to the board, may struggle to act impartially. This could lead to decisions that favor personal interests over shareholder concerns. In fact, audit committee independence may largely involve adhering to a code that ensures "procedural independence," rather than genuinely enhancing the committee's effectiveness, which requires "substantive independence" (Salehi 2020).

There are several reasons why audit committee meetings may not have contributed to tracking and controlling credit risks. One reason could be the lack of a proactive, risk-oriented approach during the meetings. Another possibility is that the meetings focused more on compliance rather than identifying and preventing NPL risks, as supported by Salehi (2020). Furthermore, a lack of financial literacy could be another contributing factor. This issue may be linked to the inadequate enforcement of the Bangladesh Code of Corporate Governance. According to the Bangladesh Securities and Exchange Commission (2006, amended in 2012 and 2018), all audit committee members should be "financially literate" (able to understand financial statements). At least one member should have a background in accounting or related financial management fields, with a minimum of ten years of relevant experience. However, the reality differs from this ideal. As shown in Akter et al. (2021), on average, 40% of audit committee members lacked financial experience, and some had none at all during the 2013–2017 period. Only one-third of committee members had professional qualifications, while two-thirds were financially literate.

Among control variables, we found that institutional shareholding (InstSh) negatively affects NPLs. This result suggests that higher levels of institutional ownership in a bank are associated with lower levels of NPLs. A possible explanation for this effect is that institutional investors, due to their significant stake and interest in the bank's financial performance, are more likely to exercise better oversight and enforce stricter risk management practices. This, in turn, reduces managerial discretion, leading to more prudent lending practices and fewer NPLs. This result is expected and consistent with the tenets of agency theory. According to agency theory, institutional investors can reduce managerial discretion and improve governance practices, thereby encouraging better risk management and reducing the likelihood of NPLs (Jensen and Meckling 1976).

Bank age (BkAge) is positively related to NPLs. This may be explained by resource-dependence theory, which suggests that older banks may face legacy issues, such as outdated risk management practices, leading to higher NPLs (Pfeffer and Salancik 2011). Additionally, older banks may increase loan disbursements, raising the likelihood of lending to weaker borrowers and resulting in more loan defaults (Pradhan et al., 2019). These findings align with studies by Shan and Xu (2012), Misra and Dhal (2010), Pradhan et al. (2019), and Akter et al. (2021). Finally, we found a negative effect of real interest rates (Intrate) on NPLs, suggesting that as real interest rates rise, NPLs decrease. These findings are rather difficult to interpret because higher interest rates typically increase the cost of borrowing, which could strain borrowers' ability to repay loans, potentially leading to more defaults. However, our results imply the opposite effect, which could be explained by the possibility that higher interest rates incentivize borrowers to repay loans more dili-

gently, or that rising rates are a sign of improving economic conditions that reduce default risks. However, this explanation is situational and context-dependent.

6 Conclusion

In this study, we examined the effectiveness of internal corporate governance mechanisms in controlling non-performing loans of listed banks in Bangladesh. The analysis used a panel data set comprising 29 banks listed on the Dhaka Stock Exchange, with 261 bank-year observations from the period 2013–2021. Unlike prior Bangladeshi studies on corporate governance mechanisms and non-performing loans, we employed the system GMM over the traditional static panel data regression models, such as the fixed-effects, and random-effects models. Like the system Generalized Method of Moments (GMM), traditional static panel data regression models are unable to address dynamic panel bias and endogeneity. Consequently, this leads to inaccurate conclusions about how internal corporate governance measures impact non-performing loans.

We found that board meetings and the size of the audit committee were effective internal corporate governance mechanisms for controlling non-performing loans in the listed banks of Bangladesh. However, other mechanisms under study, such as board size, board independence, audit committee independence, and audit committee meetings, were found to be ineffective. The reasons could be attributed to poor implementation of bank governance mechanisms due to high control of the sponsor-directors over the board, undue political intervention, and agency problems between the board and minority. Also, some loopholes, such as the board of directors' inexperience and lack of relevant qualifications, may account for the ineffectiveness of the board-related bank governance mechanisms in controlling the non-performing loans of the listed banks in Bangladesh.

The findings of this study make significant contributions to the existing literature on corporate governance and non-performing loans in several ways. Firstly, unlike previous Bangladeshi studies, our research addresses dynamic panel bias and endogeneity, providing a more accurate understanding of the effects of internal corporate governance mechanisms on non-performing loans at listed banks in Bangladesh. Secondly, our study presents evidence indicating that most of the bank governance mechanisms under investigation were ineffective in controlling non-performing loans. This ineffectiveness may stem from various weaknesses in bank governance, including insufficient enforcement of the Code of Corporate Governance, a highly concentrated ownership structure, and undue political influence on the board. The study suggests directions for regulatory bodies and other stakeholders to revise and enforce the code more effectively, thereby enhancing accountability and transparency in banking activities, especially in credit management. Finally, the findings offer insights for the government of Bangladesh to amend the necessary legal framework to reduce the magnitude of non-performing loans and ensure the financial health of banks, thereby contributing to the overall economic development of the country.

Despite these potential contributions, a crucial limitation of the study is the exclusion of non-listed banks engaged in credit operations. A substantial volume of non-performing loans can be attributed to these banks. Therefore, future research should include both listed and non-listed banks involved in credit operations. This will allow for a more comprehensive evaluation of the effectiveness of internal corporate governance mechanisms in controlling non-performing loans.

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Declarations

Conflict of interest M.K. Hossain, F. Rahman, U. Golder and H. Kabir declare that they have no competing interests.

Ethical standards For this article no studies with human participants or animals were performed by any of the authors. All studies mentioned were in accordance with the ethical standards indicated in each case. We affirm that we have followed the Ethical Standards as outlined on the SBUR website.

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