

Akhter, Nazmoon

**Article**

## Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence

Cogent Economics & Finance

**Provided in Cooperation with:**

Taylor & Francis Group

*Suggested Citation:* Akhter, Nazmoon (2023) : Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 11, Iss. 1, pp. 1-19,  
<https://doi.org/10.1080/23322039.2023.2194128>

This Version is available at:

<https://hdl.handle.net/10419/304032>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by/4.0/>

# Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence

Nazmoon Akhter

**To cite this article:** Nazmoon Akhter (2023) Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence, Cogent Economics & Finance, 11:1, 2194128, DOI: [10.1080/23322039.2023.2194128](https://doi.org/10.1080/23322039.2023.2194128)

**To link to this article:** <https://doi.org/10.1080/23322039.2023.2194128>



© 2023 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



Published online: 01 Apr 2023.



[Submit your article to this journal](#)



Article views: 6564



[View related articles](#)



[View Crossmark data](#)



[Citing articles: 13 View citing articles](#)



Received: 03 August 2022  
Accepted: 18 March 2023

\*Corresponding author: Nazmoon Akhter, Department of Business Administration, BGC Trust University, BGC Biddyanagar, Chandanaish, Chattogram, Bangladesh  
E-mail: [akhternazmoon@gmail.com](mailto:akhternazmoon@gmail.com)

Reviewing editor:  
David McMillan, University of Stirling, United Kingdom

Additional information is available at the end of the article

## FINANCIAL ECONOMICS | RESEARCH ARTICLE

# Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence

Nazmoon Akhter<sup>1\*</sup>

**Abstract:** Non-performing loan (NPL) is a red flag, providing signal of jeopardize for a country's economy. With respect to increase in NPLs, banking sector of Bangladesh has trapped in gridlock. This problem has become an alarming issue for bank's sustainability. The present study investigates the determinants of commercial bank's NPLs in Bangladesh. Due to data deficiency, the study collects data from 30 sampled commercial banks in Bangladesh over the period from 2011 to 2020, as during 2011, the total scheduled commercial banks in Bangladesh were 34. The study performs Random Effect Regression Model, Fixed Effect Regression Model, and one step GMM system to get the robust and significant result. The study reports that firm-specific factors like lag of NPLs, loan loss provision to total equity ratio, equity-to-total asset ratio, capital adequacy ratio, net loan to total deposit and borrowing ratio, return on equity, and macroeconomic factors such as inflation, and GDP ratio are the crucial determinants of NPLs in Bangladesh. The study concludes that commercial banks should operate its activities more efficiently and avoid reckless lending along with mandatory capital requirement in order to reduce NPLs and to ensure profit for their shareholders. The analysis of the study would provide insight guidelines regarding bank's credit risk management procedures and systems to country's regulatory body in order to design and adopt required prudential regulations in credit policy.

**Subjects:** Banking; Economics; Business, Management and Accounting

**Keywords:** NPLs; firm-specific and Macroeconomic factors

### ABOUT THE AUTHOR



Nazmoon Akhter

Nazmoon Akhter is an Assistant Professor in Department of Business Administration of BGC Trust University Bangladesh. Her research interest includes various sectors of banking systems, monetary, exchange rates and foreign exchange reserves.

### PUBLIC INTEREST STATEMENT

NPLs mean such type of loan which has not received payments for three months, though specific contract terms may change occasionally. This loans creates jeopardizes situation in banking sectors. As a banking crisis indicator NPLs ratio decreases the bank's credit growth which disrupts in country's economic stability. The strongest economy becomes fragile because of high NPLs. Thus, it is imperative to analyze the determinants, the firm-specific and the macroeconomic ones, to design and adopt required prudential regulations in credit policy.

## 1. Introduction

Banking sector is the main pillar of financial intermediation which plays a key role in fostering economic growth and subsequently development of a country. High economic growth is recorded when in a country's economy includes well-functioning banking system (J. Zhang et al., 2012). Thus, being a dominant part of a country's economic, banking system must be focused on credit management system and bank's activities need to be supervised and monitored strictly. However, a country's economic stagnation problems arise mainly from non-performing loans (NPLs) of the banks where NPLs mean such type of loan which have not received payments for three months, though specific contract terms may change occasionally. These loans are considered as default loans or are in danger of defaulting when payments are no longer able to made. NPLs creates jeopardizes situation in banking sectors. Increased NPLs is a precursor in case of crippling an economy's performance (Nkusu, 2011). A country's economy becomes financially vulnerable due to credit market friction resulting from nonNPLs (Naili & Lahrichi, 2020; Nkusu, 2011). Moreover, NPLs' impact is more on socio-economic sector than inflation. While the country is in the trajectory of economic boom along with all the social indicators on positive note, the NPLs are denting in a very bad way. Other way, weak economic activities, vulnerable monetary and fiscal policy, and increased inflation rate, increases the bank's credit risk exposure which consequently becomes a threat for financial stability for both the bank and the whole economy (Anita et al., 2022).

The pivot reason behind credit risk is increasing NPLs as financial institutions especially banks are directly affected by NPLs. For instance, financial crisis of Asia during 1997 and 2007–2008 are generated from NPL falling banking system in unstable situation (Anita et al., 2022). As a banking crisis indicator, NPLs ratio decreases bank's credit growth (Reinhart & Rogoff, 2010) which disrupts in country's economic stability (Ivanović, 2016). Additionally, increased NPLs increase restraints for interest revenues, decrease investment opportunities and highly influence liquidity crisis increasing country's bankruptcy (Anita et al., 2022). Further, high NPLs affect commercial banks and consequently become commercial banks' credit risk exposure to jeopardize both financial systems and economy of the country (Souza & Feijó, 2011). The strongest economy becomes fragile because of high NPLs (Naili & Lahrichi, 2020). Such dangerous consequence has recently dragged attention of various researchers on bank's NPL (Bacchiocchi et al., 2022; Ferreira, 2022; Golitsis et al., 2022).

NPLs directly related with bank failure is initially arisen from poor appraisal and inadequate follow-up and supervision of the loan disbursed. According to Adhikari (2006), NPLs of banks raise due to the lack of effective monitoring and supervision on bank's behalf, lack of effective lenders' recourse, weaknesses of legal infrastructure and lack of effective debt recovery strategies. Further, he reports that high level of NPLs reduces banks' overall credit quality. In this regard, Kroszner (2002) reports that in high NPLs, Bank resists to provide additional credit because of insufficient capital which will further weaken the production sector of the economy. Haneef et al. (2012) examine the impact of risk management on NPLs and profitability of banking sector of Pakistan and report that lack of risk management causes high NPLs which is a threat for banks' profitability. The study suggested that banks can avoid NPLs by adopting methods suggested by the central banks of respective country. Based on the sample of 20 deposit banks in turkey for 2006–2012 period, Isik and Bolat (2016) show that among the bank specific variable solvency, profitability, credit quality, diversification, economic growth and the recent financial crisis are important indicators of NPLs rate in Turkish banking sector. They conclude that higher profitability and revenue diversification reduce problem loan, higher capital and loan loss provisions leads to higher problem loan. In a high NPLs condition, bank tends to increase the asset quality than distributing credit and raise provision for loan loss that reduce the bank's both revenue and funds for new lending. Such unavailability of credit for investment opportunity might trigger the business failure which in turn deteriorates the quality of bank loans, resulting in a re-emerging of banking or financial failure.

Bangladesh, being a developing country and with an underdeveloped capital market, mainly depends on the intermediary role of commercial banks for mobilizing funds. But in recent years,

commercial banks in Bangladesh have faced serious problems due to increase in NPLs at an increasing rate. According to Fonseka (2009), the banking system of Bangladesh faced the highest and then Sri Lanka experienced second highest NPLs among Indonesia, Malaysia, Thailand, Bangladesh, Sri Lanka and Philippines. During 2011 to 2021, the NPLs have increased by a significant amount of 338.21% (Bangladesh Bank, 2011, 2021). In the banking industry, the ratio of gross NPLs to total outstanding has been maintaining steady average of 34.45% during this period (Bangladesh Bank, 2011, 2021). In 2021, the gross NPL ratio to total loan of the banking sector has increased to 6.49% due mainly to increase in total classified loan, defaulted outstanding and non-recovery of the interest charged on loans (Bangladesh Bank, 2011, 2021). According to Bangladesh Bank Report, the Stated-Owned Commercial Banks' (SCBs) NPLs are high as compared to Private Commercial Banks (PCBs), because of providing substantial loans on consideration other than commercial criteria (Bangladesh Bank, 2011, 2021). The growing NPL volume has potentiality to happen myriad negative condition on the country's economy by increasing dollar crisis if the bank loan figures over the threshold (Rahman, 2022). Thus, increased level of NPLs in banking sector of Bangladesh negatively affects the whole credit system of the country (Adhikari, 2006). For that reason, to minimize NPLs, factors that influence NPLs are required to determine. Various categories of determinants like firm-specific determinants (Bank capitalization, Bank size, Bank efficiency, Bank performance, Loan growth, Bank diversification, CEO compensation, Bank's overconfidence, Corporate social responsibility, etc.) (Khan et al., 2020; Naili & Lahrichi, 2020, 2022) and system-wide/macroeconomic factors (GDP growth, unemployment, Inflation, etc.) (Giammanco et al., 2022; Naili & Lahrichi, 2020, 2022) affect the banks' NPLs.

A comprehensive study expressed that despite a significant number of researches made to explore banks' credit risk determinant, the imperative determinant of NPLs still remains unsolved (Naili & Lahrichi, 2022). Unfortunately, research works are very few on the factors to determine NPLs of commercial banks especially in Bangladesh. For that reason, it becomes difficult to know how to decrease bank's NPLs to reduce bank crisis. On the other hand, the research works conducted in this field could not cover all internal sector of banking system properly. Thus, it has become crucial for banks to find out what factors are responsible for and what steps should be taken to cope with increasing NPLs. Therefore, the present study is needed to carry out to identify the factors which affect the NPLs of commercial banks in Bangladesh.

The purpose of this study is to find out the determinants of NPLs of commercial banks in Bangladesh. In this case, both firm-specific determinants and macroeconomic determinants of commercial are considered to draw a complete scenario of the influential factors of banks' NPLs in Bangladesh.

To conduct the research, 30 scheduled commercial banks in Bangladesh are taken into consideration with the periods of 10 years, from 2011 to 2020. More specifically, the study tries to investigate the following research questions:

- Do firm-specific factors such as bank size, capital adequacy, provisioning policy, credit advancement policy and profitability of commercial banks affect their NPLs?
- Do macroeconomic factors like GDP and inflation of Bangladesh affect the NPLs of commercial banks in Bangladesh?

The research contributes and improved the literature through considering both firm-specific and macroeconomic factors of commercial banks in Bangladesh to identify bank's continued growing NPLs using recent year's information. Additionally, the study follows panel data to represent the objective about the influential determinants of commercial bank's NPLs. Moreover, the study focuses on crucial factors of banks' NPLs from three perceptions. First, it concentrates on theoretical perspective to establish evidence-based knowledge on both firm-specific and macroeconomic factors of commercial banks for explaining the high level of banks' NPLs. Second, the original value of the study is using data of Bangladesh's commercial banks to represent how both firm-specific

and macroeconomic factors influence the bank's NPLs. Finally, the study provides guidelines for policy formation in terms of controlling bank's NPLs.

The paper is organized into different sections as follows: Section 2 represents the literature background and develops hypothesis. Section 3 introduces research design. Section 4 presents the findings and analysis, while Section 5 provides the conclusions.

## 2. Literature review

### 2.1. Theoretical background

Banks as an intermediary bear various transaction costs in their primary business. Banks' ability regarding managing risk and ameliorating asymmetric information between bank's borrower and lender has impact on bank's operating efficiency associated with their services delivery (Laryea et al., 2016). Information asymmetries role in credit market influences lending practices and economy policy (Stiglitz & Weiss, 1981) where such information friction leads to deteriorate credit market condition by creating inefficiency through underinvestment or overinvestment at both microeconomic and macroeconomic levels (Bernanke & Gertler, 1989).

Information asymmetry can be in two main forms like adverse selection and moral hazard, where adverse selection results from pre-contractual asymmetric information and moral hazard indicate post-contractual asymmetric information (Milgrom & Roberts, 1992). Adverse selection is occurred when borrower select high risky projects with high default rate probability for investment (Laryea et al., 2016). Moral hazard indicates borrower's ability to take actions which are not noticeable by bank. Borrowers such as less-riskier drop out from market competition because of fearing about negative return when market interest is higher than an expected level (Laryea et al., 2016). Moreover, most investors prefer high-risk project to low-risk project; try to ignore negative return probability of low-risk project when market interest rate is high (Laryea et al., 2016). Thus if information asymmetries are not handled properly, credit risk must be escalated. Such practices are especially dangerous for banks as banks' profitability is mainly depend on providing loan on interest. Therefore, the present study tries to investigate what factors affect banks' credit risk where NPL is to measure banks' credit risk.

### 2.2. Determinants of NPLs

The literature reviews on the determinants of NPLs are categorized into two form: firm-specific determinants and system-wide/macroeconomic determinants (Naili & Lahrichi, 2022), whereas some authors give their attention only on one of the two categories (Bofondi & Ropele, 2011; T. Beck et al., 2013); other studies consider both categories as important in explaining NPLs (Louzis et al., 2012; Messai & Jouini, 2013; Salas & Saurina, 2002).

### 2.3. Firm-specific determinants

#### 2.3.1. Bank Size

Natural logarithm of the total assets ratio of bank is used to measure bank size as such measure indicates the banks' capital strength for a particular year (Durguti, 2020). Bank's size reduces its NPLs (Hu et al., 2004). Such finding is consistent with Salas and Saurina (2002) and Hasmiyana and Pintor (2022) who found the existence of negative relationship between size of bank and NPLs, indicating that more diversification is allowed by larger banks to reduce bank's risk.

**H1:** Bank size has a negative correlation with its NPLs.

### 2.4. Capital Adequacy

Capital adequacy ratio (CAR) is set by The Basel Accord, supervisory bodies of bank to control bank's risk and to protect them from facing insolvent situation through reviewing the banks CAR (EIBannan, 2017). Madugu et al. (2020) stated that banks having higher CAR and a good provision



policy reduce its problem loan. A positive relation between CAR and Bank risk is found by various researches such as Shrieves and Dahl (1992), Blum (1999), Lin et al. (2005), Altunbas et al. (2007), Ahmad et al. (2009), and S. Ghosh (2014). However, no relationship between CAR and banks' risk is shown by Louzis et al. (2012), indicating that for bank's small-sized market in Greece introduces a deterrent to take reckless risk and short-termism because of reputation fact. They argue that regulatory authorities try to follow a supervisory policy on bank's riskiness loan portfolio through which they can control accordingly. Additionally, Delis et al. (2012) found that banks' capital regulation can have a positive or negative impact on its risk based on bank characteristics and other regulations and factors like macroeconomic environment. Moreover, Barra and Ruggiero (2022) stated that in India, the bank's CAR is negatively related with NPLs. The finding is in line with Karels et al. (1989), Jacques and Nigro (1997), Iwatsubo (2007), Agusman et al. (2008), Z. Y. Zhang et al. (2008), Deelchand and Padgett (2010), Agoraki et al. (2011), Zhou (2013), Guidara et al. (2013), Fiordelisi and Mare (2013), Agusman et al. (2014), Maji and De (2015), Nguyen and Nghiem (2015), Chang and Chen (2016), Alnabulsi et al. (2022). To determine capital adequacy, total capital ratio (A. Ghosh, 2017; Naili & Lahrichi, 2022; Rime, 2001; Shrieves & Dahl, 1992) and equity capital to total assets (Amidu & Hinson, 2006; Athanasoglou et al., 2008; Gupta et al., 2021; Kwan & Eisenbeis, 1997; Tan & Floros, 2013) are used. Considering the diverse perspectives among researchers, the study supposes that:

**H2:** *Bank capital has a positive association with NPLs.*

### **2.5. Provisioning policy**

Loan loss provision is a controlling strategy taken by banks for loan loss probability in future. For default loan, provision is maintained which indicates higher NPLs are related with higher provisioning (Durguti, 2020; Hasan & Wall, 2004). Besides, banks anticipation regarding high capital loss rate lead to create higher amount of provision in order to reduce earnings volatility and ensure banks solvency. For this reason, bank manager can maintain provision policy of loan loss to provide a positive signal about banks' performance in future (Ahmad et al., 1999). To assess banks' provisioning policy, loan loss provision to total loan ratio (Aggarwal & Jacques, 2001; Bougategf & Mgadmi, 2016; Gupta et al., 2021) and loan loss provision to total equity ratio (Jahangir & Akhter, 2019; Odunga, 2016) are measured.

**H3:** *Banks' provisioning policy has a positive association with NPLs.*

### **2.6. Credit Advancement Policy**

Bank managers basically seek to expand bank's credit to optimize short-run benefits which in result may create inadequate situation in credit exposures (Castro, 2012; N. Klein, 2013; T. Beck et al., 2013). Total advance to deposit ratio as credit advancement measurement is used by Laryea et al. (2016) to examine the factors of NPL of banks in Africa and found a positive relationship between them, explaining that with increasing credit activities, banks' NPL is also increased. The findings corroborate with Jesus and Gabriel (2006), Dash and Kabra (2010), Espinoza and Prasad (2010), and Festić et al. (2011). However, a negative relation is also found between these variables in various literature (Boudriga, Taktak, et al., 2009; Khemraj & Pasha, 2009; Quagliarello, 2007; Swamy, 2012) explaining that non-performing may be generated from the origin of banking system, certain regulation, specific condition which force banks to become more cautious and conservative in case of extending loan. To measure credit advancement, gross loan to total assets ratio (Jahangir & Akhter, 2019; Kumbirai & Webb, 2010; Odunga, 2016) and net loan to total deposits and borrowings ratio (End, 2016; Jahangir & Akhter, 2019; Odunga, 2016) are used.

**H4:** *Banks' credit advancement policy has a positive association with NPLs.*

### **2.7. Profitability**

Bank profitability can determine bank managers' behavior about risk taking. Banks having high profitability have less forces for creating revenue and consequently less engaged in high credit risk

projects. But inefficient banks have more propensities to experience higher problem loans. Moreover, bank managers having lack of ability to assess and monitor risks are influenced by new and low creditworthiness customer in case of providing loan (Berger & Deyoung, 1997). For these reasons, banks' profitability is negatively related with NPLs (Alnabulsi et al., 2022; Athanasoglou et al., 2005; Brock & Suarez, 2000; Kosmidou & Zopounidis, 2008). As a proxy of profitability, Godlewski (2004) used adjusted return on assets (ROA) ratio and Garcia-Marco and Robles-Fernandez (2007) uses return on equity (ROE) and they found positive relationship between banks' profitability and NPLs. Such findings are consistent with Flamini et al. (2009) and found a positive relationship between banks' profitability and its NPLs, explaining that shareholders who are risk averter focus on risk adjusted returns and try to earn more revenue to compensate bank's credit risk. To determine bank profitability, ROA (Anarfi et al., 2016; Davis & Mathew, 2017; Djalilov & Piesse, 2016; Gupta et al., 2021; Javaid, 2016; P.-O. Klein & Weill, 2017; Tan, 2016) and ROE (Benrquia & Jabbouri, 2021; Jabbouri & Attar, 2018; Louzis et al., 2012; Makri et al., 2014; Naili & Lahrichi, 2022) ratios are considered.

**H5:** Bank profitability has a negative association with NPLs.

## 2.8. System-wide/macroeconomic determinants

Macroeconomic volatility influence NPLs, reflecting a country's undiversified economic nature (Fofack, 2005). As economic growth indicators GDP is a crucial factor for loan quality (De Bock & Demyanets, 2012), a country's lending rate and unemployment rates have a positive influence on NPLs but GDP has negative influence on NPLs (Bofondi & Ropele, 2011; Erdas & Ezanoglu, 2022; Huljak et al., 2022; Messai & Jouini, 2013; Salas & Saurina, 2002). T. Beck et al. (2013) report that large stock markets relative to GDP of a country have a negative impact on bank asset quality in market's bearish period. However, Jara-Bertin et al. (2014) found a positive relationship between GDP and bank credit risk, reflecting borrower's default upsurges, particularly in loan with variable interest under inflationary environment. Such finding is supported by Kasman and Kasman (2015) and Zheng et al. (2017) indicating economic progression period when banks try to take calculative risk to render credit. Another indicator of macroeconomic is inflation which has a positive impact on NPLs (Hoggarth et al., 2005; Jara-Bertin et al., 2014). But Naili and Lahrichi (2022) found negative relationship between inflation and NPLs explaining that inflation increases NPLs especially in floating rate loans indicating high inflation reduce household's revenues real value, constraint their ability to reimburse debts which finally reduce loan quality of bank.

**H6:** GDP has a negative association with NPLs.

**H7:** Inflation has a positive association with NPLs.

Summarizing the mentioned literatures, the present study has focused on the determinants of commercial banks' NPLs in Bangladesh in order to provide insight knowledge on risk management to managers and regulatory body of banking sectors in Bangladesh.

## 3. Research Design

### 3.1. Sample Design

The sample adopts 30 scheduled commercial banks' annual observations in Bangladesh (Table 1) over the period from 2011 to 2020. The study tries to cover most of the scheduled commercial banks in Bangladesh that have available data for at least 10 years, as during 2011, the total scheduled commercial banks in Bangladesh were 34.

### 3.2. Data Collection

In the study, secondary data are collected from the annual reports of the selected scheduled commercial banks in Bangladesh are used which are actually collected from annual report and



**Table 1. Name of selected scheduled commercial banks in Bangladesh**

| Name of Selected Commercial Banks | Name of Selected Commercial Banks                                 |
|-----------------------------------|---|
| AB Bank                           | Mutual Trust Bank Limited   |
| Bank Asia                         | National Bank Limited   |
| Islami Bank Bangladesh Limited    | Prime Bank Limited  |
| Jamuna Bank                       | Eastern Bank Limited  |
| The City Bank Limited             | International Finance Investment and Commerce Bank Limited (IFIC) |
| Southeast Bank Limited            | Janata Bank Limited   |
| Premier Bank                      | Uttara Bank Limited   |
| Social Islami Bank Limited        | Standard Bank Limited   |
| Dutch Bangla Bank Limited         | NCC Bank Limited  |
| ONE Bank Limited                  | Al-Arafah Islami Bank Limited                                     |
| United Commercial Bank            | Trust Bank  |
| Exim Bank                         | Pubali Bank Limited   |
| Brac Bank Limited                 | Shahjalal Islami Bank Limited                                     |
| Dhaka Bank Limited                | Agrani Bank   |
| Mercantile Bank Limited           | Rupali Bank   |

*Author's Survey.*

web site of the respective banks. On the other hand, various articles have been reviewed to select related variables which identify the NPLs of commercial bank.

### 3.3. Methodology and Data Analysis

Initially, descriptive statistics, correlation matrix and test of multicollinearity are run on the study. Then, both Random Effect Model and Fixed Effect Model are performed, and Fixed Effect Regression Model is selected by performing Hausman test (Hausman, 1978). After performing Fixed Effect Regression Model, for diagnostic test, three post-estimation tests are carried out to verify heteroskedasticity, autocorrelation and cross-sectional independence. As the result of diagnostic is not satisfactory, one step GMM system is performed to get the robust and significant result. Here, Statistical software STATA 12 is used to perform all tests and models.

The estimating equation of the autoregressive model took the following form:

$$it = \alpha_{itk} + \sum \sum \beta_{itk} X_{itk} + \varepsilon_{itk}$$

where:  $t = 1 \dots 10$  (time in years)

$i = 1 \dots 30$  (number of banks)

$k = 1 \dots n$  (combination of explanatory variables)

$Y_{it}$  = Non-performing Loans Ratio (NPLs)

$\alpha_{itk}$  = the alpha constant

$\beta_{itk}$  = Coefficient of Bank financial and macroeconomics indicators

$X_{itk}$  = Bank financial and macroeconomics indicators

$\varepsilon_{itk}$  = Estimation error

### 3.4. Variables Measurement

Considering prior literature reviews, the study selects variables to measure NPLs and its determinants (Table 2).

## 4. Findings and Analysis

### 4.1. Descriptive analysis

Table 3 shows the descriptive statistics of the selected variables.

Table 3 reports the summary of the bank specific factors data set for the period of 10 years from 2011 to 2022. The average value of the NPLs is 5.95% with a range of 25.59% to 0.95% which explains that the change in NPLs of the selected commercial banks is adequate. But the NPLs ratio is lower than some developed and developing countries when compared to those observed by N. Klein (2013) and Rajha (2016). The average value of LTA is 25.97 ranging from 22.87 to 27.53. The CA ratio is 12.23% (minimum ratio is 10.5% under base III) ranging from 3.70% to 121.28%, and presents that the sampled banks maintain their capital above the minimum statutory requirement. Besides, The ECTA ratio takes average value as 10.34%, explains in that banks having lower ECTA ratio use their earnings in large proportion for interest payment. The average value of LLPTL and LLPTE is 2.81% and 13.20%, respectively, indicating sampled commercial banks use income at particular portion as provision to tackle credit risk. The average GLTA record was 67.03%, indicates an imprudent lending policy as standard ratio (0.40 or lower) which is preferable as better debt ratio as per pure risk perspective. However, NLTDB's average value is 80.58% reflecting that sampled banks required increasing their efficiency to properly operate credit policies. Here, ROA's average value is 1.09%, explaining low banks' management efficiency. Moreover, ROE's average value is 10.83%, explains that sampled commercial banks offer a good return to their shareholders as compared to the prevailing market

**Table 2. Selected variables**

| Variables                 |           | Elaboration                                  | Signs of Expectation |
|---------------------------|-----------|--|----------------------|
| Dependent Variable        | NPLs      | Non-performing Loans Ratio                   |                      |
| Independent Variable      |           |  |                      |
| Bank Size                 | LTA       | Log of Total Assets                          | -                    |
| Capital Adequacy          | CA        | Total Capital Ratio (Capital Adequacy Ratio) | +                    |
|                           | ECTA      | Equity Capital to Total Assets               | +                    |
| Provisioning policy       | LLPTL     | Loan Loss Provision to Total Loan            | +                    |
|                           | LLPTE     | Loan Loss Provision to Total Equity          | +                    |
| Credit Advancement Policy | GLTA      | Loan Ratio (Gross Loan to Total Assets)      | +                    |
|                           | NLTDB     | Net Loan to Total Deposits and Borrowings    | +                    |
| Profitability             | ROA       | Return on Assets                             | -                    |
|                           | ROE       | Return on Equity                             | -                    |
| Macroeconomic Variables   | GDP       | Yearly Growth of GDP (%)                     | -                    |
|                           | Inflation | Annual average inflation rate (%)            | +                    |

*Author's Contribution.*

**Table 3. Descriptive analysis**

| Variable  | Observation | Mean    | Std. Dev. | Min      | Max     |
|-----------|-------------|---------|-----------|----------|---------|
| NPLs      | 300         | 0.0595  | 0.0423    | 0.0095   | 0.2559  |
| LTA       | 300         | 25.9695 | 0.5948    | 22.8706  | 27.5256 |
| ECTA      | 300         | 0.1034  | 0.1436    | 0.0093   | 1.0000  |
| CA        | 300         | 0.1223  | 0.0771    | 0.0370   | 1.2128  |
| LLPTL     | 300         | 0.0281  | 0.1442    | 0.0006   | 1.9520  |
| LLPTE     | 300         | 0.1320  | 0.3083    | 0.0010   | 3.8223  |
| GLTA      | 300         | 0.6703  | 0.4598    | 0.0058   | 7.0331  |
| NLTDB     | 300         | 0.8058  | 0.1736    | 0.0072   | 1.1213  |
| ROA       | 300         | 0.0109  | 0.0157    | -0.04917 | 0.14658 |
| ROE       | 300         | 0.1083  | 0.2269    | -2.5994  | 1.2183  |
| GDP       | 300         | 0.0670  | 0.0050    | 0.0600   | 0.0758  |
| Inflation | 300         | 0.0704  | 0.0176    | 0.0561   | 0.1105  |

*Author's Computation.*

rates. Additionally, GDP and inflation rates are 6.70% and 7.04%, respectively, means that Bangladesh is in inflationary environment.

#### 4.2. Test of Multicollinearity

The study performs correlation analysis and variance inflation factor to verify multicollinearity.

##### 4.2.1. Correlation Analysis

Pairwise correlation matrix has been performed to examine the relationship between the selected variables of the sampled commercial banks in Bangladesh (Table 4). The results in Table 4 show the correlation of all selected variables. The multicollinearity problem exists when the variables correlation coefficient exceed 0.80 (Pervez & Ali, 2022). The study is free from multicollinearity as no strong relation exists between the variables (Bhowmik & Sarker, 2021). Moreover, all selected variables except ECTA and LLPTL are significantly related with NPLs of the sampled commercial banks in Bangladesh where lags of NPLs, LTA, LLPTE, NLTDB, and GDP are positively and CA, GLTA, ROA, ROE, and inflation ratios are negatively correlated. Additionally, LTA, LLPTE, NLTDB, and GDP are positively significant, and ROE and Inflation are negatively significant with lag of NPLs. ECTA, LLPTE, GLTA, ROA, ROE, GDP, and Inflation are significantly connected with LTA where LLPTE and GDP are positively and ECTA, GLTA, ROA, ROE, and Inflation are negatively related. Besides, LLPTL, GLTA, NLTDB, and ROA are significant and positively related with ECTA. GLTA, NLTDB, and ROA are significantly correlated with LLPTL where GLTA is negatively related and NLTDB and ROA are positively related with LLPTL. ROA and ROE are negatively correlated with LLPTE. Furthermore, NLTDB and ROA are positively correlated with GLTA and ROE is positively correlated with ROA.

##### 4.2.2. Variance Inflation Factor Model

Additionally, variance inflation factor is used to identify multicollinearity in a matrix of explanatory variables. Table 5 shows that VIF factor for all variables is less than 5; explain that there is no multicollinearity between the explanatory variables (Amer et al., 2011).

#### 4.3. Hausman Test

The Hausman test is used to differentiate between fixed effect regression model and random effect regression model in panel data. Random effect is preferred under null hypotheses and fixed effect is preferred under alternative hypotheses. The fixed effect regression model is appropriate in that case (Table 6).

Table 4. Correlation analysis

|           | NPLs       | Lag NPLs   | LTA        | ECTA      | CA      | LLPTL     | LLPTE      | GLTA      | NLTDB   | ROA       | ROE     | GDP     | Inflation |
|-----------|------------|------------|------------|-----------|---------|-----------|------------|-----------|---------|-----------|---------|---------|-----------|
| NPLs      | 1          |            |            |           |         |           |            |           |         |           |         |         |           |
| Lag NPLs  | 0.7522***  | 1          |            |           |         |           |            |           |         |           |         |         |           |
| LTA       | 0.3585***  | 0.3880***  | 1          |           |         |           |            |           |         |           |         |         |           |
| ECTA      | 0.0038     | -0.0106    | -0.3089*** | 1         |         |           |            |           |         |           |         |         |           |
| CA        | -0.115*    | -0.0813    | -0.089     | 0.0029    | 1       |           |            |           |         |           |         |         |           |
| LLPTL     | 0.0711     | 0.0333     | -0.0351    | 0.1886*** | -0.0065 | 1         |            |           |         |           |         |         |           |
| LLPTE     | 0.3932***  | 0.1399**   | 0.1595**   | -0.0754   | -0.0527 | 0.0970    | 1          |           |         |           |         |         |           |
| GLTA      | -0.1192*   | -0.1112    | -0.3855*** | 0.2765*** | -0.0027 | -0.1288*  | -0.0320    | 1         |         |           |         |         |           |
| NLTDB     | 0.4046***  | 0.4010***  | -0.0232    | 0.3691*** | 0.0402  | 0.4030*** | 0.0062     | 0.2405*** | 1       |           |         |         |           |
| ROA       | -0.1785*** | -0.1081    | -0.5428*** | 0.5103*** | 0.0324  | 0.1808*** | -0.2889*** | 0.4741*** | -0.0935 | 1         |         |         |           |
| ROE       | -0.3881*** | -0.1717**  | -0.1768**  | -0.0085   | 0.0533  | -0.0621   | -0.7391*** | 0.0293    | 0.0782  | 0.4618*** | 1       |         |           |
| GDP       | 0.1197*    | 0.1446**   | 0.3638***  | 0.0235    | 0.0089  | -0.0638   | 0.0334     | 0.0004    | 0.1300  | -0.1062   | -0.0008 | 1       |           |
| Inflation | -0.2622*** | -0.4236*** | -0.3628*** | -0.0465   | -0.0619 | -0.0142   | -0.0944    | -0.0119   | 0.0447  | 0.1055    | 0.0933  | -0.4916 | 1         |

Authors' Calculation.

**Table 5. Test of multicollinearity**

**Test of Multicollinearity**

| Variable  | VIF  | 1/VIF  |
|-----------|------|--------|
| ROA       | 3.79 | 0.2636 |
| ROE       | 3.37 | 0.2966 |
| ECTA      | 3.16 | 0.3169 |
| LLPTE     | 2.42 | 0.4132 |
| NLTDB     | 2.17 | 0.4618 |
| LTA       | 2.14 | 0.4682 |
| Lag NPLs  | 1.87 | 0.5360 |
| GLTA      | 1.86 | 0.5362 |
| Inflation | 1.69 | 0.5906 |
| GDP       | 1.52 | 0.6573 |
| LLPTL     | 1.36 | 0.7379 |
| CA        | 1.04 | 0.9582 |
| Mean VIF  | 2.12 |        |

Authors' Computation.

**Table 6. Hausman test result**

**Test: Ho: difference in coefficients not systematic**

|                    |
|--------------------|
| chi2(13) = 177.87  |
| Prob>chi2 = 0.0000 |

Authors' Calculation.

#### 4.4. Empirical Models

The study performs various models such as Random Effect Model, Fixed Effect Regression Model, and GMM One System to get the robust results. The findings of empirical models are as follows: From Table 7, it is observed that the empirical models are at satisfactory level as the level of significance of all models is less than 5%. The study reveals that changes in NPLs are 68.65% under Random Effect Model and 42.70% under Fixed Effect Regression Model as a result of the study variables. Further, the result of the study reports that lag of NPLs, log to total asset ratio, loan loss provision to total equity ratio, net loan to total deposit and borrowing and inflation ratio are positively and equity to total asset ratio, capital adequacy ratio, return on equity and GDP ratio are negatively significant under the mentioned various models.

##### 4.4.1. Firm-specific determinants

**4.4.1.1. Lag of NPLs and NPLs.** The positive significant relationship between lag of NPLs and NPLs report that previous year's NPLs influence current year which increases NPLs of the bank. Such finding is relevant to Zheng et al. (2017) who explained that risk of bank is persistently influenced by its previous years' risk.

**4.4.1.2. Bank Size and NPLs.** The study reports that the relationship between bank size i.e. log of total asset and non-performing loan is positive but insignificant which indicates that large banks are not necessarily more effective in screening loan customers when compared to their smaller competitors. With the increase of bank size, banks tend to use their fund in various proposals with less monitoring loan policy which increases banks' NPL. This finding is similar to the findings of Khemraj and Pasha (2009), Abid et al. (2014) and Rajha (2016) and contradicts to Salas and

**Table 7. Empirical models**

|                 | Random Effect Model     | Fixed Effect Model      | GMM One System          |
|-----------------|-------------------------|-------------------------|-------------------------|
| NPLs            | Coefficient (Std. Err.) | Coefficient (Std. Err.) | Coefficient (Std. Err.) |
| Lag NPLs        | 0.5986 (0.0520) ***     | 0.1927 (0.0588) ***     | 0.4631 (0.0827) ***     |
| LTA             | 0.0058 (0.0042)         | −0.0117 (0.0088)        | 0.0158 (0.0121)         |
| ECTA            | −0.0191 (0.0210)        | −0.0317 (0.0184) *      | 0.0194 (0.0265)         |
| CA              | −0.0155 (0.0225)        | −0.0173 (0.0200)        | −0.0163 (0.0284)        |
| LLPTL           | −0.0125 (0.0137)        | 0.0106 (0.0132)         | 0.0089 (0.0160)         |
| LLPTE           | 0.0308 (0.0086) ***     | 0.0212 (0.0084) **      | 0.0323 (0.0127) *       |
| GLTA            | 0.0014 (0.0050)         | −0.0028 (0.0048)        | 0.0022 (0.0065)         |
| NLTDB           | 0.0423 (0.0144) ***     | 0.0054 (0.0167)         | 0.0033 (0.0199)         |
| ROA             | 0.1781 (0.2108)         | −0.0263 (0.2217)        | 0.1568 (0.3050)         |
| ROE             | −0.0233 (0.0137) *      | −0.0043 (0.0135)        | −0.0161 (0.0200)        |
| GDP             | 0.5423 (0.4158)         | 0.3991 (0.4049)         | −2.0053 (1.1841) *      |
| Inflation       | 0.2328 (0.1253) *       | 0.4504 (0.1368) ***     | 1.4950 (0.7905) *       |
| _cons           | −0.1788 (0.1191) ***    | 0.3659 (0.2275) ***     | −0.2729 (0.2873) ***    |
| Wald chi2(14) = | 427 ***                 |                         | 103.16 ***              |
| F Value         |                         | F(14,166) = 7.61***     |                         |
| Maximum Lag     |                         |                         |                         |
| R-sq: within    | 0.2895                  | 0.3908                  |                         |
| between         | 0.9640                  | 0.7112                  |                         |
| overall         | 0.6865                  | 0.4270                  |                         |

*Authors' Computation.*

Saurina (2002), Hu et al. (2004), Louzis et al. (2012), Alhassan et al. (2014), Naili and Lahrichi (2022), supporting more large amount of diversification (Louzis et al., 2012).

**4.4.1.3. Capital Adequacy and NPLs.** Here, capital adequacy of banks is represented by total capital ratio and equity capital to total asset. CA and ECTA are significant and have a negative relationship with NPLs. Banks seek to avoid risky lending to protect their capital, so improved capital adequacy leads to control banks problem loans. Such findings are supported by N. Klein (2013) and Okyere and Mensah (2022) who explained that low capital has incentives to involve in risky lending as capital limits banks from risky lending (Barth et al., 2004; Boudriga, Boulila, et al., 2009; Singh et al., 2021; Sinkey & Greenawalt, 1991). Banks' performance is responsible for their effective monitoring policy regarding loan proposal assessment (Erdas & Ezanoglu, 2022). The study supports that banks are in undercapitalized increase according to their extra risk exposure (Naili & Lahrichi, 2022). The findings explained that banks having CARs seek to ignore imprudent lending for sustaining their capital (Salas & Saurina, 2002; Us, 2017). Therefore, the findings confirm moral hazard theory indicating that banks which are narrowly capitalized are likely to involve in risky lending with limited screening, which results in high NPL level (Berger & Deyoung, 1997).

**4.4.1.4. Provisioning Policy and NPLs.** The study shows that LLPTE has a positive and significant impact on NPLs ratio indicating that banks allocate fund for provision to cope with unpleasant environment that banks' client will not have ability to properly repay loan on time (Radivojevic & Jovovic, 2017). The result is consistent with Hasan and Wall (2004) and Messai and Jouini (2013). For that reason, funding cost is increased as investors, especially risk adverse, do not prefer to lend such institutions which have low credit quality (Arnould et al., 2019).



**4.4.1.5. Credit Advancement Policy and NPLs.** This study provides significant and negative associations between NPLs and Net loan to deposit ratio. The result indicates that the commercial banks in Bangladesh require to improve a stable funding profile for banks by maintaining a lending to stable resources ratio as per regulatory and Basel III requirements. The result is in line with N. Klein (2013), Makri et al. (2014) and Kumar and Kishore (2019). On the contrary, Caprio and Klingebiel (1996) stated that credit to deposit ratio (CDR) increases stressed loan. However, higher CDR may not be responsible for bad loan only when a good screening procedure for loan proposal along with default lending with low probability is maintained by banks (Mohanty et al., 2018). Such findings indicate that banks try to follow credit management properly and review mechanism for loan's post disbursement. (Mohanty et al., 2018). Therefore, the bank can improve their loan management by concentrating on appraisal system which support loan repayment policy and decline bad debt (Bhowmik & Sarker, 2021).

**4.4.1.6. Profitability and NPLs.** The study reveals that ROE has a negative and significant impact on NPL, explains that profitable banks face less issues on loan repayment system, ensure good management in their operation system. Such case is observed by Godlewski (2004), Fan and Shaffer (2004) and Louzis et al. (2012), explained that banks' loan portfolio, higher profitable banks do not consider borrowers having low creditworthiness. Moreover, banks having high profitability ratio reduce bank's risk substantially (Zheng et al., 2017). The findings support bad management theory, indicating that banks' low profitability is associated with poor management in response to their lending strategies, consequently increase NPLs (Louzis et al., 2012; Merhbene, 2021). Moreover, banks with low profitability have propensity to increase their risk, adopt credit policy more liberally to recover their proceeding loss along with maintaining minimum current profitability, which can be happened only at the cost of increased future NPLs (Bhowmik & Sarker, 2021). Since high profitability banks are in less pressure to produce more income as compared to counterparts, they try to grant less risky lending proposal that reduces their NPLs (A. Ghosh, 2015; Louzis et al., 2012; Singh et al., 2021).

#### **4.4.2. Macroeconomic variables and NPLs**

**4.4.2.1. GDP and NPLs.** The study shows a negative significant relationship between GDP and NPLs which explains that increase in economic growth negatively influences NPL (Anastasiou et al., 2019; Foglia, 2022; Jabbouri & Naili, 2019; Nkusu, 2011; R. Beck et al., 2015; Salas & Saurina, 2002; Zheng et al., 2017). When a country's economic situation is improved by increasing nation's income level, debtor can be able to pay bank loans which reduces bank's NPLs. This scenario is created because of increasing the country's GDP (Muqorrobin et al., 2021; Nasir et al., 2022). The finding is consistent with Mohanty et al. (2018), indicating that with GDP growth, the income level of the borrowers is increased, enabling them to repay the bank loan within stipulated time (90 days norms). At expansionary stage of economic growth, both firm and individual have revenues to fulfill financial obligations (Louzis et al., 2012). At challenged times, most of households and firms have faced loan default situation due to their decreased asset values which provides as collateral, consequently increase NPLs (Naili & Lahrichi, 2022).

**4.4.2.2. Inflation and NPLs.** The study reveals that inflation has a positive relation with banks risk which explains that with the increase in inflation of a country's economy, bank's risk also increases. Households face more challenges for their loan repayment during Inflationary conditions that worsens quality of banks' loan (Naili & Lahrichi, 2022). Such finding is in line with Arpa et al. (2001), Majumder et al. (2018), Singh et al. (2021), but Tan and Floros (2013) have shown insignificant negative effect of inflation on bank's risk. The findings report that increased inflation reduces revenues of household, their ability for loan repayment. Thus, as financial regulators, inflation is crucial issues due to sticky wages (Singh et al., 2021).

### **5. Conclusion**

Commercial bank is the pivot participant in a country's economy, as its productive investment ensures the country's economic sustainability. For that reason, the stability of banking sector is imperative for economic development and resilience against financial crisis. Bank's stability and sustenance are

threatened by its increasing credit risk which results from increasing NPLs. Thus, monitoring NPLs is essential for both individual bank's effectiveness and the economy's financial development. The present study has conducted on the factors that influence the NPLs of commercial banks in Bangladesh.

The analysis of the study implies that the average value of the NPLs is 5.95% with a range of 25.59% to 0.95% reflecting a high disparity between banks. The study explores that changes in NPLs are 68.65% under Random Effect Model and 42.70% under Fixed Effect Regression Model. The study reports show that high capital ratio increases the probability of creating risky loan portfolio that will increase NPLs. In this case, high provision is required to reduce earnings volatility and improve solvency of commercial banks. On the other hand, loan to deposit ratio decreases NPLs indicating commercial banks in Bangladesh need to follow good screening procedure for loan proposal and maintain a stable funding profile by following a lending to stable resources ratio according to bank regulatory and Basel III requirements. Moreover, the study shows negative and significant relationship between NPLs and Profitability of commercial banks which explains that profitability of commercial banks decreases their NPLs. The study concluded that commercial banks should maintain mandatory capital in line with regulatory requirement and avoid imprudent lending which would raise unsecured credits in bank's portfolio, eventually may lead to increase the level of NPLs. As per Haynes et al. (2021), policymakers can impose policy that bank must assess loans in current value without any corruption to control zombie loans. The policy can be successful with the new IFRS-9 standard, stress tests and effective asset quality reviews (AQRs). Besides, in case of macroeconomic determinants, GDP decreases and inflation increases commercial banks' NPLs in Bangladesh explaining that economic growth of Bangladesh increases income level indicating bank's borrowing ability to pay loan in time but the country's inflation increases bank's risk. The study shows that macroeconomic-prudential policies can have a crucial step in controlling NPLs problems (Ari et al., 2021). For example, the initiative of the government of Bangladesh can be desirable regarding monetary policies to reduce high credit rate and restrict bank's risk-taking behavior. Thus, mechanisms and regulations of country level are required to properly monitor bank's risk exposure.

Here, the study does not capture the integrated sectors of commercial banks in Bangladesh to monitor NPLs. The study only focuses on bank specific factors and some macroeconomic factors of commercial banks that influence NPLs. The present study can be extended in several ways. For example, the further study can focus on the relationship by following new econometric models at various time frequencies like the MIDAS (Mixed Data Sampling) model. This would use variables of financial markets such as stock price, VaR, term-spread, etc. on daily basis. For instance, by using a quantile ARDL model (Guo et al., 2021), the study can further explore variables in quantile-specific short term and long term to analyze their impact on NPLs. Additionally, Further research can analyze bank's credit risk by considering banks' stakeholders perspective and apply qualitative research through interviews and structure questionnaires to provide insight knowledge about the major NPLs' determinants. Moreover, the next potential development of the study could include large sample, considering Asian countries, Australia, New Zealand and South Eastern Pacific countries together to provide a global understanding of banking policies and diverse governments rules in banking and financing sectors.

#### Author details

Nazmoon Akhter<sup>1</sup>

E-mail: [akhternazmoon@gmail.com](mailto:akhternazmoon@gmail.com)

<sup>1</sup> Department of Business Administration, BGC Trust University, BGC Biddyanagar, Chandanaish, Chattogram, Bangladesh.

#### Disclosure statement

No potential conflict of interest was reported by the author(s).

#### Citation information

Cite this article as: Determinants of commercial bank's non-performing loans in Bangladesh: An empirical evidence,

Nazmoon Akhter, *Cogent Economics & Finance* (2023), 11: 2194128.

#### References

- Abid, L., Ouertani, M. N., & Ghorbel, S. Z. (2014). Macroeconomic and Bank-Specific Determinants of Household's Non-Performing Loans in Tunisia: A Dynamic Panel Data. *Procedia Economics and Finance*, 13, 58–68. [https://doi.org/10.1016/S2212-5671\(14\)00430-4](https://doi.org/10.1016/S2212-5671(14)00430-4)
- Adhikari, B. K. (2006). *Non-Performing Loans in the Banking Sector of Bangladesh: Realities and Challenges*. Bangladesh Institute of Bank Management (BIBM).

- Aggarwal, R., & Jacques, K. T. (2001). The impact of FDICIA and prompt corrective action on bank capital and risk: Estimates using a simultaneous equations model. *Journal of Banking & Finance*, 25(6), 1139–1160. [https://doi.org/10.1016/S0378-4266\(00\)00125-4](https://doi.org/10.1016/S0378-4266(00)00125-4)
- Agoraki, M. E. K., Delis, M. D., & Pasiouras, F. (2011). Regulations, competition and bank risk-taking in transition countries. *Journal of Financial Stability*. *Journal of Financial Stability*, 7(1), 38–48. <https://doi.org/10.1016/j.jfs.2009.08.002>
- Agusman, A., Cullen, G. S., Gasbarro, D., Monroe, G. S., & Zumwalt, J. K. (2014). Government intervention, bank ownership and risk-taking during the Indonesian financial crisis. *Pacific-Basin Finance Journal*, 30, 114–131. <https://doi.org/10.1016/j.pacfin.2014.07.003>
- Agusman, A., Monroe, G. S., Gasbarro, D., & Zumwalt, J. K. (2008). Accounting and capital market measures of risk: Evidence from Asian banks during 1998–2003. *Journal of Banking & Finance*, 32, 480–488. <https://doi.org/10.1016/j.jbankfin.2006.06.018>
- Ahmad, R., Ariff, M., & Skully, M. J. (2009). The Determinants of Bank Capital Ratios in a Developing Economy. *Asia-Pacific Financial Markets*, 15(3–4), 255–272. <https://doi.org/10.1007/s10690-009-9081-9>
- Ahmed, A. S., Takeda, C., & Thomas, S. (1999). Bank loan loss provisions: A re-examination of capital management, earnings management and signaling effects. *Journal of Accounting and Economics*, 28, 1–26.
- Alhassan, A. L., Kyereboah-Coleman, A., & Andoh, C. (2014). Asset quality in a crisis period: An empirical examination of Ghanaian banks. *Review of Development Finance*, 4(1), 50–62. <https://doi.org/10.1016/j.rdf.2014.03.001>
- Alnabulsi, K., Kozarević, E., & Hakim, A. (2022). Assessing the determinants of non-performing loans under financial crisis and health crisis: Evidence from the MENA banks. *Cogent Economics & Finance*, 10(1), 2124665. <https://doi.org/10.1080/23322039.2022.2124665>
- Altunbas, Y., Carbo, S., Gardener, E. P. M., & Molyneux, P. (2007). Examining the Relationships between Capital, Risk and Efficiency in European Banking. *European Financial Management*, 13(1), 49–70. <https://doi.org/10.1111/j.1468-036X.2006.00285.x>
- Amer, H. M., Moustafa, W., & Eldomiaty, T. (2011). Determinants of Operating Efficiency for Lowly and Highly Competitive Banks in Egypt. Cambridge Business & Economics Conference, Cambridge, UK. ISBN:9780974211428.
- Amidu, M., & Hinson, R. (2006). Credit risk, capital structure and lending decisions of banks in Ghana. *Banks and Bank Systems*, 1, 93–101. <https://essuir.sumdu.edu.ua/bitstream-download/123456789/56878/1/Amidu.pdf>
- Anarfi, D., Abakah, E. J. A., & Boateng, E. (2016). Determinants of bank profitability in Ghana: New evidence. *Asian Journal of Finance & Accounting*, 8(2), 194–204. <https://doi.org/10.5296/ajfa.v8i2.10274>
- Anastasiou, D., Louri, H., & Mike, T. (2019). Nonperforming loans in the euro area: Are core-periphery banking markets fragmented? *International Journal of Finance & Economics*, 24(1), 97–112. <https://doi.org/10.1002/jife.1651>
- Anita, S. S., Tasnova, N., & Nawar, N. (2022). Are non-performing loans sensitive to macroeconomic determinants? An empirical evidence from banking sector of SAARC countries. *Future Business Journal*, 8(7). <https://doi.org/10.1186/s43093-022-00117-9>
- Ari, A., Chen, S., & Ratnovski, L. (2021). The dynamics of non-performing loans during banking crises: A new database with post-covid-19 implications. *Journal of Banking & Finance* Google Scholar, 133, 106140. <https://doi.org/10.1016/j.jbankfin.2021.106140>
- Arnould, G., Pancaro, C., & Zochowski, D. (2019). Bank funding costs and solvency. Working Paper 2356, European Central Bank January, 2019.
- Arpa, M., Giuliani, I., Ittner, A., & Pauer, F. (2001). The influence of macroeconomic developments on Austrian banks: Implications for banking supervision. *Business Papers*, 1, 91–116.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18(2), 121–136. <https://doi.org/10.1016/j.intfin.2006.07.001>
- Athanasoglou, P. P., Sophocles, N. B., & Matthaïos, D. D. (2005). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. Working paper, Bank of Greece, 3–4.
- Bacchiocchi, A., Bischi, G. I., & Giombini, G. (2022). Non-performing loans, expectations and banking stability: A dynamic model. *Chaos, Solitons & Fractals*, 157, 111906. <https://doi.org/10.1016/j.chaos.2022.111906>
- Bangladesh Bank. (2011). Bangladesh Bank Annual Report, 2010–2011.
- Bangladesh Bank. (2021). Bangladesh Bank Annual Report, 2020–2021.
- Barra, C., & Ruggiero, N. (2022). Bank-specific factors and credit risk: Evidence from Italian banks in different local markets. *Journal of Financial Regulation and Compliance*, Emerald Publishing Limited, 1358–1988. <https://doi.org/10.1108/JFRC-04-2022-0051>
- Barth, J. R., Caprio, G., Levine, R., & Ross. (2004). Bank regulation and supervision: What works best? *Journal of Financial Intermediation*, 13(2), 205–248. <https://doi.org/10.1016/j.jfi.2003.06.002>
- Beck, T., Jakubik, P., & Piliou, A. (2013). Non-performing loans. What matters in addition to the economic cycle? European Central Bank Working Paper Series 1515, February.
- Beck, R., Jakubik, P., & Piliou, A. (2015). Key determinants of nonperforming loans: New evidence from a global sample. *Open Economies Review*, 26(3), 525–550. <https://doi.org/10.1007/s11079-015-9358-8>
- Benrquia, Y., & Jabbouri, I. (2021). Performance evaluation of European grocery retailers: A financial statement analysis. *International Journal of Logistics Economics and Globalisation*, 9(1), 24–39. <https://doi.org/10.1504/IJLEG.2021.116230>
- Berger, A. N., & Udell, P. (1997). Problem loans and cost efficiency in commercial banks board of governors of the federal reserve system. *Journal of Banking & Finance*, 21(6), 849–870. [https://doi.org/10.1016/S0378-4266\(97\)00003-4](https://doi.org/10.1016/S0378-4266(97)00003-4)
- Bernanke, B., & Gertler, M. (1989). Agency costs, net worth. *And Business Fluctuations American Economic Review*, 79, 14–31.
- Bhowmik, P. K., & Sarker, N. (2021). Loan growth and bank risk: Empirical evidence from SAARC countries. *Heliyon*, 7(5), e07036. <https://doi.org/10.1016/j.heliyon.2021.e07036>
- Blum, J. (1999). Do capital adequacy requirements reduce risks in banking? *Journal of Banking & Finance*, 23(5), 771–775. [https://doi.org/10.1016/S0378-4266\(98\)00113-7](https://doi.org/10.1016/S0378-4266(98)00113-7)
- Bofondi, M., & Ropele, T. (2011). Macroeconomic Determinants of Bad Loans: Evidence from Italian Banks (March 22, 2011). Bank of Italy Occasional Paper 89, Available at SSRN: <https://ssrn.com/>

- abstract=1849872 or <https://doi.org/10.2139/ssrn.1849872>
- Boudriga, A., Boulila, N., & Jellouli, S. (2009). Banking supervision and nonperforming loans: A cross-country analysis. *Journal of Financial Economic Policy*, 1(4), 286–318. <https://doi.org/10.1108/17576380911050043>
- Boudriga, A., Taktak, N. B., & Jellouli, S. (2009). Bank specific, business and institutional environment determinants of nonperforming loans: Evidence from MENA countries. Paper for ERF Conference on “Shocks, Vulnerability and Therapy”, Cairo.
- Bougatef, K., & Mgdmi, N. (2016). The impact of prudential regulation on bank capital and risk-taking: The case of MENA countries. *The Spanish Review of Financial Economics*, 14(2), 51–56. <https://doi.org/10.1016/j.srfe.2015.11.001>
- Brock, P. L., & Suarez, L. R. (2000). Understanding the behavior of bank spreads in Latin America. *Journal of Development Economics*, 63(1), 113–134. [https://doi.org/10.1016/S0304-3878\(00\)00102-4](https://doi.org/10.1016/S0304-3878(00)00102-4)
- Caprio, G., & Klingebiel, D. (1996). Bank Insolvencies: Cross Country Experience. *The World Bank Policy Research Working Paper Series*, 1620, 1–52.
- Castro, V. (2012). Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI. *Economic Modelling*, 31, 672–683. <https://doi.org/10.1016/j.econmod.2013.01.027>
- Chang, C. P., & Chen, S. (2016). Government capital injection, credit risk transfer, and bank performance during a financial crisis. *Economic Modelling*, 53, 477–486. <https://doi.org/10.1016/j.econmod.2015.10.046>
- Dash, M., & Kabra, G. (2010). The determinants of non-performing assets in Indian commercial bank: An econometric study. *Middle Eastern Finance and Economics*, 7, 94–106.
- Davis, C., & Mathew, J. (2017). Determinants of profitability of private sector bank old and new in India. *Asian Journal of Research in Banking and Finance*, 7(5), 20–33. <https://doi.org/10.5958/2249-7323.2017.00026.8>
- De Bock, R., & Demyanets, M. A. (2012). *Bank asset quality in emerging markets: Determinants and spillovers* (Vols. 12–71). International Monetary Fund.
- Deelchand, T., & Padgett, C. (2010). The Relationship between Risk, Capital and Efficiency Evidence from Japanese Cooperative Banks; International Capital Market Association (ICMA) Center Discussion Papers in FinanceDP 2009-12. November, Henley University of Reading.
- Delis, M. D., Tran, K. C., & Tsionas, E. G. (2012). Quantifying and explaining parameter heterogeneity in the capital regulation-bank risk nexus. *Journal of Financial Stability*, 8(2), 57–68. <https://doi.org/10.1016/j.jfs.2011.04.002>
- Djalilov, K., & Piesse, J. (2016). Determinants of bank profitability in transition countries: What matters most? *Research in International Business and Finance*, 38, 69–82. <https://doi.org/10.1016/j.ribaf.2016.03.015>
- Durguti, E. A. (2020). Challenges of Banking Profitability in Eurozone Countries: Analysis of Specific and Macroeconomic Factors. *Naše gospodarstvo/Our Economy*, 66(4), 1–10. <https://doi.org/10.2478/ngoe-2020-0019>
- EIBannan, M. A. The Financial Crisis, Basel Accords and Bank Regulations: An Overview. (2017). *International Journal of Accounting and Financial Reporting*, 7(2), 225. ISSN 2162-3082. <https://doi.org/10.5296/ijaf.v7i2.12122>
- End, J. W. V. D. (2016). A Macroprudential Approach to Address Liquidity Risk with the Loan-to-Deposit Ratio. *European Journal of Finance*, 22(3), 237–253. <https://doi.org/10.1080/1351847X.2014.983137>
- Erdas, M. L., & Ezanoglu, Z. (2022). How Do Bank-Specific Factors Impact Non-Performing Loans: Evidence from G20 Countries. *Journal of Central Banking Theory and Practice*, Central Bank of Montenegro, 11(2), 97–122. <https://doi.org/10.2478/jcbtp-2022-0015>
- Espinoza, R. A., & Prasad, A. (2010). Nonperforming loans in the GCC banking system and their macroeconomic effects; Working Papers 1–24, IMF.
- Fan, L., & Shaffer, S. (2004). Efficiency versus Risk in Large Domestic US Banks. *Managerial Finance*, 30(9), 1–19. <https://doi.org/10.1108/03074350410769245>
- Ferreira, C. (2022). Determinants of Non-performing Loans: A Panel Data Approach. *International Advances in Economic Research*, 2022. <https://doi.org/10.1007/s11294-022-09860-9>
- Festić, M., Kavkler, A., & Repina, S. (2011). The macroeconomic sources of systemic risk in the banking sectors of five new EU member states. *Journal of Banking & Finance*, 35(2), 310–322. <https://doi.org/10.1016/j.jbankfin.2010.08.007>
- Fiordelisi, F., & Mare, D. S. (2013). Probability of default and efficiency in cooperative banking. *Journal of International Financial Markets, Institutions and Money*, 26, 30–45. <https://doi.org/10.1016/j.intfin.2013.03.003>
- Flamini, V., Schumacher, M. L., & McDonald, M. C. A. (2009). *The determinants of commercial bank profitability in Sub-Saharan Africa* Vols. 9–15, International Monetary Fund
- Fofack, H. (2005). Nonperforming loans in Sub-Saharan Africa: Causal analysis and macroeconomic implications; Policy Research Working Paper 3769, World Bank.
- Foglia, M. (2022). Non-Performing Loans and Macroeconomics Factors: The Italian Case. *Risks*, 10(1), 21. <https://doi.org/10.3390/risks10010021>
- Fonseka, N. (2009). Bouncing back—the opportunities and constraints. In *20th anniversary convention of Association of professional bankers in Sri Lanka*.
- Garcia-Marco, T., & Robles-Fernandez, M. D. (2007). Risk-taking behavior and ownership in the banking industry: The Spanish evidence. *Journal of Economics and Business*, 60(4), 332–354. <https://doi.org/10.1016/j.jeconbus.2007.04.008>
- Ghosh, S. (2014). Risk, capital and financial crisis: Evidence for GCC banks. *Borsa Istanbul Review*, 14(3), 145–157. <https://doi.org/10.1016/j.bir.2014.06.003>
- Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability*, 20, 93–104. <https://doi.org/10.1016/j.jfs.2015.08.004>
- Ghosh, A. (2017). Sector-specific analysis of non-performing loans in the US banking system and their macroeconomic impact. *Journal of Economics and Business*, 93, 29–45. <https://doi.org/10.1016/j.jeconbus.2017.06.002>
- Giammanco, M. D., Gitto, L., & Ofria, F. (2022). Government failures and non-performing loans in Asian countries. *Journal of Economic Studies*, 0144–3585. <https://doi.org/10.1108/JES-06-2022-0348>
- Godlewski, C. (2004). *Capital Regulation and Credit Risk Taking: Empirical Evidence from Banks in Emerging Market Economies*. EconWPA. Finance, 0409030
- Golitsis, P., Khudoykulov, K., & Palanov, S. (2022). Determinants of non-performing loans in North Macedonia. *Cogent Business & Management*, 9(1),



2140488. <https://doi.org/10.1080/23311975.2022.2140488>
- Guidara, A., Lai, V. S., Soumaré, I., & Tchana, F. T. (2013). Banks' capital buffer, risk and performance in the Canadian banking system: Impact of business cycles and regulatory changes. *Journal of Banking & Finance*, 37(9), 3373–3387. <https://doi.org/10.1016/j.jbankfin.2013.05.012>
- Guo, Y., Li, J., Li, Y., & You, W. (2021). The roles of political risk and crude oil in stock market based on quantile cointegration approach: A comparative study in china and us. *Energy Economics* [Google Scholar] [CrossRef, 97, 105198. <https://doi.org/10.1016/j.eneco.2021.105198>
- Gupta, A. D., Sarker, N., Rahman, M. R., & McMillan, D. (2021). Relationship among cost of financial intermediation, risk, and efficiency: Empirical evidence from Bangladeshi commercial banks. *Cogent Economics & Finance*, 9(1), 1967575. <https://doi.org/10.1080/23322039.2021.1967575>
- Haneef, S., Riaz, T., Ramaza, M. A., Ishaq, H. M., & Karim, Y. (2012). Impact of Risk Management on Non-Performing Loans and Profitability of Banking Sector of Pakistan. *International Journal of Business and Social Science*, 3(7), 307–315.
- Hasan, I., & Wall, L. D. (2004). Determinants of the Loan Loss Allowance: Some Cross-country Comparisons'. *Financial Review*, 39(1), 129–152. <https://doi.org/10.1111/j.0732-8516.2004.00070.x>
- Hasmiana, M., & Pintor, S. (2022). The effect of financial risk, capital structure, banking liquidity on profitability: Operational efficiency as intervening variables in Persero bank and private commercial banks. *International Journal of Arts and Social Science*, 5(1), 226–234.
- Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica*, 46(6), 1251–1271. <https://doi.org/10.2307/1913827>
- Haynes, J., Hope, P., & Talbot, H. (2021). Non-Performing Loans–New Risks and Policies. Technical Report, Economic Governance Support Unit (EGOV) at the Request of the Committee on Economic and Monetary Affairs (ECON) European Parliament. [Google Scholar]
- Hoggarth, G., Sorensen, S., & Zicchino, L. (2005). *Stress Tests of UK Banks Using a VARApproach*. Bank of England.
- Huljak, I., Martin, R., Moccero, D., & Pancaro, C. (2022). Do non-performing loans matter for bank lending and the business cycle in euro area countries? *Journal of Applied Economics*, 25(1), 1050–1080. <https://doi.org/10.1080/15140326.2022.2094668>
- Hu, J., Yang, L., & Yung-Ho, C. (2004). Ownership and non performing loans: Evidence from Taiwan's banks. *The Developing Economies*, 42(3), 405–420. <https://doi.org/10.1111/j.1746-1049.2004.tb00945.x>
- Isik, O., & Bolat, S. (2016). Determinants of non-performing loans of deposit banks in Turkey. *Journal of Business. Economics and Finance*, 5(4), 341–350. <https://doi.org/10.17261/Pressacademia.2017.356>
- Ivanović, M. (2016). Determinants of credit growth: The case of Montenegro. *Journal of Central Banking Theory and Practice*, 5(2), 101–118. <https://doi.org/10.1515/jcbtp-2016-0013>
- Iwatsubo, K. (2007). Bank capital shocks and portfolio risk: Evidence from Japan. *Japan and the World Economy*, 19(2), 166–186. <https://doi.org/10.1016/j.japwor.2005.09.001>
- Jabbouri, I., & Attar, A. E. (2018). The dividend paradox: A literature review. *International Journal of Markets and Business Systems*, 3(3), 197–221. <https://doi.org/10.1504/IJMABS.2018.093292>
- Jabbouri, I., & Naili, M. (2019). Determinants of nonperforming loans in emerging markets: Evidence from the MENA region. *Review of Pacific Basin Financial Markets and Policies*, 22(4), 1–33. <https://doi.org/10.1142/S0219091519500267>
- Jacques, K., & Nigro, P. (1997). Risk-based capital, portfolio risk, and bank capital: A simultaneous equations approach. *Journal of Economics and Business*, 49(6), 533–547. [https://doi.org/10.1016/S0148-6195\(97\)00038-6](https://doi.org/10.1016/S0148-6195(97)00038-6)
- Jahangir, A., & Akhter, N. (2019). An Assessment of Bank-Specific Factors on Operational Efficiency: An Empirical Study on Selected Commercial Banks in Bangladesh. *International Journal of Business and Technopreneurship*, 9(3), 247–266.
- Jara-Bertin, M., Moya, J. A., & Perales, A. R. (2014). Determinants of bank performance: Evidence for Latin America. *Academia Revista Latinoamericana de Administración*, 27(2), 164–182. <https://doi.org/10.1108/ARLA-04-2013-0030>
- Javadi, M. E. (2016). Bank specific and macroeconomic determinants of bank profitability. *Journal of Management Information*, 10(1), 38–54. <https://doi.org/10.31580/jmi.v10i1.46>
- Jesus, S. S., & Gabriel, J. (2006, May). Credit Cycles, Credit Risk, and Prudential Regulation. *International Journal of Central Banking*, 2(2), 65–98.
- Karels, G. V., Prakash, A. J., & Roussakis, E. (1989). The Relationship between Bank Capital Adequacy and Market Measures of Risk. *Journal of Business Finance & Accounting*, 16(5), 663–680. <https://doi.org/10.1111/j.1468-5957.1989.tb00045.x>
- Kasman, S., & Kasman, A. (2015). Bank competition, concentration and financial stability in the Turkish banking industry. *Economic Systems*, 39(3), 502–517. <https://doi.org/10.1016/j.ecosys.2014.12.003>
- Khan, M. A., Siddique, A., & Sarwar, Z. (2020). Determinants of non-performing loans in the banking sector in developing state. *Asian Journal of Accounting Research*, 5(1), 135–145. Emerald Publishing Limited. 2443-4175. <https://doi.org/10.1108/AJAR-10-2019-0080>
- Khemraj, T., & Pasha, S. (2009). The determinants of non-performing loans: An econometric case study of Guyana; presented at the Caribbean centre for Banking and Finance Bi-Annual Conference on banking and Finance, St Augustine, Trinidad.
- Klein, N. (2013). Non-performing Loans in cesee: Determinants and Impact on Macroeconomic Performance; Working Paper Series, No. wp/13/72, International Monetary Fund, 27 pages.
- Klein, P. -O., & Weill, L. (2017). *Bank Profitability: Good for Growth? Laboratoire de Recherche en Gestion et Economie (LaRGE)*. Université de Strasbourg.
- Kosmidou, K., & Zopounidis, C. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. *Managerial Finance*, 34(3), 146–159. <https://doi.org/10.1108/03074350810848036>
- Kroszner, P. (2002). *Non-Performing Loans, Monetary Policy and Deflation: The Industrial Country Experience*. Economic and Social Research Institute Cabinet Office, Government of Japan.
- Kumar, D. V., & Kishore, M. P. (2019). Macroeconomic and Bank Specific Determinants of Non-Performing Loans in UAE Conventional Bank. *Journal of Banking and Finance Management*, 2(1), 1–12.
- Kumbirai, M., & Webb, R. (2010). A financial Ratio Analysis of Commercial Bank Performance in South Africa. *African Review of Economics and Finance*, 2(1), 30–53.
- Kwan, S., & Eisenbeis, R. A. (1997). Bank Risk, Capitalization, and Operating Efficiency. *Journal of*

- Financial Services Research*, 12(2/3), 117–131. <https://doi.org/10.1023/A:1007970618648>
- Laryea, E., Ntow-Gyamfi, M., & Alu, A. A. Nonperforming loans and bank profitability: Evidence from an emerging market. (2016). *African Journal of Economic and Management Studies*, 7(4), 462–481. Emerald Group Publishing Limited 2040-0705. <https://doi.org/10.1108/AJEMS-07-2015-0088>
- Lin, S. L., Penm, J. H. W., Gong, S. -C., & Chang, C. -S. (2005). Risk-based capital adequacy in assessing on insolvency-risk and financial performances in Taiwan's banking industry. *Research in International Business and Finance*, 19(1), 111–153. <https://doi.org/10.1016/j.ribaf.2004.10.006>
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, 36(4), 1012–1027. <https://doi.org/10.1016/j.jbankfin.2011.10.012>
- Madugu, A. H., Ibrahim, M., & Amoah, J. O. (2020). Differential effects of credit risk and capital adequacy ratio on profitability of the domestic banking sector in Ghana. *Transnational Corporations Review*, 12(1), 37–52. <https://doi.org/10.1080/19186444.2019.1704582>
- Maji, S. G., & De, U. K. (2015). Regulatory capital and risk of Indian banks: A simultaneous equation approach. *Journal of Financial Economic Policy*, 7(2), 140–156. <https://doi.org/10.1108/JFEP-06-2014-0038>
- Majumder, M., H, T., & Li, X. (2018). Bank risk and performance in an emerging market setting: The case of Bangladesh. *Journal of Economics, Finance and Administrative Science*, 23(46), 199–229. <https://doi.org/10.1108/JEFAS-07-2017-0084>
- Makri, V., Tsigkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus*, 61(2), 193–206. <https://doi.org/10.2298/PAN1402193M>
- Merhbene, D. E. (2021). The relationship between non-performing loans, banking system stability and economic activity: The case of Tunisia, *IHEID Working Papers*, 03-2021, Economics Section, The Graduate Institute of International Studies.
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*, 3(4), 852–860.
- Milgrom, P., & Roberts, J. (1992). *Economics, Organization and Management*, Prentice Hall.
- Mohanty, A. R., Das, B. R., & Kumar, S. (2018). Determinants of Non-Performing Loans in India: A System GMM Panel Approach. *Prajnan*, XLVII(1), 37–56.
- Muqorrobin, Y., Rahman, A. A., & Maharani, S. (2021). Analysis of External Factors Affecting Non Performing Finance (Npf) Sharia Banks in Indonesia (Period 2009 Q1–2018 Q4). *Asia Pacific Management and Business Application*, 10(1), 69–84. <https://doi.org/10.21776/ub.apmba.2021.010.01.5>
- Naili, M., & Lahrichi, Y. (2020). The determinants of banks' credit risk: Review of the literature and future research agenda. *International Journal of Finance & Economics*, 27(1), 334–360. <https://doi.org/10.1002/ijfe.2156>
- Naili, M., & Lahrichi, Y. (2022). Banks' credit risk, systematic determinants and specific factors: Recent evidence from emerging markets. *Heliyon*, 8(2022), e08960. <https://doi.org/10.1016/j.heliyon.2022.e08960>
- Nasir, M. S., Oktaviani, Y., & Andriyani, N. (2022). Determinants of Non-Performing Loans and Non-Performing Financing level: Evidence in Indonesia 2008–2021. *Banks and Bank Systems*, 17(4), 116–128. [https://doi.org/10.21511/bbs.17\(4\).2022.10](https://doi.org/10.21511/bbs.17(4).2022.10)
- Nguyen, T. P. T., & Nghiem, S. H. (2015). The interrelationships among default risk, capital ratio and efficiency. *Managerial Finance*, 41(5), 507–525. <https://doi.org/10.1108/MF-12-2013-0354>
- Nkusu, M. (2011). Nonperforming Loans and Macroeconomic Vulnerabilities in Advanced Economies (July 2011); IMF Working Paper No. 11/161, Available at SSRN: <https://ssrn.com/abstract=1888904> or <https://doi.org/10.2139/ssrn.1888904>.
- Odunga, R. M. (2016). Specific Performance Indicators, Market Share and Operating Efficiency for Commercial Banks in Kenya. *International Journal of Finance and Accounting*, 5(3), 135–145.
- Okyere, E., & Mensah, A. C. (2022). Macroeconomic and Bank Specific Determinants of Non-performing Loans in Ghanaian Banking Sector. *International Journal of Accounting, Finance and Risk Management*, 7(2), 40–48. <https://doi.org/10.11648/j.jiafr.20220702.12>
- Pervez, A., & Ali, I. (2022). Robust Regression Analysis in Analyzing Financial Performance of Public Sector Banks: A Case Study of India. *Annals of Data Science (July 2022)*. <https://doi.org/10.1007/s40745-022-00427-3>
- Quagliarello, M. (2007). Banks' Riskiness Over the Business Cycle: A Panel Analysis on Italian Intermediaries. *Applied Financial Economics*, 17(2), 119–138. <https://doi.org/10.1080/096031005000486501>
- Radivojevic, N., & Jovovic, J. (2017). Examining the determinants of the non performing loans. *Prague. Economic Papers*, 26(3), 300–316. <https://doi.org/10.18267/j.pap.615>
- Rahman, M. (2022). NPL hits 1.34 lakh crore as defaulters go scot-free. *NEWAGE Business*. November 14, 2022. Access link: <https://www.newagebd.net/article/186363/npl-hits-134-lakh-crore-as-defaulters-go-scot-free>
- Rajha, K. S. (2016). Determinants of Non-Performing Loans: Evidence from the Jordanian Banking Sector. *Journal of Finance and Bank Management*, 4(1), 125–136. <https://doi.org/10.15640/jfbm.v5n1a5>
- Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *The American Economic Review*, 100(2), 573–578. <https://doi.org/10.1257/aer.100.2.573>
- Rime, B. (2001). Capital requirements and bank behaviour: Empirical evidence for Switzerland. *Journal of Banking & Finance*, 25(4), 789–805. [https://doi.org/10.1016/S0378-4266\(00\)00105-9](https://doi.org/10.1016/S0378-4266(00)00105-9)
- Salas, V., & Saurina, J. (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of Financial Services Research*, 22(3), 203–224. <https://doi.org/10.1023/A:1019781109676>
- Shrieves, R. E., & Dahl, D. (1992). The relationship between risk and capital in commercial banks. *Journal of Banking & Finance*, 16(2), 439–457. [https://doi.org/10.1016/0378-4266\(92\)90024-T](https://doi.org/10.1016/0378-4266(92)90024-T)
- Singh, S. K., Basuki, B., & Setiawan, R. (2021). The Effect of Non-Performing Loan on Profitability: Empirical Evidence from Nepalese Commercial Banks. *The Journal of Asian Finance, Economics and Business*, 8(4), 0709–0716. <https://doi.org/10.13106/jafeb.2021.vol8.no4.0709>
- Sinkey, J. F., & Greenawalt, M. B. (1991). Loan-loss experience and risk-taking behavior at large commercial banks. *Journal Financial Services Research*, 5(1), 43–59. <https://doi.org/10.1007/BF00127083>
- Souza, G. J. G., & Feijó, C. A. (2011). Credit risk and macroeconomic interactions: Empirical evidence from the Brazilian banking system. *Modern Economy*, 2(05), 910–929. <https://doi.org/10.4236/me.2011.25102>



- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393–410.
- Swamy, V. (2012). Impact of Macroeconomic and Endogenous Factors on Non-performing Bank Assets. *International Journal of Banking and Finance*, 9(1), 27–47. <https://doi.org/10.32890/ijbf2012.9.1.8447>
- Tan, Y. (2016). The impacts of risk and competition on bank profitability in China. *Journal of International Financial Markets, Institutions and Money*, 40, 85–110. <https://doi.org/10.1016/j.intfin.2015.09.003>
- Tan, Y., & Floras, C. (2013). Risk, Capital and efficiency in chinese banking. *Journal of International Financial Markets, Institutions and Money*, 26, 378–393. <https://doi.org/10.1016/j.intfin.2013.07.009>
- Us, V. (2017). The determinants of nonperforming loans before and after the crisis: Challenges and policy implications for Turkish banks. *Emerging Markets Finance and Trade*, 54(7), 1608–1622. <https://doi.org/10.1080/1540496X.2017.1315334>
- Zhang, J., Wang, P., & Qu, B. (2012). Bank risk taking, efficiency, and law enforcement: Evidence from Chinese city commercial banks. *China Economic Review*, 23(2), 284–295. <https://doi.org/10.1016/j.chieco.2011.12.001>
- Zhang, Z. Y., Wu, J., & Liu, Q. F. (2008). Impacts of Capital Adequacy Regulation on Risk-taking Behaviors of Banking. *Systems Engineering—theory & Practice*, 28 (8), 183–189. [https://doi.org/10.1016/S1874-8651\(09\)60035-1](https://doi.org/10.1016/S1874-8651(09)60035-1)
- Zheng, C., Gupta, A. D., & Moudud-UI-Huq, S. (2017). Do market competition and development indicators matter for banks' risk, capital, and efficiency relationship? *International Journal of Financial Engineering*, 4(2), 1750027. <https://doi.org/10.1142/S242478631750027X>
- Zhou, C. (2013). The impact of imposing capital requirements on systemic risk. *Journal of Financial Stability*, 9(3), 320–329. <https://doi.org/10.1016/j.jfs.2013.06.002>