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INDICATORS OF NON-PERFORMING LOAN: DOES EFFICIENCY MATTER?

Tao JIANG[1], Yanqiu ZHENG[2]✉

[1]*School of Accounting, Southwestern University of Finance and Economics, Chengdu 611130, China*
[2]*School of Management, Xihua University, Chengdu 610039, China*

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Abstract. The purpose of this study is to examine the impact of various factors on the level of non-performing loans (NPL) and, to determine the moderating role of efficiency on the relationship between different factors and NPL in China. The current study addressed four important factors to examine the role in relation to the NPL. These factors include; return on assets (ROA), return on equity (ROE), economic sustainability and political instability index. Furthermore, the moderating role of efficiency is addressed between these factors and NPL. Secondary data is used in this study to consider the empirical results. Secondary data related to ROA, ROE, economic sustainability and political instability index is collected from different sources. Consistent with the literature, we found significant effect of ROA, ROE, economic sustainability and political instability index on NPL. Banking sector of China is majorly influenced by these factors due to the effect on NPLs. Furthermore, the efficiency has contribution to the NPLs as moderating variable. Results of this study are helpful for the management of banking industry to resolve various issues related to NPLs.

Keywords: non-performing loans (NPL), return on assets (ROA), return on equity (ROE), economic sustainability, political instability index, efficiency, banking industry.

JEL Classification: E58, D72, F63, M21.

✉Corresponding author. E-mail: ***Zyq790915@163.com***

1. Introduction

A non-performing loan (NPL) is a bank loan that is subject to late repayment or is unlikely to be repaid by the borrower in full. Generally, bank loan is supposed non-performing if the 90 days pass after the due date for the agreed amount related to the principle or interest amount (Badell et al., 2020; Çollaku & Aliu, 2021; Dong et al., 2020; Kaya et al., 2021; Khoirunisa et al., 2022; Kiral, 2020; Mahato, 2021). This loan also called as "bad debt" which is a negative effect on the bank performance. It is the summation of substandard and doubtful as well as projected loss loans of commercial banks. NPL has significant effect on the performance of banking industry. As commercial banks majorly based on the lending of loan and earn the interest which causes to increase in profit ration, however, due to the increase in the amount of NPL, the profitability of the banks remain unsatisfactory. Although banks always face credit risk, however, credit risk more than the specific amount may influence negatively on the banking industry performance.

Further to discussion, bank's loan portfolio quality contains a high potential to influence its ability in order to provide lending to real economy, however, NPLs are one of the aspects which influence the bank's ability to develop new lending. Resultantly, banks, which obtain large and countless NPLs on their balance sheets, are required to side track their capital from profitable venture to reserves for losses. Nevertheless, in order to manage risks, banks are required to enact a safety net so that that the compensation can be made for losses that are derived from impaired loans.

It is argued that banking reforms have entertained China in its transformation from centrally planned economy to market-based economy. Various reforms have been introduced by government in 1998 in order to manage NLPs and offer protection against financial risks. These four measures were' "injecting equity into state-owned banks, requiring banks to use international classification requirements for NPLs, making loans solely on a commercial basis and restricting local governments from influencing bank lending decisions". It is argued that implementation of first measure was involved in the issuance of special bonds of around 270 billion RMB in 1998. It was intended to recapitalize "state-owned" banks. Consequently, required of deposit reserve was shrinker. The next measure was introduced to take this significant step in order to recognize NPLs. The third reform reflects on the "abolition of credit plan". Until 97, China had an obligatory credit allocation system under which People bank of China lowered the limit on the new loans annually and permitted them to be to allotted to particular sectors. However, from next year, the measure has established to procure bank credit for "loss making" SOEs more challenging since loans are granted on the basis of repayment ability. The other argument which must be underlined is that Chinese NPLs have been accessible for purchasing since 2001 through foreign investors. This is due to the recent efforts of the country into streamline processes that made access to market easier. However, regardless of huge efforts of banking sector, the subtle structural issues continue to pose threat on entire sector.

More recently, the economic growth of China was dragged down by pandemic regardless of the measures taken by authorities to lift up the economy and financial systems. In case of NPLs, Reuters (2020) reported that average NPL ratio of China's commercial banks were 1.94% in 2020 which appears to be highest since 2009. According to Wildau (2017), the banking sector of China has been expanding rapidly in fact it became the largest since 2016. Unfortunately, high level of bank NPL ratios are still a problem especially after pandemic. It is quite unpleasant situation and high and persistent NPLs quantities subdue the profitability of banks and chain the bank capital as provisions rises. Besides, it also fragile balance sheets and restrict capacity of bank in terms of lending (Ari et al., 2021; Lee et al., 2021).

As discussed earlier, Chinese banking industry is facing various issues related to the NPLs. The increase in credit risk among the Chinese banking industry increasing the bad debts. Figure 1 shows the NPL ratio of China which are latest statistics from the year of 2022. The NPL ratio for the second quarter of 2022 is approximately 1.7%. There is a fluctuation in the NPL in China, the inconsistency is one of the threats to the banking sector. Based on the arguments, China is a perfect study setting to explore the determinants of NPLs.

NPL ratio is affected due to several indicators in China. These indicators are highlighted by different studies (Arham et al., 2020; Badawaiy & Sabah, 2021; Batlle et al., 2020; Sunardi

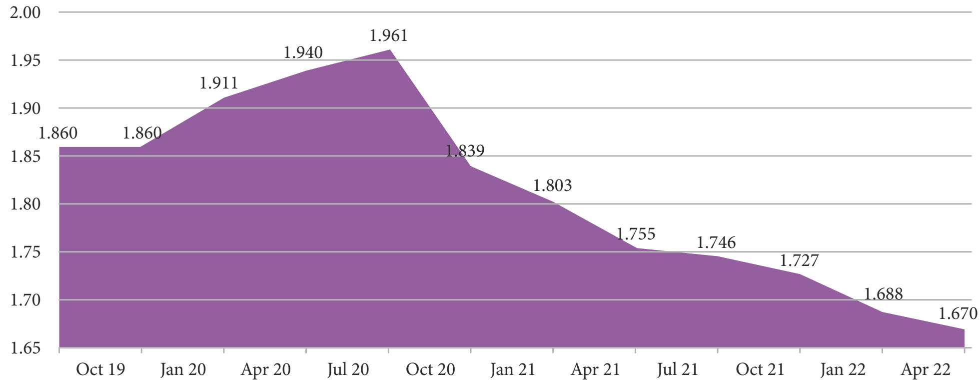

Figure 1. Non-performing loan ratio in China (source: CEIC Data, 2023)

et al., 2021; Vouldis & Louzis, 2018), however, this study attempted to address the important literature gap. We addressed four important indicators which are repeatedly mentioned by the previous studies. These indicators include; return on assets (ROA), return on equity (ROE), economic sustainability and political instability index. In line with this, Aprilia and Handayani (2018) investigated the influence of capital adequacy ratio, operational costs to operational income, non-performing loans, and loan to deposit ratio on ROA and ROE in Indonesian banking, providing a comparative perspective to this study's findings. Different studies examined the effect of ROA and ROE. Few studies addressed the role of economic sustainability and political instability index in relation to NPL. But these four factors have not addressed in a combine study framework, especially on Chinese banking industry. The economic sustainability and political instability index are risks which has different impact on each country due to the own economic and political situation. Even these factors have influence on different situations in the same country, therefore, the effect of these factors in any specific conditions could be worthwhile. More importantly, none of the previous study addressed the moderating role of efficiency. Bank efficiency has key influence on the NPL (Jassim, 2021; Mosala & Chinomona, 2020; Rašidagić & Hesova, 2020; Shah et al., 2022), therefore, this study considered the moderating role of bank efficiency which may provide valuable insights for the practitioners to control NPL ratio.

2. Literature review

2.1. Return on asset, return of equity, economic sustainability, political instability index, and non-performing loans

In the earlier studies, return on asset was considered essential for banks and other loan-providing institutions (Alzahrani & Alfares, 2021; Bhattarai, 2018; Edi & Wijaya, 2022; Pereira et al., 2022; Ramachann et al., 2022; Service, 2021; Wynn, 2021), because the survival of these institutions is directly dependent on return on asset. In this regard, the banks' management should ensure that the loans provided by the banks are appropriate as they can be returned safely to the owners (Hamid & Ibrahim, 2021; Partovi & Matousek, 2019; Petkovski et al., 2018; Pilinkienė et al., 2021; Qin et al., 2021; Ribaudo, 2020; Sell, 2020; Tetrevova et al., 2021). Indeed, in America and United Kingdom the banks are working with strict laws related to return on investment and if the people are not willing to pay the banks (Farooq et al., 2019; Sigurdsson et al., 2021; Wang et al., 2020), the administration takes strict actions against the defaulters. Similarly, the banking sector in China also has strict regulations related to return on investment because it is believed that without an appropriate return on investment (Khan et al., 2020), there would be less productivity in the organization (Morakinyo & Sibanda, 2016; Wolfe et al., 2021). However, in third-world countries, the banking sector is not working appropriately for dealing with such kind issues related to loans (Oni, 2019; Ulutas et al., 2021; Vinte et al., 2021). In India and Bangladesh, the laws every year a lot of cases are reported against fraud activities in banks that are not appropriate for the people (Wood & Skinner, 2018). Therefore, the banking sector and other loan-providing organizations have a strong influence on non-performing loans because these are credit risks. Indeed, the system of loans in any country can be improved but the return on investment should be considered for non-performing loans in any country (Makri et al., 2014). On the other hand, responsible citizens are those who always respect the return on investment of the banks, and they return the loans to the government on time (Mazreku et al., 2018). Multinational corporations are also worried about non-performing loans because the finance department of these organizations failed to manage the return on investment for the organization (Ciukaj & Kil, 2020). Indeed, there is an important loan return capacity in the approval of loans (Ghosh, 2005). Likewise, the banking sector in China has strict regulations for loan management in the country. The above discussed literature has provided a detailed insight for the hypothesis;

H1. *There is a relationship between ROA and NPL.*

In loan management, the role of equity is critical because it has a major influence on the price of the loan (John, 2018). Modern financial organizations are concerned more about the equity on the loan because it has value for the institutions and the business as well (Petkovski et al., 2018). Indeed, loan management is critical for the process of loans in any institution (Radivojevic & Jovovic, 2017). The banks in Denmark and Norway are more concerned about the equity of loans because they have more attention to it (Long et al., 2020). According to the study of Rinaldi and Sanchis-Arellano (2006), the return of equity is not only beneficial for the host organization, but it has significant for word-of-mouth marketing. The loan-providing institutes are always concerned about the equity of credit risk because they believe the default in the credit would challenge their status in the market (Çollaku & Aliu, 2021). Moreover, the American banks are also working importantly to regulate the customers in more terms for dealing with non-performing loans. The motive is to control the payment of the loan and make sure it is taken by the right person to achieve the right purpose (Zheng et al., 2020). Hence, the US Senate also has strict restrictions to provide loans to the people who could bank the credit risk (Kumar & Kishore, 2019). Additionally, in China, loan-providing organizations are working with government departments to control the loan management system to make sure that the amount of loan is rightly invested (Koju et al., 2018). In this regard, the people who appear to be a risk to the credit of the bank, and willing to utilize it in an unfruitful way (Kjosevski & Petkovski, 2021), these people are not considered for the loan not even in mainland China and Taiwan. Accordingly, the professional management system to control the return on equity is necessary for dealing with non-performing loans. On the other hand, according to, return of equity facilitates the business for appropriate growth in the sustainable development of the business organization. The above discussed literature has provided a detailed insight for the hypothesis;

H2. *There is a relationship between ROE and NPL.*

In modern times, the focus of loan management organizations is to provide loans to businesses that are appropriately working for the economic sustainability of the country (Kjosevski & Petkovski, 2017). Chowdhury (2020) assured that Chinese banks are allocating loans to multinational and national firms that are working effectively for improving the standard of business, and its performance. In this regard, loan management is critical for any bank, and it has the responsibility to make sure that the business idea is according to economic sustainability (Lee et al., 2020). In Copenhagen, the firms are providing loans to businesses that are working for economic sustainability and producing green energy for environmental sustainability (Olorogun, 2020). Similarly, the study by Ntarmah et al. (2020), which analyzes the responsiveness of environmental sustainability to non-performing loans in Africa, further underscores the significance of economic sustainability in loan management. These kinds of organizations are valued by the loan management to ensure that the loan would not be misused, but would be used for benefit of the society (Ciukaj & Kil, 2020; Mazreku et al., 2018). However, the legal entities in Denmark are also concerned about the non-performing loans because these loans are not in the favor of economic sustainability (Ciukaj & Kil, 2020; Mazreku et al., 2018). Therefore, the focus of business management is to focus on the loans that are appropriate and facilitate emerging businesses (Bhattarai, 2018). In the case of China, the banks are allocating loans to the emerging businesses that are creating jobs, and working for exports of products for the economic growth of the country (Farooq et al., 2019; Partovi & Matousek, 2019). Indeed, the purpose of any business is to achieve sustainability (Mazreku et al., 2018), therefore the businesses in New York are provided loans with the assistance of the government by the banking sector to improve their performance and get success in economic sustainability (Morakinyo & Sibanda, 2016; Oni, 2019; Wood & Skinner, 2018). On the other hand, the loans that are not sustainable for the economy of any country, the kinds of loans are rejected by the loan management firms as the credit risk is increased in these kinds of loans (Khan et al., 2020; Partovi & Matousek, 2019). To get loans from private sector banks in China, the management of businesses should focus more on performing well with sustainability (Bhattarai, 2018; Farooq et al., 2019; Makri et al., 2014). The above discussed literature has provided a detailed insight for the hypothesis;

H3. *There is a relationship between ES and NPL.*

Political sustainability is critical for any country because the economic sustainability of the country is directly dependent on political sustainability (Anjom & Karim, 2016; Olorogun, 2020). Indeed, the businesses working in America are growing and facilitating economic sustainability due to success in political sustainability (Chowdhury, 2020; Lee et al., 2020). In modern times, loan management organizations are in the challenge of non-performing loans because these loans are credit risk due to instability in the country (Kjosevski & Petkovski, 2017). No doubt, most of the banks in Hong Kong and Taiwan are not allocating loans to different businesses due to political instability (Anjom & Karim, 2016), but some organizations are still providing loans to achieve better marketing (Kjosevski & Petkovski, 2021). In this regard, the loans of these organizations are turned into credit risks that are a challenge for the organizations because the loan is not performing (Koju et al., 2018; Kumar & Kishore, 2019; Zheng et al., 2020). In this way, the private sector loan-providing firms and banks in Burma also face the challenge of non-performing loans due to instability in politics (Çollaku & Aliu, 2021). The less attention paid to the political stability has led the people of Burma to economic instability, highlighted by Chowdhury (2020). In advanced countries, due to political and economic stability the loan management system is easy and the public is not facing any kind of challenge in utilizing the loans (Çollaku & Aliu, 2021; Rinaldi & Sanchis-Arellano, 2006). Therefore, these individuals are achieving success in their businesses. America is the number one country for new business startups due to its political and economic stability, and the banks in America are allocating loans to students and passionate individuals for entrepreneurial activities (Long et al., 2020; Petkovski et al., 2018; Radivojevic & Jovovic, 2017). Therefore, the countries with appropriate political stability are working accordingly to get economic strength with the collaboration between the banks for providing loans to the businesses for growing to the international markets (Ciukaj & Kil, 2020; Ghosh, 2005). The Chinese banks are also allocating resources to the national businesses because of political stability in the country and there is no risk of credit to the banks (Kjosevski & Petkovski, 2017). The above discussed literature has provided a detailed insight for the hypothesis;

H4. *There is a relationship between PII and NPL.*

2.2. Moderating role of efficiency for return on asset, return of equity, economic sustainability, political instability index, and non-performing loans

In the banking sector, there is a critical role of efficiency because it is used to measure the current assets and liabilities with the total assets of the entity (Chowdhury, 2020). In this regard, the business that is getting loans to extend the operations, or they are interested to get appropriate new products in the firms (Chowdhury, 2020), these businesses are concerned for efficiency of loan management and business (Kjosevski & Petkovski, 2021). Indeed, for the organization that remained unsuccessful in paying back the returns, legal actions are taken against such kind of organization (Long et al., 2020; Radivojevic & Jovovic, 2017). The banks in India and China are always looking for client organizations that can have good efficiency in business performance to return the loan on time by effectively managing all the resources (Olorogun, 2020). In other words, efficient financial management is an appropriate working method that is best to improve the current assets of the business by working on the liabilities (Lee et al., 2020). In this regard, the financial condition of the organization can be improved, and there would be no delay in the return of loans to the banks. The business organizations in China are working to get appropriate loans that could be easily returned to the banks on time by enhancing the owner equity and increasing the assets for the organizations (Koju et al., 2018; Kumar & Kishore, 2019). On the other hand, the responsibility of the business is to assist the finance department within the organization with professionals that could work for the benefit of the organization productively (Chowdhury, 2020; Lee et al., 2020). To avoid the risk of credit to the banks, the organizations need to get the calculated loans from banks and non-government organizations that could be returned easily to the business (Ciukaj & Kil, 2020). Chowdhury (2020) also demonstrated that the businesses are working to enhance efficiency in financial planning to get an advantage in returning loans to the banks in a short duration of time. The above discussed literature has provided a detailed insight for the hypothesis;

H5. *There is a moderating role of EF in the relationship between ROA and NPL.*

Modern businesses are more concerned about the return of equity in the operation of businesses to get better profit by reducing the owner liabilities in the business world. Indeed, the purpose of business organizations is to maximize the owner assets, by getting liabilities from the banking sector to enhance the operations of the organizations for the long term (Oni, 2019). In this regard, the role of the finance department is critical because all the estimates about the operations in different departments are done by the finance department which is critical for enhancing the performance of businesses (Mazreku et al., 2018). In China, businesses with a guarantee to enhance the equity of the owners are working more politely in the way to extend the business environment (Radivojevic & Jovovic, 2017). Moreover, the decision for loans in Indian household startups is directly based on the efficiency of working to get the maximum return of equity (Çollaku & Aliu, 2021). These startups estimate all the investments and returns before working on papers to get the loan because they avoid the risk of non-performing loans. The cases of non-performing loans or credit risks are increasing in India, and it has made it difficult for small businesses to get loans without a mortgage of a maximum of the amount loan (Kjosevski & Petkovski, 2021). In this way, these practices are not only dangerous for the performance of businesses, but it is also a challenge for the economy of the country (Long et al., 2020; Rinaldi & Sanchis-Arellano, 2006). On the other hand, the motive of business organizations is to lead the organizations productively and increase the return on equity by investing in the right projects timely (Farooq et al., 2019; Partovi & Matousek, 2019). Interestingly, Chowdhury (2020) concluded that the firms with credit risk are declined in the competitive list because these organizations are not getting an appropriate return on equity as there is no efficiency in financial planning and investment. Therefore, the financial efficiency ratio is critical for improving the business performance in a productive way to avoid credit risk (Olorogun, 2020). The above discussed literature has provided a detailed insight for the hypothesis;

H6. *There is a moderating role of EF in the relationship between ROE and NPL.*

Economic sustainability is critical for any business function in the market as concluded by Partovi and Matousek (2019). The business firms that are working to improve their business performance effectively by getting loans from the banks (Oni, 2019; Wood & Skinner, 2018), these firms are more concerned about the sustainability of the economy (Makri et al., 2014).

Economic sustainability is critical because without economic sustainability in the country, it would be quite difficult for any business to return the loan to the banks (Chowdhury, 2020; Lee et al., 2020). In this way, a non-performance loan would be challenging for the brand equity of the business (Xiao et al., 2011). However, the firms that have achieved sustainability in the efficiency of finance departments, these organizations are willing to get a loan for the economic sustainability of the business in the market (Ekinci & Poyraz, 2019). Although there is economic sustainability in the business sector of America (Clauß et al., 2022; Wang et al., 2020; Yang et al., 2016; Zia et al., 2021), the American private sector firms are more concerned about the efficiency of investing and working for the business to increase the assets of the stakeholders in the business (Bekun et al., 2020). In this way, it has become easier for businesses to get loans for sustainable development and reduce the risk of credit (Anjom & Karim, 2016; Chowdhury, 2020; Olorogun, 2020). Almost 95% of small and large businesses in American markets are not involved in credit risk because of economic sustainability that is supported by the right appropriately investing by the business (Kjosevski & Petkovski, 2021; Koju et al., 2018; Kumar & Kishore, 2019). The relationship between business performance and business loans is important because a business can be extended to new markets with economic sustainability (John, 2018; Long et al., 2020; Singh et al., 2021). Khan et al. (2020) demonstrated that the Chinese firms have simple and appropriate rules and regulations to get loans from the banks due to economic sustainability in the country. Hence, the improvement should be done in the finance sector to get efficiency for improving the total assets of the businesses for improving the performance of organizations by less depending on the banks for loans (Koju et al., 2018). Businesses with low efficiency to improve the profit of stakeholders are defaulters for non-performing loans. The above discussed literature has provided a detailed insight for the hypothesis;

H7. *There is a moderating role of EF in the relationship between ES and NPL.*

The banking sector has become efficient with the advancement of technology and information sharing (Bhattarai, 2018). Appropriate banking sector easiness to provide the loans to different business firms, there is little focus on the firm performance in Indonesia and Thailand. However, the banking sector must analyze the profit and growth banking sector effectively for understanding the business performance effectively (Mazreku et al., 2018; Wood & Skinner, 2018). Indeed, with appropriate development and political stability, the Chinese government has directed the banks to provide easy loans to national businesses for economic growth (John, 2018; Singh et al., 2021). On the other hand, the responsibility of the government is to focus on sustainable economic development and political stability to improve the chances of loans to business firms by the banks (Ciukaj & Kil, 2020). disclosed that the organizations that have no efficiency to improve the business practices in the finance departments, these firms are less attractive to the banks for providing loans (Kjosevski & Petkovski, 2021). Furthermore, Olorogun (2020) revealed that efficient performance in any organization can increase the chances of a loan for a business. In this regard, to get the best loans and avoid the risk of credit risk, businesses need to focus on the political instability index of previous years and forecast the changes in the future (Chowdhury, 2020). Salman and Hidan (2019) highlighted that there is less attention paid to the political stability for getting loans by the household firms in India and Burma which has led to a decrease in the ratio of performing loans. Pu and Fu (2018) also demonstrated that businesses in political instability are more inclined to credit risk because there is no performance of businesses in the market. Therefore, the focus of the businesses should be to enhance the business practice in an effective way to bring efficiency in investing in different departments and getting better returns for the stakeholders of the businesses (Philip et al., 2022). In this way, the businesses with more productive financial understanding for utilizing the loans are increasing the equity in the market by determining the index of political stability in the country (Murad et al., 2022). The above discussed literature has provided a detailed insight for the hypothesis;

H8. *There is a moderating role of EF in the relationship between PII and NPL.*

3. Methodology

We examined the Chinese banks with respect to the ROA, ROE, economic sustainability, political instability index, bank efficiency and NPL. Data is collected from annual financial reports and annual non-financial reports. Additionally, websites of the respective banks are also used to get required data. Five-year data is collected to examine the effect of ROA, ROE, economic sustainability, and political instability index and bank efficiency on NPL. The specific definitions of the variables used in this study are provided in Table 1, which elaborates on their conceptual and operational framework.

A linear regression line has an equation of the form $Y = a + bX$, where X is the explanatory variable and Y is the dependent variable. The model of the current study are as follows;

Model I

$$NPL = \alpha + ROA\beta_1 + \alpha + ROA\beta_2 + \alpha + ROA\beta_3 + \alpha + ROA\beta_4 + \in. \quad (1)$$

Model II

$$NPL = \alpha + (ROA \times EFF)\,\beta_1 + (ROE \times EFF)\,\beta_2 + (ES \times EFF)\,\beta_3 + (PII \times EFF)\,\beta_4 + \in. \quad (2)$$

Model I is given in equation one which shows the effect of ROA, ROE, economic sustainability and political instability index on NPL. Based on this model, the current study proposed four hypotheses (H1, H2, H3, H4). Model II is given in equation two which shows moderation effect of bank efficiency (H5, H6, H7, H8). All the hypotheses are developed in second section of the study with the help of literature review.

Moreover, sample of the study is based on the Chinese commercial banks. The banks working in China were considered in the sample of the study. Table 2 shows all the banks included in the sample along with the bank type and region. Sample of the current study include city commercial bank and rural commercial bank. Most of the banks involve from east region, west region, northern region and middle region.

Table 1. Variables and definition

Variable	Definition
ROA	"Return on assets is a metric that indicates a company's profitability in relation to its total assets."
ROE	"Return on equity (ROE) is the measure of a company's net income divided by its shareholders' equity."
Economic Sustainability	"Refers to a situation where all the essential economic resources of a country are available to its citizens, and no economic swings interrupt their daily lives."
Political Instability Index	"Measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism."

Table 2. Sample of the study

Name	Type	Region
Bank of Beijing	City Commercial Bank	East
Bank of Chengdu	City Commercial Bank	West
Bank of Chongqing	City Commercial Bank	West
Bank Of Dalian	City Commercial Bank	Northeast
Bank of Guangzhou	City Commercial Bank	East
Bank of Hangzhou	City Commercial Bank	East
BANK OF JIANGSU	City Commercial Bank	East
Bank of Nanjing	City Commercial Bank	East
Bank of Shanghai	City Commercial Bank	East
Bank of Xi'an	City Commercial Bank	West
Baoshang Bank	City Commercial Bank	West
Beijing Rural Commercial Bank	Rural Commercial Bank	East
Chongqing Rural Cooperative Bank	Rural Commercial Bank	West
Fudian Bnak	City Commercial Bank	West
Huarong Xiangjiang Bank	City Commercial Bank	Middle
Huishang Bank	City Commercial Bank	Middle
Lanzhou City Commercial City	City Commercial Bank	West
Tangshan City Commercial Bank	City Commercial Bank	East
Tianjin City Commercial Bank	City Commercial Bank	East
Tianjin Rural Cooperative Bank	Rural Commercial Bank	East
Urumqi City Commercial Bank	City Commercial Bank	West

4. Results

Model I

Model I presented in below equation and results are presented in Table 3. In this model, the effect of ROA, ROE, economic sustainability and political instability index is considered on NPLs. While considering the results, the path coefficient, t-value and p-value is considered. T-value and p-value considered to examine the significance of the relationship. ROA has significant effect on NPL (β = –0.138; t-statistics = 4.18; p-statistics = < 0.05). ROE has significant effect on NPL (β = –0.493; t-statistics = 3.7; p-statistics = < 0.05). Furthermore, economic sustainability has significant effect on NPL (β = –0.044; t-statistics = 2.93; p-statistics = < 0.05) and political instability index has significant effect on NPL (β = 0.269; t-statistics = 5.2; p-statistics = < 0.05). Detailed information on all the hypotheses' decisions related to Model I (both supported and not supported) are presented in Tables 3 and 4.

$$NPL = \alpha + ROA\beta_1 + \alpha + ROA\beta_2 + \alpha + ROA\beta_3 + \alpha + ROA\beta_4 + \in, \text{ (Model I)},$$

where: ROA – Return on Assets: ROE – Return on Equity: ES – Economic Sustainability: PII – Political Instability Index: NPL – Non-Performing Loan.

Table 3. Regression coefficients

Independent variable	Dependent variable	Coefficient	Standard Deviation	T-Statistics	Significance
ROA	NPL	–0.138	0.033	4.18	< 0.05
ROE	NPL	–0.493	0.13	3.7	< 0.05
Economic Sustainability	NPL	–0.044	0.015	2.93	< 0.05
Political Instability Index	NPL	0.269	0.051	5.2	< 0.05

Table 4. Model I hypotheses decisions

Hypothesis	Hypothesis Statement	Decision
Hypothesis 1	There is a relationship between ROA and NPL.	Supported
Hypothesis 2	There is a relationship between ROE and NPL.	Supported
Hypothesis 3	There is a relationship between ES and NPL.	Supported
Hypothesis 4	There is a relationship between PII and NPL.	Supported

Model II

Model II presented in below equation and results are presented in Table 5. In this model, the moderation effect of efficiency is considered. First moderation effect of efficiency is considered between ROA and NPL. Second moderation effect of efficiency is considered between ROE and NPL. Third moderation effect of efficiency is considered between economic sustainability and NPL. Fourth moderation effect of efficiency is considered between political instability index and NPL. Similar with the Model I, the path coefficient, t-value and p-value is considered. T-value and p-value considered to examine the significance of the relationship. The moderation effect of efficiency is significant between ROA and NPL (β = –0.08; t-statistics = 7.25; p-statistics = < 0.05). The moderation effect of efficiency is significant between ROE and NPL (β = –0.185; t-statistics = 4.5; p-statistics = < 0.05). Additionally, the moderation effect of efficiency is significant between economic sustainability and NPL (β = –0.058; t-statistics = 4.11; p-statistics = < 0.05). However, the moderation effect of efficiency is insignificant between political sustainability index and NPL (β = 0.019; t-statistics = 0.471; p-statistics = > 0.05). Detailed information on all the hypotheses' decisions related to Model II (both supported and not supported) are presented in Tables 5 and 6.

$$NPL = \alpha + (ROA \times EFF)\ \beta_1 + (ROE \times EFF)\ \beta_2 + (ES \times EFF)\ \beta_3 + (PII \times EFF)\ \beta_4 + \in \text{ (Model II)},$$

where: ROA – Return on Assets: ROE – Return on Equity: ES – Economic Sustainability: PII – Political Instability Index: NPL – Non-Performing Loan: EFF – Efficiency.

Table 5. Regression coefficients (moderation effect)

Interaction Effect	Dependent variable	Coefficient	Standard Deviation	T-Statistics	Significance
ROA × Efficiency	NPL	–0.08	0.011	7.25	< 0.05
ROE × Efficiency	NPL	–0.185	0.041	4.5	< 0.05
Economic Sustainability × Efficiency	NPL	–0.058	0.014	4.11	< 0.05
Political Instability Index × Efficiency	NPL	0.009	0.019	0.471	> 0.05

Table 6. Model I hypotheses decisions

Hypothesis	Hypothesis Statement	Decision
Hypothesis 5	There is a moderating role of EF in the relationship between ROA and NPL	Supported
Hypothesis 6	There is a moderating role of EF in the relationship between ROE and NPL	Supported
Hypothesis 7	There is a moderating role of EF in the relationship between ES and NPL	Supported
Hypothesis 8	There is a moderating role of EF in the relationship between PII and NPL	Not Supported

5. Conclusions

To achieve the study objective, the current study considered the effect of ROA, ROE, economic sustainability and political instability index on NPLs. Furthermore, the moderating effect of efficiency is considered. It is evident from the results; ROA has significant role in NPLs in banking industry. Any change in ROA has significant influence to effect NPLs. This is in line with the findings of Khamisah et al. (2020), who explored the effect of NPL, BOPO, and company size on ROA of banking companies listed on the Indonesia Stock Exchange. Previous studies also reported the significant relationship between ROA and NPLs. Increase in ROA among the Chinese banks can resolve the issues of NPLs. Similarly, ROE also has positive effect on NPLs which means that increase in ROE has the ability to influence NPLs positively and it can decrease the percentage of NPLs. Similar with this study results, results of other studies are consistent with the previous studies already conducted on the relationship between ROE and NPLs. Furthermore, the current study results proved the important role of economic sustainability on NPLs. Any change in the economic sustainability causes to change in the percentage of NPLs among the banking industry of China. Although economic sustainability has impact on the business sector, however, it has major effect on the NPLs. As reported in the previous investigations that economic sustainability has impact on NPLs. The direct effect of political instability index has significant effect on NPLs. Therefore, any change in political instability index can change the percentage of NPLs in China. The results of previous studies are consistent with the current study (Adem, 2022). Therefore, ROA, ROE, economic sustainability and political instability index has valuable role to change the percentage of NPLs in Chinese banking industry. Additionally, it is observed that; bank efficiency has critical role on the relationship between ROA, ROE, economic sustainability and NPLs. Bank efficiency create interaction effect with the help of ROA, ROE and economic sustainability which further causes to influence NPLs. Consequently, any change in bank efficiency has role to influence NPLs.

6. Study implications

This study contributed to the knowledge by highlighting the important area among the Chinese banking industry. NPLs are addressed in various countries, but it is very rare in Chinese banking industry by introducing economic sustainability and political instability index. Both the constructs, economic sustainability and political instability index has minor work in relation to the NPLs. Additionally, the interaction effect of bank efficiency was not highlighted by previous studies. This study proved the key role of bank efficiency in NPLs. Thus, the contribution of this study to the knowledge can contribute to the improvement of NPLs percentage among Chinese banks. It is recommended to the management of banks to resolve various issues related to the NPLs by focusing on ROA, ROE, economic sustainability and political instability index. Banks should enhance efficiency ratio which is important to maintain NPL ratio.

We can also argue that government failures increase risky financial behaviors that further increases financial fragility which eventually increases NPLs share. Our findings support this idea that healthy and stable financial sector relies on institutional quality and political regime. The outcomes which are consistent with prior findings in sample of other Asian countries, ensure the relevance of institutional settings which are aimed to instruct banks to fulfill requirements such as increasing their capital reserves in order to avoid deterioration of assets' quality stemming in non-performing loans. It is also suggested to monitor governance indicators thoroughly in order to reduce NPLs. Besides, it is also recommended for countries to establish the mechanism in order to reduce adverse effect of NPLs on environment. Countries where NPLs ratio is higher and persistent, structured experts' committee must be formed to observe unique causes of NPLs in deeper manner so that a clear and sound recommendation can be given in order to recover loans. But it is also necessary to evaluate the cost of setting up a committee compared to economic outcomes. Moreover, China and other related countries make sure that their financial sector contains comprehensive policy measures that would be treated as a guideline to evaluate economic viabilities prior to loans grants given to firms and businesses. This way, they would gain an option to restrict excessive lending, thus, threat posed to banking sector would be minimized. Besides, high interest rates should also be taken care of through the assessment of existing interest rates. This helps them to motivate businesses and investors to pay back their loans within allocated time.

In order to address NPLs, Chinese banks are also recommended to make sure that customers have viable way out to repay their loans. Banks may offer professional advice regarding loan investment to make sure that the required return is attained. Banks should also make sure that consumers who apply for loan, are being monitored thoroughly so that bank could monitor the progress of business for which customer has asked for loan. This would help them to be aware of the status of customer's business so that necessary action can be taken before it gets too late. NPL must be check further in order to make sure that investors in banking sector are not being discouraged. Electronic platforms should also be provided to evaluate if asset used by consumer as collateral to borrow money from other providers. Punishment criteria must be set for defaulters because if it is neglected, it will lead to non-performing loans. Lastly, there should also be a penalty on banks who specifically have high NPL ratio. On the other hand, a reward must be given to banks who are able to maintain their NPL ratio as minimum they can.

Availability of data and material

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The author declare that they have no competing interests.

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