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THE EFFECT OF INSTITUTIONAL QUALITY AND MACROECONOMICS VARIABLES ON NON-PERFORMING LOANS IN DEVELOPING COUNTRIES

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ABSTRACT

This study intends to examine how institutional quality and macroeconomic factors affect non-performing loans within developing countries in 2010–2019. The estimation results employing the Generalized Method of Moment (GMM) method reveal that the institutional quality variable with a proxy for the government effectiveness index and regulatory quality index has a significant effect with a negative coefficient on the non-performing loans ratio (NPL). Moreover, macroeconomic variables such as inflation, unemployment, and real interest rates significantly affect NPL. In contrast, economic growth has a significant negative effect on NPL. Policymakers should focus on creating effective regulations to reduce NPLs. The government can make clear, consistent, and transparent regulations to promote a strong and competitive private sector.

Keywords: *Non-Performing Loans, Institutional Quality, Macroeconomics, GMM*

ABSTRAK

Penelitian ini bertujuan untuk melihat pengaruh variabel kualitas institusi dan variabel makroekonomi terhadap kredit bermasalah (Non-Performing Loans) di negara berkembang pada tahun 2010–2019. Hasil estimasi menggunakan metode Generalized Method of Moment (GMM) menunjukkan bahwa variabel kualitas institusi dengan proksi indeks efektivitas pemerintah dan indeks kualitas regulasi berpengaruh signifikan dengan koefisien negatif terhadap rasio kredit bermasalah (NPL). Selain itu variabel makroekonomi dengan proksi tingkat inflasi, tingkat pengangguran, dan suku bunga riil berpengaruh positif signifikan terhadap NPL, sedangkan pertumbuhan ekonomi berpengaruh negatif signifikan terhadap NPL. Untuk mengurangi NPL, pengambil kebijakan harus fokus pada penciptaan peraturan yang efektif. Pemerintah dapat membuat peraturan yang jelas, konsisten, dan transparan untuk mendorong sektor swasta yang kuat dan kompetitif.

Kata Kunci: *Non-Performing Loans, Kualitas Institusi, Makroekonomi, GMM*

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Introduction

In the bank's ideal cycle of credit activities, each debtor will pay their obligations according to the specified amount and time. However, this ideal condition does not fully occur because debtors often fail to pay. It causes banks to experience problematic credit, usually called a non-performing loan (NPL). Referring to the Compilation Guide on Financial Soundness Indicators 2004 published by the International Monetary Fund (IMF), a credit will be classified as non-performing credit if the debtor fails to make principal and interest payments for a period exceeding 90 days (Lee et al., 2020).

The quality of a country's banking loan portfolio can be inferred from the NPL ratio. The Asian Development Bank (2013) identified an unfavorable non-performing loan ratio exceeding 5 percent. Maintaining a low NPL ratio is essential for banks seeking long-term profits. The financial sector's health is one of the foundations for maintaining economic stability and encouraging sustainable growth. Hence, the high NPL ratio raises significant concerns that require attention, given the essential role of banking institutions in the country's economy.

World Bank data in Figure 1 reveals that the average NPL ratio among emerging market countries experienced fluctuations between 2010 and 2019. In 2019, the NPL ratio reached the lowest value at 5.48 percent, while the highest was recorded at 6.71 percent in 2017. It indicates that the NPL ratio is in bad condition as it surpasses the 5 percent threshold (Asian Development Bank, 2013). Therefore, this is a warning for developing countries to focus on their non-performing credit ratio. A country's banking system can be disrupted due to a high NPL ratio. It can be a sign of a banking crisis. Several factors can contribute to the rise in the NPL ratio. Büyükoglu et al. (2021) state that the determining factors for NPL can be classified into macroeconomic, banking, and institutional.

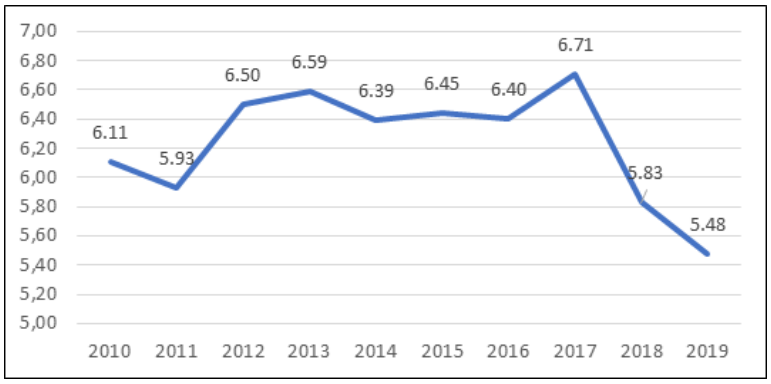

Figure 1: Average Percentage Value of the Ratio of Non-Performing Loans to Total Loans in 40 Developing Countries 2010-2019

Source: World Bank (2023)

The definition of institutional quality is explained by Kaufmann et al. (2010) as an institution where authority is implemented in a country. This definition covers several things first: when the government is elected, monitored, and replaced. Second, the government's ability to develop and implement effective policies. Third, respect by both citizens and the state for institutions that regulate economic and social interactions between communities. Previous studies have assessed the effect of institutional aspects on non-performing loans by employing government indicators or the Worldwide Governance Indicator (WGI), which measures six critical dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption.

Governance indicators are essential to economic growth and development (Mohammadi et al., 2017). Haq & Zia (2006) emphasized that effective governance promotes long-term economic growth by increasing investment inflows, growing market confidence, removing trade barriers, increasing market volume, and increasing the country's competitiveness. According to a study conducted by Boudriga et al. (2010), in Middle Eastern and North African (MENA) countries, the government has an essential role in lowering the NPL ratio.

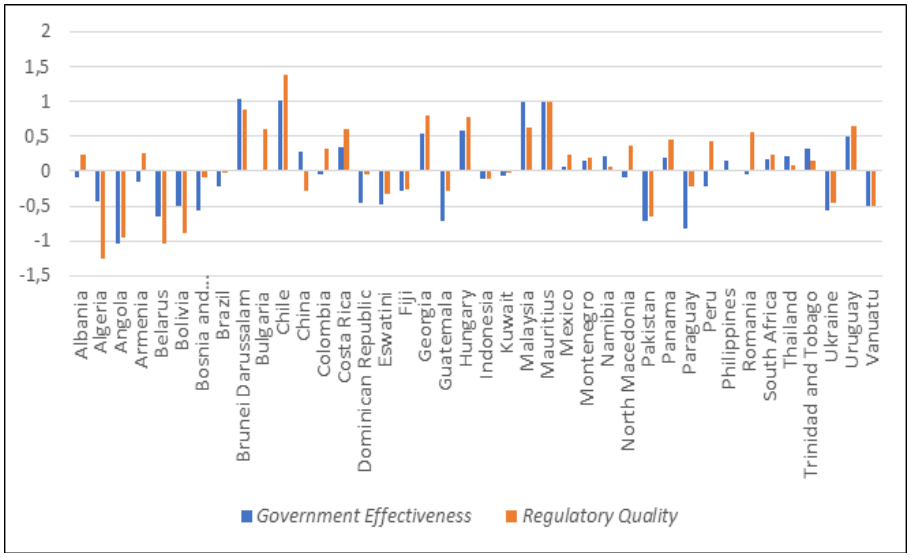

Figure 2: Average values of Government Effectiveness and Regulatory Quality in Developing Countries 2010 – 2019

Source: World Bank (2022)

Figure 2 shows that 21 out of 40 developing countries had a negative average value of the government effectiveness index during 2010-2019. This negative figure shows that each country's government's effectiveness level is getting worse. In addition, 22 out of 40 developing countries also have a negative average value of the regulatory quality index. This negative value signifies the government's limited capacity in devising and implementing effective policies and regulations. A study by Tatarici et al. (2020) demonstrates that government effectiveness and regulatory quality significantly negatively influence the level of non-performing loans within 12 European Economic Community (EEC) countries.

Thus, this study aims to analyze the influence of institutional quality and macroeconomic factors on NPL. Specifically, it intends to prove the hypothesis that institutional quality variables such as government effectiveness and regulatory quality and macroeconomic indicators such as economic growth, unemployment, inflation, and credit interest rates influence the NPL level. This study also aims to determine whether effective governance and good regulatory frameworks contribute to reducing the NPL ratio in emerging market countries.

Several previous studies defining the impact of institutional quality on non-performing loans have been carried out using various variables as proxies for institutional quality. Arham et al. (2020) employed interaction variables between government and macroeconomic variables to analyze their effect on non-performing loans within ten emerging market countries. The study revealed that the interplay among corruption control variables, government effectiveness, and regulatory quality on macroeconomic variables can mitigate the influence of debt/GDP, unemployment rates, and real interest rates on non-performing loans. Meanwhile, Büyükoglu et al. (2021) conducted research that integrated six indicators from the Worldwide Governance Indicator into a governance index. The study revealed that institutional quality significantly negatively affects non-performing loans.

Moreover, studies exploring the influence of macroeconomic components on non-performing loans still provide mixed results. Kuzucu & Kuzucu (2019) researched emerging and advanced countries before and after the 2008 crisis. The study revealed that the inflation rate significantly negatively influenced NPL. Different results were found by Foglia (2022), demonstrating that in Italy, inflation has a significant positive effect on NPL. By analyzing the effects of macroeconomic factors (real interest rates, GDP growth, unemployment rate, and inflation rate) and government quality variables (government effectiveness index and regulatory quality index) in 40 developing nations, this study aims to fill this research gap.

Literature Review

Loanable Funds Market

Mankiw (2018) explains that the loan fund market brings together people who want to save with the public and companies who want to borrow funds for investment activities. The source of loan funds comes from national savings, which include private and public savings. These savings will become a supply in the loanable funds market. From the demand side, investment is one source of demand in the loanable funds market because demand comes from households and companies who want to borrow funds for investment activities.

The loanable funds market uses interest rates as prices and loanable funds as goods. The interest rate represents the amount the borrower will pay and the amount the depositor will receive. High interest rates can make loans more expensive. Therefore, the quantity demanded will decrease as the interest rate increases. On the contrary, this makes saving more attractive. As a result, loanable funds will increase when interest rates increase.

Credit Risk

Credit risk is the possibility of financial loss due to a debtor's failure, reluctance, or delay in paying their debts (Bouteille & Coogan-Pushner, 2021). It is often gauged using the non-performing loan ratio. Szarowska (2018) elaborates that a loan is classified as non-performing credit when two criteria are met. First, the principal or interest payment is overdue by 90 days or more. Second, there is a known weakness in the loan or borrower. The World Bank defines non-performing loans as loans for which principal and interest payments are due for 90 days or more, but payment cannot be fully received.

The high NPL value of a country is a phenomenon that can threaten the banking system (Büyükoglu et al., 2021). The NPL value will affect bank efficiency and reduce financial stability. Moreover, high NPLs will reduce bank profits. The decline in bank profits was caused by increasing provision costs and NPLs (Foglia, 2022). The NPL ratio can influence economic activity through the credit supply channel. When NPLs increase, uncertainty regarding banks' actual capitalization increases (Tanasković & Jandrić, 2015). It will result in a more significant risk premium on bank funding and less credit availability (Diwan & Rodrik, 1992). It ultimately shows a contraction in the credit supply to households and companies due to a decrease in credit.

Quality of Government

The financial system must be closely monitored and governed by a robust regulatory framework to prevent future problems. Financial crime and high risk-taking are common in countries with fragile government structures (Kinda et al., 2016). According to Francis (2003), effective governance is essential for fostering financial stability as it significantly impacts the government's ability to execute its main functions. Thus, the country's economic goals can be successfully achieved.

Kaufmann & Kraay (2007) introduced six Worldwide Governance Indicators (WGI) indicators designed to assess government quality. The World Bank subsequently developed these indicators. The six WGI indicators comprise voice and accountability (VA), political stability and absence of violence (PV), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC). These indicators are derived from aggregating hundreds of individual variables from 33 data sources from 30 organizations. These data reflect government quality perceived by the public and private sectors, non-governmental organizations, the broader community, and businesses.

Tanasković & Jandrić (2015) research examines the impact of macroeconomic and institutional variables on NPL. The study demonstrates that insufficient supervision, an ineffective justice system, and underdeveloped supporting institutions in the financial system can affect market competitiveness and exacerbate the conditions for both debtors and lenders. Lee et al. (2020), using the WGI variable in their research, found that government effectiveness reduced NPL by working efficiently, such as providing quality services and implementing good policies. Moreover, it also negatively affects NPL. It indicates that effective regulations can lower the NPL ratio if the government enacts policies that promote private sector growth.

Prior research by Arham et al. (2020) indicates that government effectiveness significantly negatively affects NPL. This study demonstrates that the interplay between government effectiveness and macroeconomic variables can mitigate NPL. Giammanco et al. (2023) explain that effective governance can be assessed from government actions instructing banks to comply with Basel requirements by increasing bank capital reserves to avoid a decline in asset quality originating from NPLs.

Macroeconomic Variables

Bernanke et al. (1999) developed a theoretical framework known as the financial accelerator. This theory elucidates a dynamic general equilibrium model to unveil the presence of credit market friction, a pivotal factor in shaping the business cycle. The concept of a financial accelerator pertains to the development of endogeneity within credit markets, which magnifies and impacts macroeconomic shocks. This theory was developed and elaborated on the real business cycle by Kiyotaki (2011), who explained how the business cycle influences the credit cycle. Generally, the relationship between these cycles is shaped by the asset quality at each stage of the business cycle.

Economic growth is an essential indicator for assessing a country's economy, particularly in describing the condition of individual income levels. Previous literature and research have highlighted macroeconomic variables as primary factors influencing NPL. Koju et al. (2019) stated that NPLs influence financial institutions, while NPLs are influenced by economic growth. A weakening economy can significantly affect banking performance, and the impact is more significant than in other industries. Moreover, economic growth is also the main driver for improving credit quality.

In their study, Kuzucu & Kuzucu (2019) elucidated that economic growth is the primary determinant influencing NPL in emerging and developed countries. It aligns with the theoretical framework positing that macroeconomic expansion enhances the quality of bank assets by diminishing non-performing loans. Kjosevski & Petkovski (2021) also corroborated these findings, noting that economic growth significantly negatively affected non-performing loans.

A continuous increase in the prices of goods and services over some time is known as inflation. Samuelson & Nordhaus (2009) describe inflation as a condition characterized by a

rise in the overall price level, including goods, services, and production factors. High inflation can indicate a decline in the value of a country's currency, which can affect the economy and banking system. Arham et al. (2020) explained that inflation can negatively and positively impact NPL. High inflation can enhance borrowers' repayment capacity by decreasing the real value of debt borrowed, thereby lowering NPLs. On the other hand, rising inflation requires a high-risk premium, causing interest rates to rise. Consequently, borrowers' cash flow can be disrupted, reducing their ability to repay their debts.

Previous studies analyzing the impact of inflation on NPLs have provided mixed results. Ghosh (2015) found that inflation significantly influenced NPLs in the 50 states of the United States and the District of Columbia during 1984–2013. Conversely, Szarowska (2018) discovered that inflation significantly negatively affected NPLs in 11 Central and Eastern European countries for the 1999-2015 period. This diversity of results is also reinforced by research by Semia (2019), which shows that inflation has a positive influence on NPLs in CEE countries and a significant negative influence on MENA countries.

A high unemployment rate usually indicates a country's poor economic condition. Klein (2013) explains that increasing unemployment can increase NPL. When a debtor does not have a job, he will lose his ability to pay credit. Büyükoglu et al. (2021) also found that unemployment positively affects NPL. When unemployment increases, NPL will also increase. In their research, Giammanco et al. (2023) also found that unemployment significantly influenced NPL in 31 Asian countries from 2000 to 2020.

Interest rate is a crucial factor affecting bad loans or NPLs (Farhan et al., 2012). High bank interest rates increase the number of borrowers needing help to repay their loans. It will reduce the borrower's ability to repay the loan (Ombaba, 2013). The calculation of real interest rates incorporates the country's inflation rate. Thus, real interest rates are expected to positively influence increasing NPLs (Arham et al., 2020). Research by Mascu & Pescu (2016) shows that real interest rates positively influence NPL. Research by Wood & Skinner (2018) also shows similar results, where higher interest rates lead to an increase in NPLs.

Based on the above description, this research hypothesizes that government effectiveness, regulatory quality, economic growth, inflation, unemployment, and real interest rates significantly affect the NPL ratio.

Data and Research Methods

This research applies a quantitative approach using the generalized method of moment (GMM). The data employed in this study is panel data sourced from the World Bank, covering 10 years from 2010 to 2019. The data is processed through the STATA 14 application.

The cross-section data in this study are 40 developing countries consisting of Albania, Algeria, Angola, Armenia, Belarus, Bolivia, Bosnia and Herzegovina, Brazil, Brunei Darussalam, Bulgaria, Chile, China, Colombia, Costa Rica, Dominican Republic, Eswatini, Fiji, Georgia, Guatemala, Hungary, Indonesia, Kuwait, Malaysia, Mauritius, Mexico, Montenegro, Namibia, North Macedonia, Pakistan, Panama, Paraguay, Peru, Philippines, Romania, South Africa, Thailand, Trinidad and Tobago, Ukraine, Uruguay, and Vanuatu. Meanwhile, the time series data in this research is annual data from 2010 to 2019. The data period used is based on the completeness of the data and the year closest to the time this research was conducted.

Table 1: Variables, Definitions, and Sources

Variable	Definition	Source
Non-performing loan ratio	Non-performing loans are measured using bank non-performing credit data on total gross loans in percent (%). The value of non-performing loans is obtained by dividing the value of non-performing loans by the total value of the credit portfolio.	World Bank
Government effectiveness index	Government effectiveness is described in an index that reflects the quality of public services, the quality of government services, the degree of independence from political pressure, the quality of policy formulation and implementation, and the government's commitment to these policies.	Worldwide Governance Indicators
Regulatory quality index	An index indicates the government's capacity to design and implement effective policies and regulations that promote private sector development, representing the quality of regulations.	Worldwide Governance Indicators
Economic growth	Economic growth is the annual percentage growth of GDP at constant 2015 prices, expressed in US dollars. The unit used for economic growth is percent (%).	World Bank
Inflation	Inflation is gauged through the annual growth rate of the GDP deflator, which shows the overall rate of price change in the economy. Inflation is expressed in percent (%).	World Bank
Real Interest rate	Real interest rates are nominal interest rates adjusted for inflation as measured by the GDP deflator. Real interest rates expressed in percent (%)	World Bank
Unemployment rate	Unemployment is the proportion of the workforce that does not have a job but is still actively looking for work opportunities. Labor force and unemployment have distinct definitions in each country. The unemployment rate is expressed in percent (%).	World Bank

The empirical model used in this research consists of two models. The model equation for analyzing the influence of government effectiveness and macroeconomic variables on NPL is as follows:

$$NPL_{it} = \alpha NPL_{it-1} + \beta GE_{it} + \beta GDP_{it} + \beta INF_{it} + \beta UNMP_{it} + \beta RIR_{it} + \varepsilon_{it} \quad (1)$$

The model equation for analyzing the influence of regulatory quality and macroeconomic variables is as follows:

$$NPL_{it} = \alpha NPL_{it-1} + \beta RQ_{it} + \beta GDP_{it} + \beta INF_{it} + \beta UNMP_{it} + \beta RIR_{it} + \varepsilon_{it} \quad (2)$$

Where:

NPL : Non-performing loan ratio
GE : Government effectiveness index
RQ : Regulatory quality index
GDP : Economic growth
INF : Inflation rate
RIR : Real interest rate
UNMP : Unemployment rate
$\varepsilon_{i,t}$: Error
α, β : Coefficient
i : Cross section (40 developing countries)
t : Time series (2010 – 2019)

Data analysis is performed utilizing the SYS-GMM method. The generalized method of moments (GMM) is a parameter measurement estimation method initially introduced by Arellano & Bond (1991) and subsequently developed by Arellano & Bover (1995) and Blundell & Bond (1998). This method can efficiently overcome bias in dynamic panels. The GMM method has two estimation procedures: first is the difference between GMM and System GMM. These two procedures can resolve endogeneity problems and eliminate bias in dynamic panels through instrument variables (Koju et al., 2019). However, Blundell & Bond (1998) recommend using the System GMM method because this method can eliminate problems by combining difference and level regression. This method also uses the lag values of the dependent variable and other independent variables as level regression instruments.

The GMM method requires instrument validity to determine whether the model is valid. The Sargan-Hansen test measures this, which can identify the validity of all variables if the number of instruments exceeds the number of estimated parameters (overidentifying condition). If the Prob > chi2 value exceeds the significance level of 1%, 5%, or 10%, then it can be concluded that the model used is valid and vice versa.

In addition, the Arellano-Bond AR(2) test was employed to assess the presence of autocorrelation within the model. This test is conducted to verify that the error terms are not serially correlated. If the Z Prob value exceeds the significance level of 1%, 5%, or 10%, it can be concluded that there is no autocorrelation and vice versa.

The multicollinearity test was conducted to determine the presence of a high correlation among the independent variables. A high correlation between independent variables can disrupt the relationship between independent and dependent variables. This study employs the variance inflation factor (VIF) method to detect multicollinearity within the model. A VIF value exceeding 10 indicates the existence of multicollinearity among the variables.

Last, the t-test is employed to individually determine the level of significance of the independent variable on the dependent variable. This test involves comparing the p-value with the level of significance. If the p-value is less than the significance level of 1%, 5%, and 10%, then the null hypothesis is rejected, and vice versa.

Finding and Discussion

Descriptive Statistics

Table 2 displays descriptive statistics for each variable. The table includes the variables employed, the number of observations, the mean, the standard deviation, the minimum value, and the maximum value.

Table 2: Descriptive statistics

Variable	Obs.	Min	Max	Mean	Std. Dev.
NPL Ratio	397	0.764	54.823	6.285	6.977
Government effectiveness index	400	-1.246	1.311	-0.236	0.545
Regulatory quality index	400	-1.373	1.536	0.897	0.585
Economic growth	400	-10.078	11.313	3.333	2.741
Inflation	400	-1.584	59.219	4.38	5.665
Unemployment rate	400	0.25	32.02	8.935	7.277
Real Interest rate	396	-33.596	41.713	5.725	7.513

GMM Estimation Results

This study applies the Generalized Method of Moments (GMM) dynamic panel estimation technique to examine the impact of institutional quality and macroeconomic variables on non-performing loans in developing countries. The GMM estimation results are presented in Table 3. The findings indicate that the lagged dependent variable, NPL_{t-1}, has a coefficient of 0.9091 in model 1 and 0.8863 in model 2, both significant at the 1% level. It demonstrates that the model correlates with time or can be called a dynamic model.

Table 3: GMM Estimation Results

Variable	Coefficient Expectation	Model 1	Model 2
Constant		-0.6788	-0.2148
NPLt-1		0.9091***	0.8863***
GE	-	-0.8485***	
RQ	-		-2.595***
GDP	-	-0.1514***	-0.1378***
INF	+	0.2118***	0.1827***
RIR	+	0.0387***	0.3845***
UNMP	+	0.0649***	0.7825***
Sargan Test		0.2047	0.131
Arellano-Bond Test		0.2645	0.2791

Information: ***significant at 1%; ** significant at 5%; and * significant at 10%.

Specification Test Results

In Generalized Methods of Moment (GMM) dynamic panel estimation, an overidentifying test is conducted to assess the validity of the employed model. This test can be performed by examining the Sargan test results. A model is considered valid if the Sargan test value exceeds 1%, 5%, and 10% significance levels. As shown in Table 3, the Sargan test values for both models exceed the significance level, with values of 0.2047 for model 1 and 0.1310 for model 2. Therefore, the null hypothesis can be accepted. It means that both models used are valid.

Autocorrelation Test Results

An autocorrelation test is performed on the GMM dynamic panel estimation to assess whether autocorrelation exists in the model. The test is carried out by analyzing the results of the Arellano-Bond test values. A model can be indicated as not experiencing autocorrelation if the Arellano-Bond test value exceeds the significance level value, namely 1%, 5%, and 10%. As displayed in Table 3, the Arellano-Bond test values for both models exceed the significance level, namely 0.2645 (model 1) and 0.2791 (model 2), so the null hypothesis can be accepted. This means that the two models used do not show any autocorrelation.

Multicollinearity Test Results

A multicollinearity test is performed to ascertain whether there is a correlation between dependent variables in the regression model. The test is conducted utilizing the variance inflation factor (VIF) method. If the VIF value exceeds 10, it indicates the presence of a multicollinearity issue. Given that the VIF value is less than 10, the multicollinearity test results in Table 4 demonstrate that the model does not have a multicollinearity issue.

Table 4: Multicollinearity Test Results

Variable	VIF Model 1	VIF Model 2
GE	1.15	
RQ		1.2
GDP	1.54	1.56
INF	1.55	1.57
UNMP	2.28	2.33
RIR	1.48	1.47
Mean VIF	1.65	1.67

Statistical Test Results

As displayed in Table 3 above, the partial test results (t-test) reveal a significant negative impact of the government effectiveness index, regulatory quality index, and economic growth on the NPL variable, with a significance level of 1%. The government effectiveness (GE) variable has a coefficient of -0.8485 in model 1. It shows that increasing the GE variable by 1% will reduce NPL by 0.8485, assuming other variables are ceteris paribus. Then, the regulatory quality variable (RQ) has a coefficient of -2.595 in model 2. It shows that an increase of 1% in the RQ variable will cause a decrease in the NPL variable of 2.595, assuming other variables remain constant. Meanwhile, the economic growth (GDP) variable has a coefficient value of -0.1514 (model 1) and -0.1378 (model 2). It shows that a % increase in the GDP variable by 1% will decrease NPL by 0.1514 in model 1 and by 0.1378 in model 2, assuming other variables are ceteris paribus.

On the other hand, inflation, real interest rate, and unemployment rate positively and significantly affect the NPL variable with significance levels of 1%. The inflation rate variable (INF) has a coefficient value of 0.2118 (model 1) and 0.1827 (model 2). It shows that a % increase in the INF variable by 1% will increase the NPL by 0.2118 in model 1 and by 0.1827 in model 2, assuming other variables are ceteris paribus. Furthermore, the real interest rate (RIR) variable has a coefficient value of 0.0387 (model 1) and 0.3845 (model 2). It shows that a % increase in the RIR variable by 1% will increase NPL by 0.0387 in model 1 and 0.3845 in model 2, assuming other variables are ceteris paribus. Finally, the unemployment rate variable (UNMP) has a coefficient value of 0.0649 (model 1) and 0.7825 (model 2). It shows that a % increase in the UNMP variable by 1% will increase NPL by 0.0649 in model 1 and 0.7825 in model 2, assuming other variables are ceteris paribus.

Discussion

The estimation results show that the government effectiveness index negatively and significantly influences the ratio of non-performing loans in developing countries. Enhancing the government effectiveness index can result in a reduction in the non-performing loan ratio. These results align with a study by Francis (2003), which emphasizes the important role of good governance in promoting financial stability. The government effectiveness index can indicate the quality of policy making and implementation and the credibility of the government's commitment to policy. The government must be able to instruct banks and financial supervisory institutions to comply with Basel requirements by increasing their capital reserves. This way, a decline in asset quality originating from NPLs can be avoided.

Basel requirements are international banking regulations created by the Basel Committee on Banking Supervision (BCBS). This regulation was created to increase the global financial system's stability by strengthening banking and reducing the risk of banking failure. The Basel Standards were designed based on preventive measures following the banking

crisis. Countries that want to maintain financial stability must instruct banks and financial supervisory institutions to implement international regulatory standards such as the Basel Standards. The government effectiveness index also reflects the government's ability to adapt to economic conditions. These findings are supported by several studies showing that government effectiveness significantly affects the NPL ratio level (Giammanco et al., 2023; Lee et al., 2020; Tatarici et al., 2020).

The findings of this research reveal that the regulatory quality index has a negative and significant influence on the ratio of non-performing loans in developing countries. It implies that strengthening the regulatory framework can contribute to a decrease in the non-performing loan ratio. This result aligns with prior research by Francis (2003), which highlighted the importance of good governance in promoting financial stability. Regulatory quality refers to the government's capacity to make and implement good policies and regulations that encourage private sector development. The relevance of regulatory quality in reducing the ratio of non-performing loans is demonstrated by how the government can formulate and articulate policies encouraging the private sector. The government's ability to create and implement policies that effectively stimulate the private sector demonstrates the importance of regulatory quality in decreasing the ratio of non-performing loans.

The regulatory quality index collects data from various sources, including the business regulatory environment (Kaufmann et al., 2009). A good business regulatory environment will encourage private sector growth and investment. When regulations are clear, consistent, and transparent, businesses can run with fewer problems. Encouraging a healthy and competitive private sector can improve financial performance, lowering the non-performing loan ratio. These results are consistent with several studies that demonstrate the significant impact of regulatory quality in lowering the non-performing loan ratio (Lee et al., 2020; Okafor & Ezeaku, 2022; Tatarici et al., 2020).

Furthermore, the estimation outcomes exhibit that the economic growth variable also negatively and significantly affects the ratio of non-performing loans in developing countries. It demonstrates that when economic growth experiences a positive increase, the ratio of non-performing loans will decrease. This finding is consistent with a study conducted by Kiyotaki (2011), which emphasizes that as the business cycle expands, the credit cycle grows because asset quality improves. Serving as an indicator of improving economic conditions in a country, economic growth can be employed to elucidate the current state of the economy. Increasing asset quality caused by economic growth means debtors have extensive collateral that can be used to obtain credit. When this condition occurs, the debtor also has a healthy financial balance. This good situation allows debtors to repay their credit so that problem loans in financial institutions become low.

Otherwise, when the economy weakens, banks must focus more on distributing credit as one of their primary business activities. When the economy is in recession, uncertainty will arise for debtors. It can reduce the debtor's ability to pay. Empirical findings showing the negative influence of economic growth on the non-performing loan ratio confirm several previous studies highlighting that economic growth can mitigate the non-performing credit ratio (Lee et al., 2022; Semia, 2019; Tanasković & Jandrić, 2015). Banks can try to deal with the economic situation to maintain the non-performing credit ratio by developing management mechanisms to handle the non-performing credit ratio. In this way, banks can respond to every macroeconomic condition that occurs.

The results of this study also reveal the positive and significant influence of inflation on the NPL ratio in developing countries. In other words, rising inflation causes an increase in

the NPL ratio. Arham et al. (2020) explained that high inflation signifies a devaluation of the domestic currency, so it can directly affect the national economy and banking system. The inflation rate negatively and positively impacts the non-performing loan ratio. A high inflation rate necessitates a high-risk premium, raising interest rates. Higher interest rates can burden borrowers' cash flow, hindering their ability to meet loan repayment obligations. It is one reason the inflation rate positively impacts the non-performing loan ratio.

A high level of inflation also decreases the value of the borrower's real income, worsening his ability to pay his debts. High inflation is generally accompanied by expansionary monetary policy that increases the supply of loans. Banks often adopt aggressive loan provision strategies in circumstances like this, leading to an elevated ratio of non-performing loans. This finding is supported by research by Kuzucu & Kuzucu (2019) and Umar & Sun (2018), demonstrating that the inflation rate can elevate the ratio of non-performing loans.

The unemployment rate positively and significantly affects the non-performing loan ratio in developing countries. It indicates that an increase in the unemployment rate leads to a rise in the ratio of non-performing loans. This result aligns with the findings of Klein (2013), which demonstrated that a rise follows an increase in the unemployment rate in the non-performing loan ratio. The influence of the unemployment rate on the non-performing loan ratio further substantiates the connection between the business cycle and the credit cycle. The high unemployment rate indicates that the business cycle is experiencing a recession. It will cause households and companies to be in poor financial condition. The loss of jobs and decreased productivity created by companies due to a lack of human resources causes debtors to lose their capacity for loan repayment. It will lead to an increase in the non-performing loan ratio.

The unemployment rate can significantly contribute to the rise in the ratio of non-performing loans. When workers lose their jobs, the income they receive will diminish. Apart from that, workers also have to face the uncertainty in the job market. Debtors may already be experiencing difficulties paying their obligations, which will worsen if the debtor loses their job. Thus, the NPL ratio will increase. This finding is supported by several studies demonstrating that unemployment significantly affects the non-performing loan ratio (Foglia, 2022; Tatarici et al., 2020; Zheng et al., 2019).

Finally, real interest rates positively and significantly influence the non-performing loan ratio in developing countries. It indicates that a rise in real interest rates corresponds with an increase in the non-performing loan ratio. Messai & Jouini (2013) explained in their research that rising real interest rates can elevate the non-performing loan ratio, particularly for loans with floating interest rates. This phenomenon is caused by a decrease in the debtor's payment capacity due to an increase in the interest that must be paid.

Rising real interest rates are often associated with high inflation. Inflation causes the currency's value to fall, so the value of the money borrowed will be different now and in the future. Movements in real interest rates are adjusted to economic conditions or market conditions. When economic growth increases, interest rates will increase due to high demand for credit and inflationary pressures. High real interest rates can also prevent excessive demand for credit so that supply does not decline. These changes in real interest rates must be considered to reduce the non-performing loan ratio. Although high interest rates can prevent excessive demand for credit, they can also increase non-performing loans. Several studies also revealed that real interest rates significantly influence the NPL ratio (Arham et al., 2020; Mascu & Pescu, 2016).

Robustness Test

This study eliminates the unemployment rate variable from the set of independent variables to perform a robustness test. This test was carried out using the GMM method. The outcomes presented in Table 5 indicate that the model is robust. It is proven by the coefficient notation results (negative and positive), which are consistent for each variable used, and the coefficient values, which are not very different from the previous estimation results.

The Sargan test and Arellano-Bond AR(2) test outcomes in Table 5 confirm that the model employed in the robust test is valid and has no autocorrelation issues. These findings imply that the estimations conducted in this study are accurate. The model and independent variables employed effectively describe the dependent variable.

Table 5: Robustness Test Estimation Results

Variable	Coefficient Expectation	Model 1	Model 2
Constant		-0.2005	0.4367
NPLt-1		0.9181***	0.8886***
GE	-	-0.7601-***	
RQ	-		-2.7070***
GDP	+	-0.1660***	-0.1516***
INF	+	0.2086***	0.1838***
RIR	+	0.3818***	0.4367***
Sargan Test		0.2371	0.0601
Arellano-Bond Test		0.2681	0.2765

Conclusion

From the findings and discussion described earlier, several conclusions can be made. First, the government effectiveness index has a negative and significant relationship to the non-performing loan ratio. The ratio of non-performing loans can decline when the government can create and implement effective policies, such as enacting laws regarding international regulatory standards in the financial sector. The regulatory quality index also has a negative and significant relationship to the non-performing loan ratio. Creating and implementing regulations that support the private sector can improve macroeconomic aspects and mitigate the ratio of non-performing loans.

Furthermore, economic growth has a negative and significant relationship to the non-performing loan ratio. Increased economic growth indicates that the business cycle is in a state of expansion. This condition indicates that debtors have high-quality assets, which increases their capacity to pay their debts. It will lower the ratio of non-performing loans.

The inflation rate has a positive and significant relationship to the non-performing loan ratio. As the inflation rate rises, debtors will see a reduction in the real value of their income, leading to diminished capacity to repay their loans. Then, the unemployment rate has a positive and significant relationship to the non-performing loan ratio. Unemployment has a direct influence on the condition of debtors. When debtors lose their jobs, they have no income to pay their obligations. Therefore, high unemployment can increase the NPL ratio.

Finally, real interest rates have a positive and significant relationship to the non-performing loan ratio. Rising interest rates contribute to an increase in the amount of credit that must be paid so that the burden received by debtors will increase. This condition can contribute to a higher NPL ratio.

Several suggestions can be taken from the discussion of this research. As a policy maker to lower the NPL ratio, the government is expected to prioritize government efficiency and regulatory quality when formulating policies related to macroeconomic conditions and encouraging the private sector. The policies created could include laws instructing financial supervisory authorities to have international-standard policy frameworks and policies supporting the private sector. The government can make clear, consistent, and transparent regulations so that the private sector becomes healthy and competitive and can improve financial performance.

This research still has research limitations. The data range used is limited to the 2010-2019 period. In addition, the variables employed in this research are only the government effectiveness index, regulatory quality index, economic growth, inflation rate, unemployment rate, and real interest rates. Meanwhile, other variables can be used to define government quality and macroeconomic variables. Therefore, future research is expected to use a broader analysis unit, such as other economic country groupings. Further research can also use other indicators in the Worldwide Governance Indicator (WGI), such as the rule of law, political stability and absence of violence/terrorism, control of corruption, and voice and accountability.

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