Moderation of Country Governance on Macroeconomic Cyclical Indicator to NPL Behavior in Emerging Asia

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Abstract
Purpose: In emerging Asia banking, non-performing loans (NPLs) continue to be a significant source of credit risk. This study looked at the effect of macroeconomic cyclical variables in influencing the degree of bank NPL in Asia's rising economies, both theoretically and practically.
Design/methodology/approach: The importance of country governance in moderating the negative effects of macroeconomic cycles on bank credit risk is investigated using the presented empirical model. Using Principal Component Analysis (PCA) as an interaction tool, this study examined the links between macroeconomics and country governance variables on bank NPL by evaluating 10 countries in emerging Asia from 2010 to 2018. The geographical scope of the research data is confined to 10 nations in emerging Asia.
Findings: The interaction analysis provides new insights on the function of country governance in mitigating the negative effects of economic cycle shocks, according to this study. The impact of country governance on total gross external debt/GDP, inflation, real interest rate, and unemployment rate on bank NPL has been discovered. As a result, country governance has a substantial impact on bank NPL mitigation.
Research limitations/implications: This article adds to our understanding of the role of governance in managing bank credit risk.
Practical implications: This research contributes to the extension of bank NPL research that would be valuable to inform theory, practice and policy related to management of the bank NPLs in emerging countries of Asia.
Originality/value: The procyclical and countercyclical views were utilised to understand the significance of macroeconomic cyclical variables in determining bank NPL in Asia. In practise, this study built on prior research on the macroeconomic cyclical model by incorporating the interaction of macroeconomic cycle indicators with country governance and their impact on bank NPL.

Keywords: Asia Countries, Bank Credit Risk, Bank NPLs, Macroeconomic Cyclical Indicators.

Introduction

The banking sector in Asia has been steadily expanding, and it now serves as the primary source of funding for Asia's burgeoning economy's businesses. Despite these realities, Asia's banking industry has been hampered by the persistent and cyclical behaviour of nonperforming loans (NPLs), which has lowered Asia's asset and earnings quality. Asia as a whole has a higher rate of nonperforming loans (NPLs) than the global average of 3.5 percent (World Bank, 2017). This situation indicates that Asian banks are performing below par in managing their NPLs, which is significantly harming Asia's bank profitability, operational sustainability, and shareholder returns. This situation has alarmed many bank stakeholders, who have called for ongoing monitoring and control of bank nonperforming loans (NPLs). Understanding the bank NPL determining factors is vital in the process of monitoring and controlling bank NPLs. Previous research into the factors impacting bank NPLs divided the determinants into internal (bank particular) and external (country specific) elements (Dimitrios, Helen, and Mike, 2016). Beck, Jakubik, and Piloiu (2015) conducted a research of NPLs in 75 countries and found that macroeconomic drivers have the most important impact in bank NPLs internationally. Despite these facts, the theoretical and empirical data on the impact of macroeconomic conditions on bank NPLs is still unclear, and more research is needed.

The real business cycle theory introduced by King and Plosser (1984) list in reference is the earliest theory that could explain the links between microeconomic and bank NPLs. This theory establishes the theoretical idea that the credit cycle is linked to macroeconomic growth. Research into this theoretical foundation has yielded a varied picture of microeconomic and NPL cycled behaviour. According to one theory, the relationship between macroeconomics and nonperforming loans is procyclical. NPLs are higher while the economy is growing, according to this viewpoint. A set of researchers, on the other hand, claims that the link is countercyclical, meaning that the NPL is lower when the economy is doing well. Because of the dual function of microeconomic repercussions on bank NPLs, as well as mixed empirical evidence from previous studies around the world, the influence of macroeconomics on bank NPLs is not well understood in practise. The number of bank NPLs is demonstrated to be affected by macroeconomic variables that occur in a country's economy (Ihsan, 2011). Researchers have looked into the effects of a variety of macroeconomic variables on bank NPLs in the past, some without using any specific theory and others utilising business cycle theory. The amount of NPLs in banking sectors in emerging Asia countries would be affected by changes in the development of macroeconomic indicators, and conclusions from prior studies on the drivers of NPLs are not uniform. In a prior study, it looked at how macroeconomic cyclical indicators such construction, gross fixed capital formation, total gross external debt/GDP, unemployment, total consumption, CPI, trade balance, and interest rate on NPLs influence their cyclical behaviour. Furthermore, this study has narrowed down the NPL contributing elements in Asia rising countries by taking into account a few macroeconomic aspects.

Some country factors that neutralise the links between macroeconomic and bank NPLs could explain the non-homogeneity of the relationships between macroeconomic and bank NPLs. Taking this into account, this study goes beyond past research by looking at how governance effectiveness interacts with macroeconomic cycle behaviour on bank NPLs. Some studies have indicated that weaker country governance reduces bank risk taking (Ashraf, Arshad, and Yan, 2017), whereas others have discovered that governance characteristics influence the level of Greek non-performing loans (Anastasiou, Bragoudakis, & Malandrakis; 2019).

In summary, the novel findings reported in this study seek to expand theoretical understanding of the effect of microeconomic cyclical factors on bank NPLs, which would be useful to bank managers and policymakers concerned with managing bank NPLs in emerging Asia countries.

Literature Review

Macroeconomic cycle behavior theory

Procyclical and countercyclical approaches explain macroeconomic cycle behaviour. Procyclical refers to a period of economic expansion, whereas contractionary refers to a period of economic contraction (Mohanty & Mishra, 2017). Procyclical refers to the volatility of an economic trend of financial variables for a specific time of the economic cycle, according to Landau (2009). This can also be broken down into three aspects that are difficult to separate literally: (1) fluctuations around the trend, (2) changes in the trend itself, and (3) possibly cumulative departures from the equilibrium value. Sources of procyclicality can be found in three groups, according to Jose Ernesto and N. Gonzales (2009): (1) supervisory regulations, (2) disclosure and accounting standards, and (3) macroeconomic policy, all of which will be explored in this paper. When the economy is in a boom phase, countercyclical or a cyclical fiscal policy is used, and when the economy is in a downturn, a cyclical fiscal policy is used (Mohanty & Mishra, 2017).

Few researchers have maintained the two competing theories of procyclical and countercyclical in understanding credit risk, according to studies by Vogiazas & Nikolaidou (2011). This provides the basis for investigating the factors that cause the relationship between macroeconomic and bank-specific variables. This research focuses on a few macroeconomic-cyclical indicators, including construction, gross fixed formation, GDP, unemployment, total consumption, CPI, trade balance, and money indicators (M1 and M2). It comprises three-month Euribor interest rates, credit growth data for the Romanian banking system, and fiscal and banking statistics for Greece. According to the findings of the study, all of the factors are significant in explaining NPL in the Romanian banking sector.

Empirical evidence on macroeconomic cyclical indicators and NPL behaviour

NPL has a strong relationship with macroeconomic situations (Engelen & Authority, 2016). According to economic logic, tough macroeconomic conditions have a negative impact on financial sectors. Corporates and households are more likely to have issues repaying their loans during recessions and periods of sluggish economic development, resulting in a rise in the ratio of nonperforming loans (NPLs) on banks' balance sheets (Baudino & Yun, 2017).

In general, macroeconomic variables such as inflation, interest rate, and GDP drive NPL, as do bank-specific factors like as capital ratios and risk management quality (Cucinelli, 2016). (Balgova, Nies, & Plekhanov, 2018). These can be found in a number of studies that document both of these elements. The findings of studies conducted by Washeka and Asif (2016) reveal that the situation of non-performing loans in Bangladesh's banking sector is heavily influenced by both macroeconomic and bank-specific factors. Not only that, but macroeconomic conditions have a significant impact on the severity of the NPL problem, therefore cross-country research must avoid the problem of simultaneous causation in order to evaluate the causal relationship between NPLs and economic performance (Balgova et al., 2018).

Excessive credit expansion frequently indicates a deteriorating credit standard. According to a study by Gavin and Hausmann (1998), interest rates were found to be a key factor in the decline in loan growth in Latin America throughout the 1990s. Insolvency banks resulting in the economic crisis in developing and developed countries between 1980 and 1994 were also found to have an impact on real interest rates and GDP (Demirgüç-Kunt A and Detragiache, 1997) (Diamond & Rajan, 2005).

Studies studying the decline in economic development caused by banking system distress have indicated that rising consumption and real interest rates play key roles in the distress for 38 Asian countries during the last two decades (Hardy & Schmieder, 2014). In a study of the macroeconomic causes of bank loan losses or NPL in Nordic nations and Spain, the GDP and

interest rate were discovered to be possible macroeconomic variables influencing the bank's difficulties (Jarmo, 2001)(Kalirai and Scheicher, 2002).

Based on economic theory and empirical evidence, equity prices, unemployment rate, interest rates, and corporate bonds affect credit risk (Foglia, 2009). CPI, GDP growth, exchange rate, and industry specific indebtedness were all found to be associated with credit risk in Virolainen's macroeconomic model. The key causes of non-performing loans in the euro-area banking system using Generalized Method Of Moments (GMM) estimations for the period 1990Q1-2015Q2, as well as GDP growth, inflation rate, unemployment, tax revenue, and output gap (Dimitrios, Helen, and Mike, 2016). Ghosh (2015) looked into the macroeconomic and institutional drivers of NPL ratio rise. This verifies the notion that countries where domestic currency is not the dominant medium of credit placement will have greater NPL difficulties, which is even more obvious during periods of domestic currency depreciation throughout 50 US states and the District of Columbia from 1984 to 2013. In selected Central and Eastern Europe (CEEC) and Southeast Europe or Southeastern Europe (SEE) countries from 2006 to 2013, GDP, foreign currency loan ratio, and exchange rate level were calculated as NPL determinants.

Tanaskovi and Jandri (2015) looked at household NPLs in a number of European nations and found that discretionary income, unemployment, and monetary conditions all have a significant impact on NPLs. Over the period 1993–2005, Sanchis-arellano and Alicia (2006) discovered that real interest rates and unemployment in the Nordic banking system had an impact on problem loans. In 80 Gulf Cooperation Council banks, the NPL ratio is rising as economic development slows and interest rates climb (Berge & Boye, 2007). The results of panel regressions on the NPL ratio for 26 advanced economies from 1998 to 2009 demonstrate that bad macroeconomic developments, real GDP, interest rates, housing prices, and equity prices all have an impact on the NPL ratio (Espinoza & Prasad, 2010).

In the Eurozone (Klein, 2013), there are high links between NPL and public debt, unemployment, and GDP growth. The literature has looked into the relationship between the macroeconomic environment and loan quality, as well as the phases of the business cycle and banking stability (Messai, 2013). The first study on NPL was undertaken, and it became the most important study in which the influence of NPL was explored. According to Kuutol et al. (2014), the NPL rate is the primary cause of loan losses in financial institutions. It has been discovered that banks with higher NPLs are more likely to experience losses and insolvency. Research of the external and internal macroeconomic factors of NPL has also been conducted. Sinkey & Greenawalt (1991) discovered that macroeconomic factors had a significant impact on NPLs, with the NPL rate serving as a proxy for the study in the US banking industry. Apart from that, Espan (2002) conducted a study that included macroeconomic and firm-specific factors to investigate the impact on NPL. This was accomplished by gathering data from a Spanish-language commercial bank. It was discovered that those variables were substantially associated with the proxy, the NPL. Niyam Raj (2001) discovered that macroeconomic parameters have a substantial link with the NPL in the same study.

Hypothesis Development

Based on the existing literature, this study formulated eight hypotheses relating to the association between the bank NPLs, macroeconomic and country governance variables which government effectiveness in 10 emerging countries in Asia. The hypotheses are given below:

H_1:   There is a significant relationship of interaction between total gross external debt/GDP and country governance on NPLs

H_2 :   There is a significant relationship of interaction between unemployment and country governance on NPLs

H_3 :   There is a significant relationship of interaction between inflation and country governance on NPLs

H_4 :   There is a significant relationship of interaction between real interest rate and country governance on NPLs

Method
To examine the relationship between macroeconomic and interaction variables on NPL, the NPL to total gross loan ratio was used as the dependent variable to evaluate the determinants of NPL. As determinants of NPL, a set of independent variables are used: total gross external debt/GDP (DEB), unemployment rate (UNEM), inflation rate (INF), and real interest rate (RIR). Furthermore, using the Principal Component Analysis (PCA) index to determine the relationship of macroeconomic variables and country governance on NPL for emerging Asia countries, a set of interaction variables of country governance includes voice and accountability; political stability and absence of violence; government effectiveness; regulatory quality; rule of law and control of corruption.

The hypotheses of this study are tested using pooled ordinary least squares (POLS) analyses for variables in ten emerging Asian countries: the Philippines, Vietnam, Indonesia, Thailand, Malaysia, Singapore, India, South Korea, Hong Kong, and China, which are representative of the population of banks in emerging Asia.

Table 1: Variable of measurements

Variables	Measurement
Non- Performing Loan	Bank non-performing loans to total gross loans (%)
Total Gross External Debt/GDP	Central government debt, total (% of GDP)
Unemployment Rate	Unemployment, total (% of total labor force)
Inflation Rate	Inflation (annual %)
Real Interest Rate	Real interest rate (%)
Country Governance	Voice and Accountability; Political Stability and Absence of Violence; Government Effectiveness; Regulatory Quality; Rule of Law and Control of Corruption (PCA index)

Furthermore, the present research used aggregate country level data of bank NPL due to availability of the standardized data for 10 Asia countries by using the annual data. The empirical analysis covers 9 years from the period of 2010 to 2018. The variable of measurement used in this study are as given in Table 1.

According to the methodology of this study, the determinants NPL are tested by using model as below:

$$NPL_{it} = \beta_{0} + \beta_{1}DEB_{it} + \beta_{2}UNEM_{it} + \beta_{3}INF_{it} + \beta_{4}RIR_{it} + \beta_{5}DEB*PCA_{it} + \beta_{6}UNEM*PCA_{it} + \beta_{7}INF*PCA_{it} + \beta_{8}RIR*PCA_{it} + \mathcal{E}_{it}$$

Where,

NPL	:	Non-Performing Loan
DEB	:	Total Gross External Debt/GDP
UNEM	:	Unemployment
INF	:	Inflation
RIR	:	Real Interest Rate
PCA	:	Country Governance
β_0	:	Constant
ε	:	Error term

There are several tests has been conducted such as pool ability test and diagnostic check. From the results on these tests, the comparison with the hypothesis has been made.

Findings

The estimation process requires the selection of variables that, according to economic theory and empirical evidence, affect the emerging Asia countries credit risk. Initially the time series were tested for unit roots by the Levin, Lin & Chu. When a series is found to be integrated of at level, order one (1) or two (2), the first or the second difference was taken to obtain stationarity. The data transformation suggests that all the variables are stationary at level.

Following the methodology, the models were checked for multicollinearity using Variance Inflation Factor (VIF). The multicollinearity problems arise due to the high correlation of any two explanatory variables. As a result, this makes the significant variables turn to be insignificant by increasing the p-value. Thus, the POLS results with multicollinearity problem are solved by generating the PCA index in which standardized the country governance indicators as one interaction variables.

Next, the models were estimated by using POLS is presented in the Table 2. In order to identify the right estimator for the model, various tests have been performed using E-Views software. Three estimation methods in the panel data statistics: the pooled ordinary least squares, the fixed effects, and the random effects method are presented in the Table 2.

The Breusch-Pagan LM test is conducted in Table 3 to test random effects depending on the value of the chi-square for the models. As an extension to the selection of POLS and the panel fixed effect models, cross section dependence test is used for the models in Table 3.

Table 2: Diagnostic check testing

	Chi-Sq. Statistic	Prob>chi2
Breusch-Pagan Lagrangian Multiplier	32.8446	0.0000
Hausman test	195.0585	0.0000
Cross Section Dependence test	118.5409	0.0000

The Hausman test is used in order to select the appropriate model in Table 3 for models and it is found the fixed effect specification is to be preferred in Table 2.

The models indicate that these models is appropriately chosen the fixed effect models as and it clearly justified the significance of the macroeconomic and country governance toward the NPLs in emerging Asia countries.

The Table 2 shows the fitness of the models with the help of R-squared, F-statistics and number of significant relations of the macroeconomic variables with the country governance towards the NPLs.

R-squared values for the model is more than 0.5 in which concluding that more than 50% variance in NPLs was explained by the explanatory variables plus with the interaction. The F-

statistics for the models are significant for the model in which rejecting the null hypothesis and suggesting the explanatory and country governance can influence the NPLs jointly.

The results in Table 2 suggests that on three variables interacted with the country governance has significant association with the NPLs which are total external debt/GDP, inflation rate and unemployment rate; whereas the other one macroeconomics which is real interest rate interacted with the country governance has insignificant impact to NPLs. However, the coefficient value of this model shows direction in which suggesting that the country governance elements helps to mitigate the macroeconomic impacts on NPLs except for interaction of real interest rate and country governance.

Table 3: Pooled ordinary least squares, random effects and fixed effects

Variables	POLS	RE	FE
Constant	-1.2055**	-1.2055***	-0.4584***
	(0.0482)	(0.001)	(0.0006)
DEB	0.4327***	0.4327***	0.1681*
	(0.0042)	(0.0000)	(0.1117)
UNEM	0.0375	0.0375*	-0.0139
	(0.4087)	(0.0992)	(0.6003)
INF	-0.2698	-0.2698***	0.3286
	(0.1743)	(0.0075)	(0.2369)
RIR	0.2071**	0.2071***	-0.0329
	(0.0232)	(0.0000)	(0.6702)
PCA	0.2853	0.2853**	0.1763***
	(0.2902)	(0.0358)	(0.0011)
DEB*PCA	-0.1161***	-0.1161***	-0.0334***
	(0.0004)	(0.0000)	(0.0037)
UNEM*PCA	-0.0205	-0.0205	-0.0159
	(0.5872)	(0.2763)	(0.1833)
INF*PCA	-0.0932	-0.0932	-0.0407*
	(0.5355)	(0.2146)	(0.0666)
RIR*PCA	-0.0199	-0.0199	0.0295
	(0.7621)	(0.5429)	(0.2868)
R^2	0.5483	0.5483	0.9049
Adjusted R^2	0.4817	0.4817	0.8720
F	8.2277***	8.2277***	27.4983***
	(0.0000)	(0.0000)	(0.0000)
Durbin-Watson	0.5473	0.5473	0.6517

The Table 2 provides a positive association of total gross external debt/GDP in which NPLs suggesting the NPLs may influence through the increasing figure of total gross external debt/GDP. Moreover, when it is interacted with the country governance which government effectiveness, it helps effectively in decreasing the impact of NPLs. The similar scenario goes to the inflation rate and unemployment rate in which experienced the same effect on the NPLs when the interaction of country governance elements existed in the models.

The negative association of inflation is statistically significant on NPLs in the model. It decreases the impact of the macroeconomics variables on NPLs. The interaction of the country governance elements in macroeconomic variables statistically decreasing the coefficient values in the estimation in which suggesting that it helps to mitigate the NPLs problems in economy of emerging Asia countries. The theoretical justification for the negative association is

explaining that inflation, the equity value of banks decline resulting in the growth if bank riskiness. This is strengthening the interaction of the country governance in which explains that higher government effectiveness helps to minimize the impact of inflation on NPLs.

The Table 2 also suggests that unemployment rate has significant positive association on NPLs as results of interaction with the country governance elements. It is suggesting that unemployment rate resulting in the growth of NPLs through the decreasing impact of explanatory variables on NPLs.

At the end of the analysis, the residual of the models was checked for the existence of autocorrelation, heteroscedasticity and normal distribution. This study used Durbin-Watson check for autocorrelation in the residual given in Table 2 for the models. The results show that the models experience positive autocorrelation and rejecting the null hypothesis of no autocorrelation. The heteroscedasticity test was conducted by using White test and suggests that the null hypothesis cannot be rejected and corrected as in Table 2. The normal distribution test was conducted using Jarque-Bera test and the tests suggest that the residuals are normally distributed, given in Figure 1.
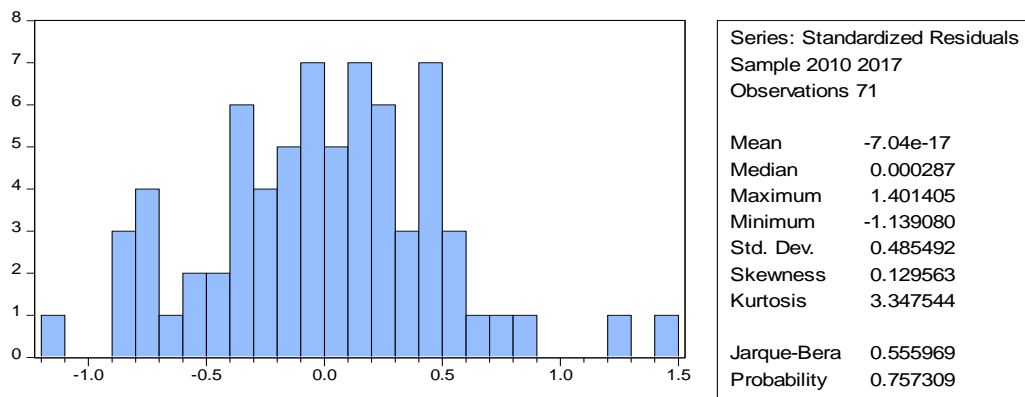
Series: Standardized Residuals	
Sample 2010 2017	
Observations 71	
Mean	-7.04e-17
Median	0.000287
Maximum	1.401405
Minimum	-1.139080
Std. Dev.	0.485492
Skewness	0.129563
Kurtosis	3.347544
Jarque-Bera	0.555969
Probability	0.757309

Figure 1: The Probability Distribution of the Residuals and Jarque–Bera Test

Discussion and Conclusion

The role of country governance in moderating the negative effects of macroeconomic cycles on bank credit risk was investigated using the presented empirical model in this study. According to the findings, country governance aided in lowering the impact of total foreign debt/GDP, unemployment rate, and real interest rate on NPL. As a result, country governance has a major impact on mitigating NPL in ten growing Asian countries.

The interaction study elucidates the function of country governance in reducing the negative impact of economic cycle shocks. This study contributes to the expansion of bank NPL research, which will be useful in informing theory, practise, and policy linked to bank NPL management in Asia's rising markets.

There are only a few recommendations based on the study's findings. To begin with, the government must ensure that GDP growth is under control. This is because, as the economy grows, the loan source is more likely to extend credit, even if the risk of default is recognised. Furthermore, the government must ensure that inflation and unemployment remain under control. This is because these two elements have a negative impact on a loan borrower's ability to repay the loan, and in the worst-case scenario, they can lead to individual and financial institution bankruptcy.

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