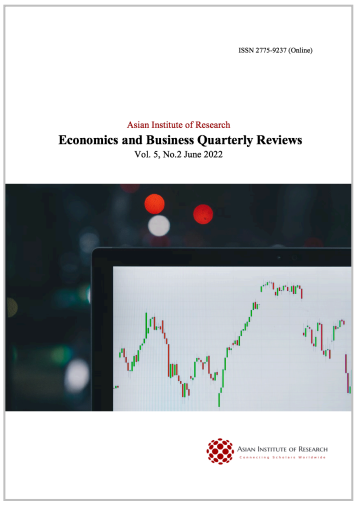

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The Macroeconomic-Based Systemic Risks and Bad Loans of Commercial Banks Listed in the Indonesian Capital Market

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Abstract
The risk is the probability of uncertain situations with the changes. In banks, this circumstance happens when they distribute credits to the parties needing the cash. In performing this intermediary function, the systemic risks related to macroeconomics are available: inflation and exchange rate (ER) of IDR/USD. Hence, this research objective is to investigate and analyze the impact of these systemic risks on non-performing loans. The population originates from the commercial banks in the capital market in Indonesia from 2009 until 2017. We apply the Slovin formula and a simple random sampling method to calculate and acquire the total representative samples. After the archival technique collects the data, we use the regression with pooled data to analyze them. This study demonstrates that systemic risk from the inflation rate positively affects non-performing loans; however, the ER of IDR/USD shows no effect.

Keywords: Commercial Banks, Loan Risk, Systemic Macroeconomic Factors

1. Introduction

To perform the functional financial intermediary institution, the commercial banks are responsible for collecting the funds from society and distributing them back (Taswan, 2010). Furthermore, this collection and distribution of funds become the indicator of development for these banks (Kasmir, 2014). The fund distribution function of commercial banks contains credit risk coming from the incompetence of borrowers to pay the money on time to the banks. Hence, the banks have to consider their credit quality to minimize their default risk (Veithzal, Sudarto, Basir, & Rivai, 2013).

The previous study shows that uncollectible credit is becoming a bank issue. At a minimum, it is affected by two sources of macroeconomic factors, i.e., inflation and exchange rate. As a factor affecting NPL, inflation can depict a positive impact, as displayed by Farhan, Sattar, Chaudhry, and Khalil (2012), Ahmad and Bashir (2013), Benazic

and Radin (2015), or a negative effect, as demonstrated by Festic and Beko (2008) and Firmansyah (2014). Meanwhile, Warue (2013) and Wairimu and Gitundu (2017) do not prove the effect.

As the triggering factor of NPL, Festic and Beko (2008), Farhan et al. (2012), Benazic & Radin (2015), and Kamaludin et al. (2015) prove that the foreign exchange rate owns a positive influence. Conversely, Yam (2016) and Hernando, Miranda, Theodora, Kadarusman, and Ariyan (2020) confirm a negative effect. Meanwhile, Valahzaghard et al. (2012), Ahmad and Bashir (2013), as well as Wairimu and Gitundu (2017) cannot provide the influence.

By considering this heterogeneous evidence of the effect of inflation and exchange rate on bad loans, this research appears with the uniqueness, i.e., utilizing the systemic risk source as the non-performing loan determinant factor. According to DeBant et al. (2000) in Nabella, Maski, and Wahyudi (2020), the shock in the macroeconomy level becomes this risk source in a broad context. Because the risk is always connected with the terrible situation, we apply this framework when explaining the effect of systemic risk from macroeconomic factors, measured by the standard deviation of inflation and exchange rate, on bad loans. Also, to support this purpose, we utilize the listed banks in the Indonesian capital market between 2009 and 2017 as population and samples.

2. Literature Review and Hypothesis Development

2.1. The systematic risk from inflation and bad loans

Inflation demonstrates the commonly increasing price in society. It weakens public purchasing power to consume the products (Sukirno, 2016) and cuts company revenue (Sunariyah, 2011). This situation makes the companies unable to pay the banks for the debt principal and interest (Odusanya, Yinusa, & Ilo, 2018). Then, the banks will have a problem related to their distributed loans (Linda, Megawati, & Deflinawati, 2015). This illumination is confirmed by Farhan et al. (2012) and Ahmad and Bashir (2013) after investigating the banks in Pakistan by stating the higher inflation, the higher the loan risk. Likewise, Benazic and Radin (2015) support this positive tendency after studying and testing the Croatian banks and economy-related data. Therefore, the first hypothesis can be framed below.

H_1. The systemic risk from inflation affects bad loans positively.

2.1. The systematic risk from the exchange rate and bad loans

The supply and demand between the US dollars and the Indonesian rupiahs determine the exchange rate position. If the dollar request for global transactions is high, the IDR/USD position will be weak (Sukirno, 2016). Therefore, the Indonesian economy will be worse. In this situation, the companies cannot pay the debt to the banks; hence, the bank loans will be at risk (Kusmayadi, Firmansyah, & Badruzaman, 2017). This explanation gets supported by Festic and Beko (2008), Farhan et al. (2012), Benazic & Radin (2015), and Kamaludin et al. (2015), declaring a positive impact of the country-related exchange rate on the non-performing loan. Therefore, the second hypothesis can be framed below.

H_2. The systemic risk from the exchange rate of IDR/USD affects bad loans positively.

3. Research Method

The variables utilized are dependent and independent. The non-performing loan performs as the dependent variable. Meanwhile, the systemic macroeconomic risks of inflation and exchange rates become independent variables. Moreover, their definition and measurement are in Table 1.

Table 1: The variable definition and measurement

Variable	Definition	Indicator	Scale
The loan risk	The inability of debtors to pay for their liabilities to the bank	The relative change in annual non-performing loan	Ratio
The systemic risk from inflation	The increase in general price in the economy of the country	The standard deviation of quarterly inflation in a year	Ratio
The systemic risk of exchange rate	The change in the currency exchange rate	The standard deviation of the quarterly IDR/USD in a year	Ratio

The population of this study contains the commercial banks continually available in the Indonesian capital market between 2009 and 2017, and their total (TP) is 26. This information was obtained after tracing IDX Fact Books from 2008 to 2018. Furthermore, to determine the sample size (SS), we utilize the Slovin formula by employing a 5% border of fault (bf) (see equation one).

$$SS = \frac{TP}{1 + TP.bf} \quad \text{..... (1)}$$

Based on this equation, the sample size (SS) = $\frac{26}{1+26(10\%)(10\%)} = \frac{26}{1.26} = 20.63 \approx 21$ banks. Then, these 21 banks are taken by the random sampling method from the population. Furthermore, their name is in this way.

1. AGRO: Bank Rakyat Indonesia Agroniaga Tbk.
2. BABP: Bank MNC Internasional Tbk.
3. BBCA: Bank Central Asia Tbk.
4. BBKP: Bank Bukopin Tbk.
5. BBNI: Bank Negara Indonesia (Persero) Tbk.
6. BBNP: Bank Nusantara Parahyangan Tbk.
7. BBRI: Bank Rakyat Indonesia (Persero) Tbk.
8. BCIC: Bank J-Trust Indonesia Tbk.
9. BDMN: Bank Danamon Indonesia Tbk.
10. BEKS: Bank Pembangunan Daerah Banten Tbk.
11. BMRI: Bank Mandiri (Persero) Tbk.
12. BBNA: Bank Bumi Arta Tbk.
13. BNGA: Bank CIMB Niaga Tbk.
14. BNII: Maybank Indonesia Tbk.
15. BVIC: Bank Victoria International Tbk.
16. INPC: Bank Artha Graha Internasional Tbk.
17. MAYA: Bank Mayapada Internasional Tbk.
18. MCOR: China Construction Bank Indonesia Tbk.
19. NISP: Bank OCBC NISP Tbk.
20. PNBN: Bank Pan Indonesia Tbk.
21. SDRA: Bank Woori Saudara Indonesia 1906 Tbk.

By indicating the variable scale in Table 1, we utilize the regression model with the pooling data and the t-statistics to investigate three hypotheses. Furthermore, this model is noticeable in equation two.

$$\Delta NPL_{it} = \beta_0 + \beta_1 SR\_INF_t + \beta_2 SR\_IDR/USD_t + \varepsilon_{it} \quad \text{.....(2)}$$

In the regression model, the technique to estimate coefficients is based on an ordinary least square. Therefore, the classical assumptions: the normality of residuals, homoskedasticity, no multicollinearity, and no autocorrelation, must be proven to result in the best, most linear, and unbiased estimators. To confirm them, by denoting Ghozali (2016), we use the Kolmogorov-Smirnov Z-statistical test, White examination, variance inflation factor detection, and runs test, respectively.

4. Results and Discussion

4.1. Result

Table 2 exhibits the statistics, covering total observation (N), minimum, maximum, average, and standard deviation to describe the data. The data are associated with the measurement of the loan risk: the relative change in annual NPL; the systemic risk from inflation and exchange rate measured by the standard deviation of quarterly inflation and exchange rate of IDR/USD in a year, one to one.

Table 2: The statistics to describe the investigated variables

Variable	N	Minimum	Maximum	Average	Standard Deviation
ΔNPL	189	0.2512	5.0286	1.121021	0.6019640
The systemic risk (SR) from INF	189	0.0877	0.5579	0.284211	0.1571639
The systemic risk (SR) from IDR/USD	189	4.64	6.83	5.6509	0.75553

Source: The data processed by IBM SPSS 19.

The regression will be an excellent empirical model if several tests related to classical assumptions are achieved (Ghozali, 2016), where the results are in Table 3:

A. For the normality test, the asymptotic significance of the Z-statistic based on Kolmogorov-Smirnov is 0.000. This value goes under the 0.05 significance level (α). Consequently, the residual of the regression model does not follow the normal distribution. According to Bowerman and O'Connel (2003), denoting the central limit theorem, this situation can be allowed as long as this study involves the samples with numerous observations.
B. For the homoskedasticity test, the probability of the Chi-Square statistic for observed R-squared is 0.2822. Because this value overdoes α of 0.05, the residual is not influenced by the squared SR_GDP, SR_INF, and SR_IDR/USD: Heteroskedasticity does not appear in this model.
C. For multicollinearity detection, the variance inflation factor of SR_INF and SR_IDR/USD is the same, i.e., 1.507. This value is below ten as the cut-off point. Thus, multicollinearity is not present in this model.
D. For the autocorrelation test, the asymptotic significance of the Z-statistic based on the average value of runs is 0.168. This value surpasses α of 0.05; hence, the residual of the regression model is random. This circumstance indicates no autocorrelation in this model.

Table 3: The result of the classical assumption tests

Classical assumption test	Statistical result	Meaning
Normality: Kolmogorov-Smirnov test	Asymptotic significance of Z-statistic = 0.000[a)]	The residual of the regression model does not follow the normal distribution.
Heteroskedasticity: White test RESID^2 = f (SR_INF^2, SR_IDR/USD^2)	Probability of Chi-Square statistic for Observed R-squared = 0.2570[b)]	Homoskedasticity exists in the regression model.
Multicollinearity detection	The variance inflation factor of SR_INF and SR_IDR/USD is 1.507[a)]	The regression model is without a multicollinearity issue.
Autocorrelation: Runs test based on the average residual	Asymptotic significance of Z-statistic = 0.772[a)]	The autocorrelation does not occur in the regression model.

Source: The output of IBM SPSS 19[a)] and E-Views 6[b)]

The fourth table displays the estimation result of the regression model with the probability of t-statistic for the explaining variables of non-performing loans:

a. The probability of the t-statistic for SR_INF is 0.0940 with a positive coefficient of 0.4572818. Because this probability is still below the relaxed significance level of 10%, the positive effect of SR_INF still exists.
b. The probability of the t-statistic for SR_IDR/USD is 0.424 with a negative coefficient of 0.045622. Because this probability is above the loosen significance level of 10%, this effect of SR_IDR/USD does not happen.

Table 4: The estimation result of the regression model:
The affecting factors of the non-performing loans

The explaining variable	Coefficient	Std. Error	t-Statistic	Probability
C	0.298161	0.288112	1.034880	0.3021[ns]
SR_INF	0.472818	0.280859	1.683472	0.0940**
SR_IDR/USD	-0.076112	0.058424	-1.302768	0.1943[ns]

Note:
** =significant at 10%, ns = not significant

Source: The data processed by E-Views 6

4.2. Discussion

This study points out some vital evidence related to inflation and IDR/USD exchange rate as the source of the macroeconomic systemic risk and their influence on the non-performing loans. Firstly, this study confirms that inflation positively affects uncollectible loans. By having a positive impact, this study affirms Farhan et al. (2012), Ahmad and Bashir (2013), and Benazic and Radin (2015). Inflation is the increase in prices of products because the aggregate demands are above its supplies. In this case, the government must control these prices by fiscal policy, such as adding subsidies for electricity and gasoline to enable the companies, especially for small and medium business scale, to create goods and services with affordable prices for society. If the goods and services are low-cost, these companies will be able to market them to obtain revenue and profits; hence, they can pay the debt, including principles and interest, to banks regularly.

Secondly, this study proves that the IDR/USD position does not affect the non-performing loans. It means that the banks can handle the IDR/USD fluctuation as one of the market risk parts by continuously measuring, monitoring, and controlling it without waiting for the lousy transmission from the business sector. Besides, the banks anticipate this risk by obeying the minimum capital adequacy rule set by the associated Indonesian central bank regulation. By having this evidence, this study supports Valahzaghard et al. (2012), Ahmad and Bashir (2013), as well as Wairimu and Gitundu (2017).

5. Conclusion

This investigation aims to prove and analyze the influence of systemic risk from inflation and the exchange rate of IDR/USD on the non-performing loan in commercial banks in the Indonesia stock exchange. After testing the hypotheses with the associated data between 2009 and 2017, this research shows that inflation positively induces uncollectible loans, but the exchange rate does not contribute to it.

This investigation is still weak, especially in the determinant numbers of bad loans and the bank scope. To overcome this first weakness, the subsequent scholars can combine two explaining variables in this study with macroeconomic determinants: economic growth, export, unemployment, interest rate, tax rate, foreign direct investment, and money supply. Then, to handle the second one, the following researchers are expected to unite the Indonesian listed and non-listed banks in their research model.

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