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THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND NON PERFORMING LOAN: EVIDENCE FROM SELECTED ASEAN COUNTRIES

NOOR AZEAN AZDZILA BINTI ZULKIFLI

MASTER OF SCIENCE (BANKING)
UNIVERSITI UTARA MALAYSIA
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THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND
NON PERFORMING LOAN: EVIDENCE FROM SELECTED ASEAN
COUNTRIES

BY:

NOOR AZEAN AZDZILA BINTI ZULKIFLI

Thesis Submitted to

School of Economics, Finance, and Banking (SEFB)

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In Partial Fulfillment of the Requirement for the Master of Science (Banking)
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telah mengesahkan kertas penyelidikan yang bertajuk
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EVIDENCE FROM ASEAN COUNTRIES

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dengan memuaskan.
(that the research paper acceptable in the form and content and that a satisfactory knowledge of the field is covered
by the dissertation).

Nama Penyelia
(Name of Supervisor)

Dr. Sabri Nayan

Tandatangan
(Signature)

22 May 2017

Date

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Senior Lecturer

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Malaysia
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ABSTRACT

High non-performing loans (NPLs) create the problem for the banking sector as financial intermediary and signal of banking crisis. Many attempts have been made to investigate the determinant of NPLs yet the crucial issue has remained unexplained. The motivation of this research paper is to study the relationship between macroeconomic variables and global financial crisis on NPLs in the Association of Southeast Asian Nations (ASEAN) countries. Using panel data of 6 countries of the ASEAN for 2005-2015, the model of NPL is regressed using Generalized Method of Moment (GMM) method. Based on the empirical finding reveals that the inflation, gross domestic product (GDP) and global financial crisis significantly effect NPL. In the area of policy implications, the policymaker should focus and reengineering the institutions together with these indicators could reduce the probability of NPLs in bank of ASEAN countries.

**Keyword:** Non-performing loan, ASEAN countries, macroeconomic variables, GMM, panel data

**Keyword:** pinjaman tidak berbayar, negara-negara ASEAN, pembolehubah makroekonomi, GMM, data panel
ACKNOWLEDGEMENTS

This research paper has been successfully completed with the assistance of many authorities. I would like to take this opportunity to express my appreciation to those who assisting me to complete this research paper with advices, guidance and support. Without them, this research paper would not be able to complete.

Special thanks to my supervisor Dr. Sabri bin Nayan, who has patiently, guided me from not knowing anything regarding research paper yet being able to complete this research paper. He also shared his knowledge and expertise, gave me support and believed in me. This research paper would not be completed without his time, effort and support.

I would like to express a big thanks to my beloved family especially my parent, Mr. Zulkifli bin Sudin and Mdm. Kelsom Bt Abdullah who always been by my side and continuously giving support and encouragement throughout this research paper process.

I also would like to extend my thankfulness and appreciation to all my friends and everyone for the biggest supports they give to me throughout this research paper.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>CESEE</td>
<td>Central, Eastern and South Eastern Europe</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>DCRISIS</td>
<td>Global Financial Crisis as dummy variable</td>
</tr>
<tr>
<td>FE</td>
<td>Fixed Effect Model</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>GMM</td>
<td>Generalized Method of Moment</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>NPA</td>
<td>Non-Performing Asset</td>
</tr>
<tr>
<td>NPL</td>
<td>Non-Performing Loan</td>
</tr>
<tr>
<td>POLS</td>
<td>Panel Ordinary Lease Square</td>
</tr>
<tr>
<td>RE</td>
<td>Random Effect Model</td>
</tr>
</tbody>
</table>
CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides a brief discussion on the non-performing loan and macroeconomic variables. The chapter begins with the discussion about the background of the study and followed by the problem statement in section 1.4. Then, explanation about the research questions in section 1.5 and in section 1.6 explains the objectives of the study. While, section 1.7 discusses scope of the study and section 1.8 explains the contribution of the study. The organization of the study is discussed in section 1.9. Lastly, the conclusion of this chapter is explained in section 1.10.

1.2 Introduction of Non-Performing Loan

Bank lending is executed as a complex process, centered on the fundamental principles of credit, assuming, firstly and objectively, the responsibility of repaying the borrowed money amounts and paying the related interest by the borrower in favor of the creditor banks. The significance of a strong and healthy banking sector to a country’s economic growth and development is well-established in literature (Adekunle, Salami and Oluseyi, 2013). The effective banking systems help countries to grow, partly by widening access to external finance and channeling resources to the helping sectors (Mugume, 2007). They can do so, if banks create the necessary income to cover their
The contents of the thesis is for internal user only
REFERENCES


## APPENDIX

### APPENDIX 1

### REVIEW OF RELATED LITERATURE

<table>
<thead>
<tr>
<th>No</th>
<th>Author (Year)</th>
<th>Country/ Data Frequency</th>
<th>Variable used</th>
<th>Model/ Method of Estimation</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gabeshi (2017)</td>
<td>Albania/ Quantitative/ Time series</td>
<td>DV: NPL IV: GDP, Inflation and exchange rate (Euro/Lek)</td>
<td>OLS</td>
<td>The result show that increase in inflation, exchange rate (Eur/Lek), will increase the NPL ratio and an increase in GDP will decrease the NPL ratio.</td>
</tr>
<tr>
<td>2</td>
<td>Hajja, et al. (2017)</td>
<td>Malaysia/ Quantitative/ Time series</td>
<td>DV: NPL IV: GDP growth, lending interest rate, inflation and money supply</td>
<td>GMM and vector auto regression (VAR)</td>
<td>The result shows that GDP growth, lending interest rate and money supply has positive relationship with NPL. Meanwhile for inflation there is negative relationship between NPL.</td>
</tr>
<tr>
<td>3</td>
<td>Idris and Nayan (2016)</td>
<td>Organization of the Petroleum Exporting Countries (OPEC)/ Quantitative/ Panel Data</td>
<td>DV: NPL IV: oil price volatility, environmental risk, real GDP, inflation, lending interest rate and unemployment rate</td>
<td>Fixed Effect</td>
<td>The results indicated a statistically significant inverse relationship between oil price volatility, GDP and NPLs whereas the relationship is statistically positive between environmental risks, unemployment and NPLs. Meanwhile for inflation and lending interest rate are not significant.</td>
</tr>
<tr>
<td>4</td>
<td>Ghosh (2015)</td>
<td>US States / Quantitative/ Time series</td>
<td>DV: NPL IV: Real GDP, state housing</td>
<td>Fixed effects and GMM</td>
<td>The findings show that higher state real GDP and real</td>
</tr>
<tr>
<td></td>
<td>Study</td>
<td>Sample/Methodology</td>
<td>DV: NPL IV: GDP, inflation, interest rates</td>
<td>GMM</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------</td>
<td>-------------------------------------------</td>
<td>-------------------------------------------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Abid et al (2014)</td>
<td>Tunisia/Quantitative/Time series</td>
<td>NPL inflation, interest rates</td>
<td>GMM</td>
<td>The findings show that macroeconomic variables, precisely the real GDP growth rate, inflation rate and the real lending rate have an effect on the level of NPLs.</td>
</tr>
<tr>
<td>6</td>
<td>Makri et al. (2014)</td>
<td>Eurozone countries/Quantitative/Panel Data</td>
<td>NPL growth GDP, public debt of gross domestic product, unemployment</td>
<td>GMM</td>
<td>The findings reveal strong correlations between NPL and various macroeconomic (public debt, unemployment, growth rate of GDP)</td>
</tr>
<tr>
<td>7</td>
<td>Castro (2013)</td>
<td>Greece, Ireland, Portugal, Spain and Italy (GIPSI)/Quantitative/Panel data</td>
<td>NPL (credit risk) GDP growth, unemployment rate, share price, interest rate, credit growth, real exchange rate, financial crisis</td>
<td>GMM</td>
<td>The findings show that the credit risk increases when GDP growth and the share price indices decrease and rises when the unemployment rate, interest rate, and credit growth increase; it is also positively affected by an appreciation of the real exchange rate; moreover, a substantial increase in the credit risk during the recent financial crisis</td>
</tr>
<tr>
<td>8</td>
<td>Messai and Jouini (2013)</td>
<td>Italy, Greece, and Spain / Quantitative / Panel data</td>
<td>DV: NPL IV: GDP growth, unemployment rate and real interest rate</td>
<td>Fixed effect</td>
<td>The results show that GDP growth has a negative impact on NPLs. The unemployment rate and the real interest rate affect impaired loans positively.</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Klein (2013)</td>
<td>Central, Eastern and South Eastern Europe (CESEE) / Quantitative / Panel Data</td>
<td>DV: NPL IV: credit the private sector to-GDP ratio, real GDP growth, unemployment rate, inflation rate</td>
<td>VAR</td>
<td>The result show that NPLs were respond to macroeconomic conditions, such as GDP growth, unemployment, and inflation, the analysis also indicates that there are strong feedback effects from the banking system to the real economy, thus suggesting that the high NPLs that many CESEE countries currently face adversely affect the pace economic recovery.</td>
</tr>
<tr>
<td>10</td>
<td>Roziela et al. (2013)</td>
<td>Asian Pacific region / Quantitative / Panel Data</td>
<td>DV: NPL IV: interest rate, inflation and economic growth (GDP)</td>
<td>Random-effect GLS method</td>
<td>The result shows significant negative effect of inflation rate and GDP on the NPL.</td>
</tr>
</tbody>
</table>
### APPENDIX 2

**DISCRIPTIVE STATISTIC**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>npl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>3.580136</td>
<td>2.621471</td>
<td>.757</td>
<td>14.4</td>
<td>N = 66</td>
</tr>
<tr>
<td>between</td>
<td>1.306226</td>
<td>1.601455</td>
<td>4.958909</td>
<td>n = 6</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>2.329889</td>
<td>.5062273</td>
<td>13.02123</td>
<td>T = 11</td>
<td></td>
</tr>
<tr>
<td>cpi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>101.0796</td>
<td>16.96154</td>
<td>59.92583</td>
<td>144.9061</td>
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<td>1.681033</td>
<td>99.35118</td>
<td>104.213</td>
<td>n = 6</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>16.8909</td>
<td>56.79252</td>
<td>141.7728</td>
<td>T = 11</td>
<td></td>
</tr>
<tr>
<td>lngdp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>26.2372</td>
<td>.614342</td>
<td>24.77736</td>
<td>27.54532</td>
<td>N = 66</td>
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<td>between</td>
<td>.5598692</td>
<td>25.46919</td>
<td>27.15594</td>
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<td></td>
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<tr>
<td>within</td>
<td>.334942</td>
<td>25.46006</td>
<td>26.75708</td>
<td>T = 11</td>
<td></td>
</tr>
<tr>
<td>dcrisis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>.1818182</td>
<td>.3886502</td>
<td>0</td>
<td>1</td>
<td>N = 66</td>
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<tr>
<td>between</td>
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<td>.1818182</td>
<td>.1818182</td>
<td>n = 6</td>
<td></td>
</tr>
<tr>
<td>within</td>
<td>.3886502</td>
<td>0</td>
<td>1</td>
<td>T = 11</td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX 3

**RESULT: PANEL ORDINARY LEASE SQUARE**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs =</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>F( 3, 62)  =</td>
<td>5.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>92.092923</td>
<td>3</td>
<td>30.697641</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>354.594362</td>
<td>62</td>
<td>5.7192639</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>446.687285</td>
<td>65</td>
<td>6.87211207</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| npl | Coef.  | Std. Err. | t    | P>|t| | [95% Conf. Interval] |
|-----|--------|-----------|------|------|----------------------|
| cpi | -0.0610672 | 0.0197215 | -3.10 | 0.003 | -0.1004898 to -0.0216445 |
| lngdp | -0.5110564 | 0.5383959 | -0.95 | 0.346 | -1.587294 to 0.5651816 |
| dcrisis | -0.7131984 | 0.7757363 | -0.92 | 0.361 | -2.263873 to 0.8374764 |
| cons | 23.29115 | 13.39302 | 1.74  | 0.087 | -3.481117 to 50.06341 |
**APPENDIX 4**

**RESULT: RANDOM EFFECT**

Random-effects GLS regression

| Coef. | Std. Err. | z    | P>|z| | 95% Conf. Interval |
|-------|-----------|------|------|---------------------|
| npl   | 0.0137957 | 0.0227179 | 0.61 | 0.544 | -0.0307305 - 0.0583219 |
| cpi   | 4.543519  | 1.023266 | -4.44 | 0.000 | -6.549085 - 2.537954 |
| lngdp | 0.7534932 | 0.6051549 | -1.25 | 0.213 | -1.939575 0.4325886 |
| _cons | 121.5319  | 25.08649 | 4.84  | 0.000 | 72.36338 170.7005 |

R-sq: within = 0.5843, between = 0.0285, overall = 0.0678

Wald chi2(3) = 42.26, corr(u_i, X) = 0 (assumed)

Prob > chi2 = 0.0000

\[
\begin{align*}
\text{Number of obs} & = 66 \\
\text{Number of groups} & = 6 \\
\text{Obs per group: min} & = 11 \\
\text{avg} & = 11.0 \\
\text{max} & = 11 \\
\text{sigma_u} & = 1.170958 \\
\text{sigma_e} & = 1.325323 \\
\text{rho} & = 0.43839569 \quad \text{(fraction of variance due to } u_i) \\
\end{align*}
\]
### APPENDIX 5

**RESULT: FIXED EFFECT**

Fixed-effects (within) regression  
Number of obs      =        66  
Group variable: country  
Number of groups   =         6

R-sq:  within  = 0.7163  
        between = 0.0333  
        overall = 0.0256

F(3,57)            =     47.96  
corr(u_i, Xb)  = -0.9308  
F test that all u_i=0:     F(5, 57) =    28.98

|        | Coef.  | Std. Err. |    t  | P>|t|   | [95% Conf. Interval] |
|--------|--------|-----------|-------|-------|----------------------|
| npl    |        |           |       |       |                      |
| cpi    | 0.133  | 0.022     | 5.98  | 0.00  | 0.088                |
| lngdp  | -11.17 | 1.118     | -9.99 | 0.00  | -13.41               |
| dcrisis| -0.85  | 0.43      | -1.98 | 0.05  | -1.71                |
| _cons  | 283.45 | 27.36     | 10.36 | 0.00  | 228.66               |

**sigma_u** | 6.7525684

**sigma_e** | 1.3253233

**rho** | 0.96290716  
(fraction of variance due to u_i)

---

F test that all u_i=0:     F(5, 57) =    28.98  
Prob > F = 0.0000
APPENDIX 6

RESULT: LM AND HAUSMAN TEST

Lagrangian Multiplier Test

\[ npl_{\text{country,}t} = Xb + u_{\text{country}} + e_{\text{country,}t} \]

Estimated results:

<table>
<thead>
<tr>
<th></th>
<th>Var</th>
<th>sd = \sqrt(Var)</th>
</tr>
</thead>
<tbody>
<tr>
<td>npl</td>
<td>6.872112</td>
<td>2.621471</td>
</tr>
<tr>
<td>e</td>
<td>1.756482</td>
<td>1.325323</td>
</tr>
<tr>
<td>u</td>
<td>1.371133</td>
<td>1.170954</td>
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</tbody>
</table>

Test: \ Var(u) = 0

\[ \text{chibar2}(01) = 12.31 \]

\[ \text{Prob > chibar2} = 0.0002 \]

Hausman Test

<table>
<thead>
<tr>
<th></th>
<th>(b)</th>
<th>(B)</th>
<th>(b-B)</th>
<th>sqrt(diag(V_b-V_B))</th>
</tr>
</thead>
<tbody>
<tr>
<td>fe</td>
<td>0.1327086</td>
<td>0.0137957</td>
<td>0.1189129</td>
<td>.</td>
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<tr>
<td>re</td>
<td>-11.17219</td>
<td>-4.543519</td>
<td>-6.628667</td>
<td>0.4514107</td>
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<tr>
<td>dcrisis</td>
<td>-0.851888</td>
<td>-0.7534932</td>
<td>-0.0983948</td>
<td>.</td>
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</tbody>
</table>

\[ \text{chi2}(3) = (b-B)'[(V_b-V_B)^(-1)](b-B) \]

\[ = 215.33 \]

\[ \text{Prob>chi2} = 0.0000 \]

(V_b-V_B is not positive definite)
## APPENDIX 7

### RESULT: GRANGER CAUSALITY

Pairwise Granger Causality Tests  
Date: 04/12/17   Time: 21:41  
Sample: 2005 2015  
Lags: 2  

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>INFLATION does not Granger Cause NPL</td>
<td>54</td>
<td>4.46863</td>
<td>0.0165</td>
</tr>
<tr>
<td>NPL does not Granger Cause INFLATION</td>
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<td>2.16571</td>
<td>0.1255</td>
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<tr>
<td>LNGDP does not Granger Cause NPL</td>
<td>54</td>
<td>1.53953</td>
<td>0.2247</td>
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<tr>
<td>NPL does not Granger Cause LNGDP</td>
<td></td>
<td>2.97110</td>
<td>0.0605</td>
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<tr>
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<td>54</td>
<td>0.94261</td>
<td>0.3966</td>
</tr>
<tr>
<td>NPL does not Granger Cause DCRISIS</td>
<td></td>
<td>3.34192</td>
<td>0.0436</td>
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<tr>
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<td>0.19700</td>
<td>0.8218</td>
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<tr>
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<td>0.0272</td>
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<tr>
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<td>0.0001</td>
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