



“The impact of credit risk and macroeconomic factors on profitability: the case of the ASEAN banks”

AUTHORS	Myra V. De Leon  <a href="http://orcid.org/0000-0001-7270-0151">http://orcid.org/0000-0001-7270-0151</a>
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Myra V. De Leon, Ph.D. Student,  
RVR College of Business, De La Salle  
University, Philippines.



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Myra V. De Leon (Philippines)

# THE IMPACT OF CREDIT RISK AND MACROECONOMIC FACTORS ON PROFITABILITY: THE CASE OF THE ASEAN BANKS

## Abstract

This study investigates the effect of credit risk and macroeconomic factors on profitability of 20 ASEAN banks, particularly from Indonesia, Malaysia, Thailand and Philippines, covering the period of 2012 to 2017. The unbalanced panel data were tested for heteroscedasticity and normality. A fixed effects model and a random effects model were utilized followed by simple ordinary least squares (OLS) regression. The obtained results show that credit risk and GDP growth negatively affect Return on Equity (ROE) at 5% level of significance. The inflation rate increases ROE by 0.323%. In terms of influence, inflation has the highest impact on ROE followed by GDP growth and credit risk. Credit risk and GDP growth negatively affect Return on Assets (ROA) at 5% level of significance. ROA was also influenced by an increase in inflation rate. Therefore, this study will help banks and bank managers, depositors, investors, policy makers and governments to identify factors affecting bank profitability.

## Keywords

bank, credit risk, GDP growth, inflation

## JEL Classification

C33, G21, L25

## INTRODUCTION

The banks' financial intermediation functions are one of the most significant factors for the development of the economy (Elsas, Hackethal, & Holzhäuser, 2010). More profitable financial institutions, like banks, entail more transfer of wealth to the economy (Hirose, Murakami, & Oku, 2004; Kohler, 2013; Maudos & Guevara, 2004; Saunders & Schumacher, 2000). The profitable banking sector is better able to withstand adverse shocks and contribute to financial system stability (Ani, Ugwunta, Ezeudu, & Ugwuanyi, 2012).

Based on the 2015 BBVA survey, profitability of ASEAN banks is decreasing but still high (Deorukhkar & Xia, 2015). Average ROE of ASEAN banks is 12.6% compared to the world average of 12%, considering the ROE of Indonesian banks at 21.5%. ROA declined for Indonesia, Philippines, Malaysia and Thailand, with significant changes for Indonesian banks from 3.1% in 2013 to 2.3% in the third quarter of 2015. As of 2017, the profitability of ASEAN banks has been stable as compared to the past three years with the economic slowdown (Vidal-Abarca, Xia, Deorukhkar, Rodrigo, & Ugarte, 2017).

Existing studies have shown that determinants of profitability are internal or external factors (Wasiuzzaman & Tarmizi, 2010; Masood, Ashraf, & Turen, 2015). Unlike some previous studies that were country-specific (Ani et al., 2012), the aim of this study is to examine whether credit risk, GDP growth rate and inflation rate affect the

profitability of the top five ASEAN-4 banks for the years 2012–2017. Profitability was measured by ROE and ROA. As there are similarities in economies and other banking policies, ASEAN-4 banks from Indonesia, Malaysia, Thailand and Philippines were chosen for this study.

## 1. LITERATURE REVIEW

ASEAN integration intends to establish a sole Southeast Asian market with free flow of goods, services, investments, capital and labor (ASEAN Secretariat, 2008). According to Asian Development Bank (2013), 82% of the total 2009 financial assets belong to commercial banks. Therefore, commercial banks are the dominant financial institutions in the ASEAN region.

Profitability is a substantial indicator of financial performance of banks (Zarrouk, 2012). ROE is mostly used as a profitability measure, as it reflects the financial leverage, profitability, and efficiency (Muhamet & Arbana, 2016). Other studies utilize ROA as a profitability ratio because it reflects the bank's efficiency in accumulating profits from its assets (Gizaw, Kedebe, & Selvaraj, 2015).

Internal factors, including credit risk, affected the profitability of commercial banks in Kenya based on Ongore and Kusa (2013). Studies of Ahmad, Nafees, and Khan (2012), Ahmad, Tahir, and Aziz (2014) and Mustafa, Ansari, and Younis (2011) on banks of Pakistan have shown that credit risk has a negative and significant impact on profitability. Similar findings were found in the study of Abdullah, Parvez, and Ayreen (2014) on Bangladeshi banks, and Karim, Sami, and Hichem (2010) on African Islamic banks. Credit risk or loan-loss provision is the main contributor to the fluctuation in profitability according to Beatty and Liao (2009). However, Dietrich and Wanzenreid (2011) stated that profitability is not affected by low loan loss provisions, based on the study of commercial banks in Switzerland.

External determinants of bank profitability, including GDP and inflation, are beyond the bank's management control (Vong & Chan, 2009). There are various findings of the impact of GDP on bank profitability. GDP growth is directly proportional to the demand for credit, which means that when the GDP trend increases, the demand for credit is high and vice versa (Ongore & Kusa, 2013). Bilal,

Saeed, Gull, and Akram (2013), in their study of Pakistan banks, have found that real GDP has a positive impact on ROE. In the study of 354 banks from 12 Western European countries between 2000 and 2009, only GDP growth has a significant positive effect on ROA (Van Ommeren, 2011). However, ROA was not affected by GDP, according to the study of Simiyu and Ngile (2015) on Kenya commercial banks.

Inflation, measured by the Consumer Price Index (Alalaya & Al Khattab, 2015), can affect earnings by eroding the value of money while also affecting the value of any real assets held. Pasiouras and Kosmidou (2007), in the study of 584 European banks from 1995 to 2001, show that inflation has a small positive influence on profitability of domestic banks and a negative influence on foreign banks. In the study of Chowdhury (2015) on Islamic banks, inflation rate has a positive significant impact on ROA.

Some studies argued that GDP and inflation influence bank profitability. There is a linear effect of the increase in GDP growth on Sub-Saharan African commercial banks' ROA, implying greater loan demands from financial institutions during the cyclical upswings (Flamini, McDonald, & Schumacher, 2009). The same study reveals that inflation has a positive effect on ROA. Findings of the study of Ongore and Kusa (2013) on Kenya commercial banks revealed that GDP and inflation have a significant negative effect on ROA and ROE. Kanwal and Nadeem (2013) focused on the public limited commercial banks in Pakistan and concluded that GDP had no effect on ROE and ROA. Inflation rate, on the other hand, has a negative relationship with both profitability measures on the same study. Kiganda (2014) has determined that GDP and inflation are insignificant to profitability of banks in Kenya. Aslam, Inamullah, and Ismail (2016), in the study of on Pakistan banks and Abdullah, Parvez, and Ayreen (2014) on Bangladesh banks, found that GDP growth and inflation rate have a negative impact on ROA.

## 2. DATA AND METHODOLOGY

The effect of credit risk, GDP growth rate and inflation rate on profitability of the top five banks in ASEAN countries was analyzed. Credit risk was calculated by dividing the reserve on loan loss by the total portfolio of loans. Two dimensions of bank profitability were measured: ROE (net profit/total equity) and ROA (net profit/total assets). This study aims to explain the results in the Philippines, Thailand, Indonesia and Malaysia for the top five banks.

The study is based on Hawley's risk bearing theory of profit in 1900. The theory emphasized that profit is a reward for risk taking. For different businesses, the degree of risk varies.

Secondary data used in the study was extracted from each country's central banks' websites, financial statements, related journals and other relevant reports. Online databases, such as Thomson Reuters Eikon, Central Banks and financial statements, were sources of data.

Data was analyzed using SPSS. Initially, heteroscedasticity (unequal variance) and data normality were detected. Then, panel data was used to examine the fixed and/or random effects of the entity (banks per country) or time (2012–2017). In addition, the study used regression with bootstrapping to investigate the effects of credit risk, GDP growth, and inflation rate on ROE and ROA.

## 3. RESULTS AND DISCUSSION

The descriptive statistics showed that there were 120 total observations (20 cross-section and 6-year data). ROE (%) has a minimum of 1.5% and a maximum of 32.61% with the dispersion of 31.11%. Average ROE was 14.47% and a deviation was 5.5%. Return on assets (ROA in %) has a min-

imum of 0.18% and a maximum of 3.66% with a dispersion of 3.48%. ROA has an average of 1.59% with the 0.74% standard deviation. Credit risk (%) has a minimum of -0.05% and a maximum of 3.81% with a dispersion of 3.85%. Average credit risk was 0.86% with standard deviation of 0.83%. GDP growth (%) has a minimum of 0.98% and a maximum of 7.24% with a dispersion of 6.26%. GDP growth was 5.15% with the 1.51% standard deviation. Inflation rate (%) has a minimum of -0.90 and a maximum of 6.41% with a dispersion of 7.31%. The average increase is 2.77% with the standard deviation of 1.83%.

The above descriptive statistics showed that the wide range of dispersion implies inliers and outliers. Also, the deviation from the mean indicated the wide margin of error from the mean. The remedy was to transform the data to natural logarithm to smooth large discrepancies in data that could affect the result of regression. However, the transformation to natural logarithm was not possible because of negative or zero values in the observation.

Before the regression can be run, heteroscedasticity (unequal variance) and data normality were detected to determine the appropriate regression model. Levene's test assesses this assumption. A test for homogeneity or homoscedasticity in Table 2 showed that p-values (sig. < 0.5) were less than 0.05. The unequal variances were assumed and it was concluded that data was heteroscedastic.

**Table 2.** Variance homogeneity test

Indicator	Levene statistics	df1	df2	Sig.
ROE (%)	9.921	1	118	.002
ROA (%)	21.605	1	118	.000
Credit risk (%)	35.451	1	118	.000
GDP growth (%)	40.742	1	118	.000
Inflation rate (%)	6.808	1	118	.010

**Table 1.** Descriptive statistics

Indicator	N	Range	Minimum	Maximum	Mean	Std. deviation
ROE (%)	120	31.11	1.50	32.61	14.47	5.50
ROA (%)	120	3.48	.18	3.66	1.59	0.74
Credit risk (%)	120	3.85	-.05	3.81	0.86	0.83
GDP growth (%)	120	6.26	.98	7.24	5.15	1.51
Inflation rate (%)	120	7.31	-.90	6.41	2.77	1.83

**Table 3.** Normality test – Philippines vs Malaysia

Indicator		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
ROE (%)	0	0.080	90.000	.200*	0.979	90.000	0.160
	1	0.112	30.000	.200*	0.976	30.000	0.708
ROA (%)	0	0.187	90.000	0.001	0.920	90.000	0.001
	1	0.135	30.000	0.171	0.855	30.000	0.001
Credit risk (%)	0	0.152	90.000	0.001	0.878	90.000	0.001
	1	0.131	30.000	.200*	0.813	30.000	0.001
GDP growth (%)	0	0.172	90.000	0.001	0.924	90.000	0.001
	1	0.265	30.000	0.001	0.837	30.000	0.001
Inflation rate (%)	0	0.141	90.000	0.001	0.926	90.000	0.001
	1	0.262	30.000	0.001	0.845	30.000	0.001

Note: 0 – Malaysia (Msa), 1 – Philippines (Phl), <sup>a</sup> – Lilliefors Significance Correction, \* – a lower bound of the true significance.

**Table 4.** Normality test – Indonesia vs Malaysia

Indicator		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
ROE (%)	0	0.065	90.000	.200*	0.987	90.000	0.511
	1	0.129	30.000	.200*	0.974	30.000	0.667
ROA (%)	0	0.119	90.000	0.003	0.935	90.000	0.001
	1	0.125	30.000	.200*	0.939	30.000	0.087
Credit Risk (%)	0	0.148	90.000	0.001	0.868	90.000	0.001
	1	0.150	30.000	0.082	0.932	30.000	0.055
GDP Growth (%)	0	0.176	90.000	0.001	0.907	90.000	0.001
	1	0.348	30.000	0.001	0.760	30.000	0.001
Inflation Rate (%)	0	0.139	90.000	0.001	0.936	90.000	0.001
	1	0.330	30.000	0.001	0.700	30.000	0.001

Note: 0 – Malaysia (Msa), 1 – Indonesia (Ina), <sup>a</sup> – Lilliefors Significance Correction, \* – a lower bound of the true significance.

**Table 5.** Normality test – Thailand vs Malaysia

Indicator		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
ROE (%)	0	0.087	90.000	0.086	0.979	90.000	0.158
	1	0.102	30.000	.200*	0.961	30.000	0.323
ROA (%)	0	0.186	90.000	0.001	0.896	90.000	0.001
	1	0.117	30.000	.200*	0.955	30.000	0.227
Credit Risk (%)	0	0.239	90.000	0.001	0.745	90.000	0.001
	1	0.156	30.000	0.060	0.925	30.000	0.036
GDP Growth (%)	0	0.163	90.000	0.001	0.944	90.000	0.001
	1	0.255	30.000	0.001	0.824	30.000	0.001
Inflation Rate (%)	0	0.173	90.000	0.001	0.896	90.000	0.001
	1	0.205	30.000	0.002	0.897	30.000	0.007

Note: 0 – Malaysia (Msa), 1 – Thailand (Thai), <sup>a</sup> – Lilliefors Significance Correction, \* – a lower bound of the true significance.

Since the dataset has 120 elements, less than 2000 elements, the Shapiro-Wilk test was used. From Tables 3, 4 and 5, most *p*-values were less than 0.05. The alternative hypothesis was rejected and it was concluded that the data was not normal.

Panel data was explored to determine fixed and/or random effects of entity (banks per country) or time (2012–2017). The role of dummy variables is the basis for core variance between fixed and random effect models:



$$Y_{it} = x_{it}B + z_{\delta} + e_{it}, \quad (1)$$

where  $i = 1, \dots, 20$  and  $t = 1, \dots, 6$ ;  $Y$  – ROE, ROA (all in percentage),  $X_i$  – credit risk, GDP growth, and inflation rate (all in percentage),  $z_{\delta}$  – dummy variables,

$$z_1: \quad 1 = \text{Philippines (Phl)}, 0 = \text{Malaysia (Msa)}$$

$$z_2: \quad 1 = \text{Indonesia (Ina)}, 0 = \text{Malaysia (Msa)}$$

$$z_3: \quad 1 = \text{Thailand (Thai)}, 0 = \text{Malaysia (Msa)}$$

In a fixed effects model, dummies are considered as part of the intercept, while they act as an error term in a random effect model. Assuming the same slopes and constant variance across entities or subjects, a fixed group effect model examines group differences in intercepts. Since a group (individual specific) effect is time invariant and considered a part of the intercept,  $z_{\delta}$  is allowed to be correlated to other regressors. Least squares dummy variable (LSDV) and effect estimation methods are used by fixed effect models. In fact, fixed effect models are the ordinary least squares (OLS) regressions with dummies.

Dummy variable provides the source of diversity (heteroscedasticity) and difference in regression model structure. With violation in normality and homoscedasticity, the dummy variable provided a means in violations of normality and homoscedasticity and indicated a change in model structure. Equation (1) or the full model cannot be used in this study because of structural instability discussed above.

For each dummy variable, equations can be stated as follows:

Philippines vs Malaysia

$$ROE_{(Phl)} = (b0 + z1) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (2)$$

Indonesia vs Malaysia

$$ROE_{(Ina)} = (b0 + z2) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (3)$$

Thailand vs Malaysia

$$ROE_{(Thai)} = (b0 + z3) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (4)$$

Malaysia (if Philippines, Indonesia and Thailand = 0)

$$ROE_{(Msa)} = b0 + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (5)$$

Malaysia was arbitrarily assigned a zero value to conform with the K – 1 requirement in regression and to avoid perfect multicollinearity.

$$ROA_{(Phl)} = (b0 + z1) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (6)$$

Indonesia vs Malaysia

$$ROA_{(Ina)} = (b0 + z2) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (7)$$

Thailand vs Malaysia

$$ROA_{(Thai)} = (b0 + z3) + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (8)$$

Malaysia (if Philippines, Indonesia and Thailand = 0)

$$ROA_{(Msa)} = b0 + b1 \cdot \text{credit risk} + b2 \cdot \text{gdp growth} + b3 \cdot \text{inflation rate} + e_{it}. \quad (9)$$

This study used regression with bootstrapping to determine the influence of credit risk, GDP growth and inflation rate on ROE and ROA. Bank characteristics per country of origin (Philippines, Indonesia, Thailand, and Malaysia) were included in the regression model in nominal measures. Malaysia was selected as an arbitrary benchmark. The characteristics of the selected ASEAN countries provided the variability or differences needed to describe banks.

The regression outcomes supported that credit risk and GDP growth negatively affect ROE at the 5% level of significance (Table 6). The increase in credit risk and GDP decrease the ROE of banks. The growth of inflation rate increases ROE by 0.323% implying that ROE increases with the currency devaluation. In order of effects, inflation (0.107) has the highest effect on

**Table 6.** Regression results on ROE

Model	Unstandardized coefficients	Standardized coefficients	Sig. (2-tailed)	VIF
	B	Beta		
(Constant)	14.503		.001	
Credit risk (%)	−4.248	−.639	.001	1.769
GDP growth (%)	−.199	−.055	.001	2.239
Inflation rate (%)	.323	.107	.001	2.838
1 = Phl, 0 = Msa	.513	.041	.001	1.891
1 = Ina, 0 = Msa	10.154	.803	.001	3.762
1 = Thai, 0 = Msa	4.283	.339	.001	2.426
Dependent variable: ROE (%)				
F(0.001) = 15.19, Adj R-squared = 41.7				

**Table 7.** Regression results on ROA

Model	Unstandardized coefficients	Standardized coefficients	Sig. (2-tailed)	VIF
	B	Beta		
(Constant)	1.33		0.001	
Credit risk (%)	−0.44	−0.50	0.001	1.77
GDP growth (%)	−0.03	−0.07	0.001	2.24
Inflation rate (%)	0.02	0.05	0.001	2.84
1 = Phl, 0 = Msa	0.45	0.27	0.001	1.89
1 = Ina, 0 = Msa	1.85	1.10	0.001	3.76
1 = Thai, 0 = Msa	0.67	0.39	0.001	2.43
Dependent variable: ROA (%)				
F(0.001) = 30.62, Adj R-squared = 60.0				

ROE followed by GDP growth and credit risk. Indonesia (0.803) has the highest ROE followed by Thailand and the Philippines. Malaysia has the lowest incidence of ROE.

Since all the B-coefficients were significant at the 5% level, the finding of the study is that credit risk, GDP growth and inflation rate had an impact on ROE in 2012–2017. There were significant differences in ROE of countries as reflected by dummy variables.

Regression on ROA (Table 7) has a similar result with ROE. Credit risk and GDP growth negatively affect ROA at 5% level of significance. This implies that higher credit risk and GDP growth decline the percentage ROA of banks in a specific country. However, increase in inflation rate impacts the percent increase in ROA. ROA seems to increase because of currency devaluation. Across the country, Indonesia, Thailand and the Philippines have the highest ROA in 2012–2017. Malaysia has the lowest ROA during the period analyzed.

## CONCLUSION

The study found that credit risk and GDP growth have a negative impact on ROE at 5% level of significance. An increase in inflation rate increases ROE by 0.323% implying that ROE increases with the devaluation of the currency. In terms of effects, inflation (0.107) has the highest effect on ROE, followed by GDP growth and credit risk. Indonesia has the highest ROE, followed by Thailand and the Philippines. Malaysia has the lowest incidence of ROE.

The regression on ROA has a similar result with ROE. Credit risk and GDP growth negatively affect ROA at 5% level of significance. Higher credit risk and GDP growth reduce the percentage ROA of banks in a specific country. The inflation rate upward trending influences the percent increase in ROA.

ROA seems to increase because of currency devaluation. Across the country, Indonesia, Thailand and the Philippines have the highest ROA in 2012–2017. Malaysia has the lowest ROA during the period analyzed.

The study recommends strengthening banks' credit policies with respect to the 5 C's of borrower credit-worthiness (Capacity, Collateral, Capital, Conditions, and Character) in their valuation of a borrower's credit standings before they extend credit to the borrowers. The negative effect of the loan-loss ratio should be taken into account by bank managers. In addition, bank managers should consider significant macroeconomic variables as they may represent either threats or additional opportunities for banks.

Depositors should maintain accounts in profitable banks as this will reduce the risk of bankruptcy-related losses. Investors, on the other hand, should invest in countries whose economy is booming, as evidenced by the results of GDP growth.

Due to the positive and significant effects of real GDP growth, policymakers must create policies that will stimulate a healthier economy, such as free trade deals, cutting red tape and fees for registering new businesses and incentives for startups to motivate businessmen to establish new business. Increasing business will increase bank profitability. Inflation rate is significant in the commercial banks in the ASEAN region and can be significant when measured against banks in other world regions. Thus, it is recommended that policy makers investigate such variables in other regions.

Researchers can use this study as a basis for research in the ASEAN region using variables not included in this study or similar studies with other countries not covered. Other potential determinants of profitability that can be tested include the use of control variables or other variables, such as the term structure of interest rates. Venturing into countries or associations may also be worth considering. They could check whether the profitability determinants of ASEAN banks in this study were applicable across European, American and other developed countries.

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