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HOW DOES THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND BANK EFFICIENCY? EVIDENCE FROM ASEAN COUNTRIES

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A R T I C L E I N F O

A B S T R A C T

This article examines the relationship between economic growth and bank efficiency in ASEAN countries for 2004-2017. The Generalized Method of Moment (GMM) is used to estimate the study model. Based on the World Bank's financial development indicators, this article measures the bank efficiency through four indicators, including bank return on assets (ROA), bank return on equity (ROE), bank net interest margin (NIM), bank lending-deposit spread (LD). This measure has a great advantage when considering the bank efficiency in many different aspects, instead of just looking at the bank efficiency from a single perspective, or the development of the banking system through the amount of credit provided to the economy as mentioned in the previous studies, which is a new feature of this study compared to the previous studies. The study results reveal a positive relationship between bank efficiency and economic growth. This study results are the first empirical evidence on such a relationship between economic growth and bank efficiency in ASEAN countries. This study vital results, ASEAN countries will have the basis to propose the policies to promote the development of the banking system associated with economic growth more effectively and sustainably.

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1. INTRODUCTION

The banking system is considered as an important component of the financial system and plays an important role in economic growth (Aluko & Ajayi, 2017). Not only that, the bank efficiency can also represent the financial development of each country (Greenwood & Jovanovic, 1990; Bencivenga & Smith, 1991; Pradhan et al., 2014; World Bank, 2018; Bui, 2019). The efficient development of the banking system will promote the business activities, increase competitiveness among the companies (Guiso et al., 2009), the investment capital in the economy will be allocated

effectively (Greenwood & Jovanovic, 1990; Bencivenga & Smith 1991), and especially stimulate economic growth (King & Levine, 1993; Levine, 2005; Aluko & Ajayi, 2017; Bui, 2019). Therefore, many empirical studies have suggested that through the banking system, it is possible to predict economic growth (for example, Beck & Levine, 2004; Estrada et al., 2010; Hassan et al., 2011). Therefore, the banking system has a significant impact on economic growth. In the opposite direction, there are also some views that economic growth can promote more efficient development of the banking system. Accordingly, when the economy is developing smoothly, the demand for banking products and services will increase, thus stimulating the development of the banking system (Robinson, 1952; Patrick, 1966). Not only that, some other views also suggest that there exists a two-way relationship between economic growth and the banking system (for example, Patrick, 1966; Levine, 1993; Levine, 2005; Ozturk, 2008; Acaravci et al., 2009; Hassan et al., 2011). Therefore, the relationship between economic growth and the banking system has been of great interest in empirical studies, but there are still conflicting views. Moreover, most empirical studies look at the relationship between economic growth and the development of the banking system, in which the development of the banking system is mainly measured through the amount of credit provided to the economy. There are very few studies examining the development of the banking system in terms of efficiency. Meanwhile, bank efficiency is one of the important criteria in the World Bank's financial development indicators, while bank efficiency also reflects more clearly the growth in the business of the banking system. Therefore, it is interesting and necessary to study and there are still many gaps to be explored the relationship between economic growth and bank efficiency.

2. LITERATURE REVIEW

The bank efficiency is one of the important criteria representing each country's financial development (World Bank, 2018). Therefore, bank efficiency is a study topic that is of great interest in empirical studies (Batir et al., 2017). In particular, about 95% of these studies focus only on the impact of bank efficiency on economic growth (Berger & Humphrey, 1997), about 70% of which are studied in the United States. There is a lack of empirical studies examining the two-way relationship between economic growth and bank efficiency, especially those in the ASEAN region.

2.1 IMPACTS OF BANK EFFICIENCY ON ECONOMIC GROWTH

The effective implementation of these functions by the banking system will play an important role in promoting economic growth (Levine, 2005). The main functions of the banking system include (1) Allocate investment capital, (2) Monitor the use of capital by the companies after providing credit; (3) Facilitate transactions and manage risks; (4) Make capital mobilization; (5) Facilitate the exchange of goods and services. Earlier, Schumpeter (1911) also suggested that the role of intermediary finance is to help accumulate funds, manage the risks and especially stimulate economic growth. Concurrently, King and Levine (1993) suggested that financial development has a significant impact on economic growth. The positive impact of the banking system on economic growth is also found in many empirical studies, for example, Guiso et al. (2009), Wolde-Rufael (2009), Jalil et al. (2010), Kose et al. (2010), Anwar and Cooray (2012), Khoutem et al. (2014), Aluko and Ajayi (2017), Ibrahim and Alagidede (2018), Wang et al. (2019).

However, the development of the banking system does not always have a positive impact on

economic growth. Because, the banking system grows in a high manner but not control the quality of credits provided to the economy, which can create the negative impacts for the economy, the global financial crisis at the end of 2007 is a testament to this. The negative impacts of bank efficiency on economic growth are also found in the empirical studies of Pagano and Pica (2012), Cournède and Denk (2015).

2.2 IMPACTS OF ECONOMIC GROWTH ON BANK EFFICIENCY

When the economy develops smoothly, the demand for using the banking products and services will increase, thus stimulating the development of the banking system, and the bank efficiency will also be improved. Indeed, Robinson (1952) found a significant impact of economic growth on financial development as well as the need to use financial services. Accordingly, as the economy develops, the demand for using financial products and services will increase, which will greatly contribute to promoting bank efficiency. Also, Patrick (1966) argues that financial services and institutions are formed to meet the needs of investors and depositors. Therefore, the development of the financial industry is a result of economic growth.

2.3 TWO-WAY RELATIONSHIP BETWEEN ECONOMIC GROWTH AND BANK EFFICIENCY

The bank efficiency plays an important role in promoting economic growth. In contrast, economic growth is also a condition to stimulate the development of the banking system and increase operational efficiency. In other words, there may be a two-way relationship between economic growth and bank efficiency. Indeed, Patrick (1966) argues that a two-way relationship exists between financial development and economic growth. In particular, economic growth will create the demand for financial services, improve banking efficiency, and increase bank efficiency, which also contributes to stimulating economic growth. King and Levine (1993) found a two-way relationship between financial development and economic performance in 35 countries. In another study, Levine (2005) stated that economic growth will firstly facilitate the formation of financial markets, and then financial markets will help improve economic growth. Besides, Ozturk (2008) argues that a two-way relationship exists between financial development and economic growth in Turkey. In the same opinion, Acaravci et al. (2009) find a two-way relationship between financial development from a banking perspective and economic growth in Sub-Saharan Africa. Not only that, Hassan et al. (2011) suggests that there is a two-way relationship between financial development and economic growth in low- and middle-income countries.

Therefore, the relationship between economic growth and the banking system has been found in many empirical studies, but there are still conflicting views. In particular, most empirical studies measure the development of the banking system through the amount of credit provided to the economy, and there is a lack of empirical studies examining the development of the banking system in terms of efficiency.

3. DATA AND METHODOLOGY

The author collects the World Bank data, for 2004-2017. The countries included in the analysis include 6 ASEAN countries (Indonesia, Malaysia, Thailand, Singapore, Philippines, and Vietnam), which have an impressive banking system and economic growth in the past period.

This article concentrates on the relationship between economic growth and bank efficiency in ASEAN countries. To ensure that the estimated results are highly reliable, the author uses the Generalized Method of Moment (GMM) to estimate this study's models. The GMM estimation method gives great advantages if it is very suitable with financial data (Driffill et al., 1998), can control potential endogenous phenomena well and overcome the violated regression hypothesis (Doytch & Uctum, 2011; Bui, 2020a; Bui, 2020b).

From many previous studies, the author measures economic growth (EG) through GDP growth. The bank efficiency is measured through four indicators, including bank return on assets (ROA), bank return on equity (ROE), bank net interest margin (NIM), bank lending-deposit spread (LD). These four indicators reflect bank efficiency in the World Bank's financial development indicators. Using a combination of four indicators reflecting the bank efficiency, the article will assess the bank efficiency from different perspectives, rather than just the bank efficiency from a single perspective or the development of the banking system through the amount of credit provided to the economy as mentioned in the previous studies, this is a new feature of this study compared to previous studies. Thus, the author sets up the models for this study.

Impacts of bank efficiency on economic growth:

Model 1: $EG_{it} = \beta_{10} + \beta_{11} ROA_{it} + \varepsilon_{it}$ (1),

Model 2: $EG_{it} = \beta_{20} + \beta_{21} ROE_{it} + \varepsilon_{it}$ (2),

Model 3: $EG_{it} = \beta_{30} + \beta_{31} NIM_{it} + \varepsilon_{it}$ (3),

Model 4: $EG_{it} = \beta_{40} + \beta_{41} LD_{it} + \varepsilon_{it}$ (4).

Impacts of economic growth on bank efficiency:

Model 5: $ROA_{it} = \beta_{50} + \beta_{51} EG_{it} + \varepsilon_{it}$ (5),

Model 6: $ROE_{it} = \beta_{60} + \beta_{61} EG_{it} + \varepsilon_{it}$ (6),

Model 7: $NIM_{it} = \beta_{70} + \beta_{71} EG_{it} + \varepsilon_{it}$ (7),

Model 8: $LD_{it} = \beta_{80} + \beta_{81} EG_{it} + \varepsilon_{it}$ (8).

The symbol ε is the error term within each model. The terms $\beta_{11}, \beta_{21}, \ldots, \beta_{81}$ are the linear regression coefficients while $\beta_{10}, \beta_{20}, \ldots, \beta_{80}$ are the regression constant.

Table 1: Summary of variables.

Variable name	Code	How to measure	Source
Economic growth	EG	GDP growth (annual %).	
Bank return on assets	ROA	Commercial banks' after-tax net income to yearly averaged total assets.	
Bank return on equity	ROE	Commercial banks' after-tax net income to yearly averaged equity.	
Bank net interest margin	NIM	The accounting value of a bank's net interest revenue as a share of its average interest-bearing (total earning) assets.	World Bank
Bank lending-deposit spread	LD	Difference between the lending rate and the deposit rate. The lending rate is the bank's charged rate and deposit interest rate is the bank's rate offered to customers on three-month deposits.	

4. EMPIRICAL RESULTS

Table 2 gives descriptive statistics of the studied variables.

Table 2: Descriptive statistics of all variables.

Variable	Mean	Min	Max
Economic growth (EG)	5.354	-1.514	14.526
Bank return on assets (ROA)	1.275	0.175	2.901
Bank return on equity (ROE)	12.928	1.937	29.082
Bank net interest margin (NIM)	3.479	1.386	6.842
Bank lending-deposit spread (LD)	3.808	1.451	7.681

During the study period, Singapore has the highest economic growth (2010). Meanwhile, Malaysia has the lowest economic growth (2009). As for bank efficiency, Malaysia is the country with the highest bank return on assets and bank return on equity (2011), the lowest value belongs to Thailand (2007). For bank net interest margin, the highest value belongs to Indonesia (2010), the lowest value belongs to Singapore (2016). Indonesia is the country with the highest bank lending-deposit spread bank (2004), the lowest value belongs to Malaysia (2015) (Figure 1).

Figure 1: Economic growth and bank efficiency in ASEAN countries.

The correlation coefficients between variables in the study model are described in Table 3, showing that bank efficiency (ROA, ROE, NIM, LD) positively correlates with economic growth (EG).

Table 3: Correlation coefficients between variables.

Variables	EG	ROA	ROE	NIM	LD
EG	1.000				
ROA	0.150	1.000			
ROE	0.233	0.841	1.000		
NIM	0.078	0.613	0.546	1.000	
LD	0.045	0.329	0.243	0.343	1.000

Next, the author conducts a test of heteroscedasticity and autocorrelation of the study models.

Table 4: Test results of heteroscedasticity.

Model	Heteroscedasticity test
Model 1 (ROA $\Longrightarrow$ EG)	chibar2(01) = 3.53 Prob > chibar2 = 0.030**
Model 2 (ROE $\Longrightarrow$ EG)	chibar2(01) = 1.91 Prob > chibar2 = 0.084*
Model 3 (NIM $\Longrightarrow$ EG)	chibar2(01) = 2.56 Prob > chibar2 = 0.055*
Model 4 (LD $\Longrightarrow$ EG)	chibar2(01) = 1.99 Prob > chibar2 = 0.079*
Model 5 (EG $\Longrightarrow$ ROA)	chibar2(01) = 76.10 Prob > chibar2 = 0.000***
Model 6 (EG $\Longrightarrow$ ROE)	chibar2(01) = 12.99 Prob > chibar2 = 0.000***
Model 7 (EG $\Longrightarrow$ NIM)	chibar2(01) = 369.01 Prob > chibar2 = 0.000***
Model 8 (EG $\Longrightarrow$ LD)	chibar2(01) = 288.13 Prob > chibar2 = 0.000***

Note: *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 4 shows that all study models have heteroscedasticity.

Table 5: Test results of autocorrelation.

Model	Autocorrelation test
Model 1 (ROA $\Longrightarrow$ EG)	F(1, 5) = 0.000 Prob > F = 0.987
Model 2 (ROE $\Longrightarrow$ EG)	F(1, 5) = 0.001 Prob > F = 0.972
Model 3 (NIM $\Longrightarrow$ EG)	F(1, 5) = 0.006 Prob > F = 0.939
Model 4 (LD $\Longrightarrow$ EG)	F(1, 5) = 0.013 Prob > F = 0.914
Model 5 (EG $\Longrightarrow$ ROA)	F(1, 5) = 71.313 Prob > F = 0.000***
Model 6 (EG $\Longrightarrow$ ROE)	F(1, 5) = 92.838 Prob > F = 0.000***
Model 7 (EG $\Longrightarrow$ NIM)	F(1, 5) = 47.249 Prob > F = 0.001***
Model 8 (EG $\Longrightarrow$ LD)	F(1, 5) = 57.488 Prob > F = 0.001***

Note: *** indicates significance at the 1% level.

Table 5 shows that Models 5, 6, 7 and 8 have autocorrelation with a significance level of 1%.

Meanwhile, Models 1, 2, 3 and 4 do not have autocorrelation.

Therefore, Models 5, 6, 7 and 8 have heteroscedasticity and autocorrelation. Meanwhile, Models 1, 2, 3 and 4 only suffer from heteroscedasticity.

Therefore, the author will estimate the study models according to the Generalized Method of Moment (GMM) to overcome the heteroscedasticity (Models 1, 2, 3 and 4) and the autocorrelation (Models 1, 2, 3, 4, 5, 6, 7 and 8). Not only that, the GMM estimation method also helps the author control the potential endogenous phenomena in the study models.

The estimated results of Models 1, 2, 3 and 4 by the GMM method are presented in Table 6.

Table 6: Results of estimating the impacts of bank efficiency on economic growth.

Test	Model 1 (ROA $\Rightarrow$ EG)	Model 2 (ROE $\Rightarrow$ EG)	Model 3 (NIM $\Rightarrow$ EG)	Model 4 (LD $\Rightarrow$ EG)
Constant	1.550	0.015	2.963***	1.953
ROA	2.942**			
ROE		0.416**		
NIM			0.662**	
LD				0.870**
Significance level	Wald chi2(0) = 5.26 Prob > chi2 = 0.022**	Wald chi2(0) = 5.47 Prob > chi2 = 0.019**	Wald chi2(0) = 6.45 Prob > chi2 = 0.011**	Wald chi2(0) = 5.53 Prob > chi2 = 0.019**
Arellano-Bond test for AR(2) in first differences	z = -0.32 Pr > z = 0.746	z = -0.29 Pr > z = 0.773	z = -0.67 Pr > z = 0.503	z = -0.68 Pr > z = 0.495
Sargan test	chi2(2) = 0.80 Prob > chi2 = 0.671	chi2(2) = 0.04 Prob > chi2 = 0.981	chi2(2) = 0.03 Prob > chi2 = 0.987	chi2(2) = 0.69 Prob > chi2 = 0.708

Note: ** and *** indicate significance at the 5% and 1% level, respectively.

Table 6 shows that the estimated results for Model 1, Model 2, Model 3 and Model 4 are all statistically significant at the 5% level. And also, the Sargan test shows that the instruments used in the study model are appropriate. Therefore, the estimated results of Model 1, Model 2, Model 3 and Model 4 by the GMM are appropriate and usable. Accordingly, economic growth (EG) is positively affected by the bank return on assets (β = 2.942), bank return on equity (β = 0.416), bank net interest margin (β = 0.662) and bank lending-deposit spread (β = 0.870) with a 5% significance level. In other words, bank efficiency has a positive impact on economic growth (EG).

The estimated results of Model 5, Model 6, Model 7 and Model 8 by GMM method are presented in Table 7.

Table 7: Results of estimating the impacts of economic growth on bank efficiency.

Test	Model 5 (EG $\Rightarrow$ ROA)	Model 6 (EG $\Rightarrow$ ROE)	Model 7 (EG $\Rightarrow$ NIM)	Model 8 (EG $\Rightarrow$ LD)
Constant	-0.293	0.052	-4.444	-1.578
EG	0.295**	2.386**	1.504**	1.022**
Significance level	Wald chi2(0) = 5.88 Prob > chi2 = 0.015**	Wald chi2(0) = 5.49 Prob > chi2 = 0.019**	Wald chi2(0) = 6.47 Prob > chi2 = 0.011**	Wald chi2(0) = 6.16 Prob > chi2 = 0.013**
Arellano-Bond test for AR(2) in first differences	z = -0.26 Pr > z = 0.793	z = -0.28 Pr > z = 0.781	z = -0.64 Pr > z = 0.524	z = -0.65 Pr > z = 0.517
Sargan test	chi2(2) = 0.89 Prob > chi2 = 0.640	chi2(2) = 0.04 Prob > chi2 = 0.981	chi2(2) = 0.03 Prob > chi2 = 0.987	chi2(2) = 0.77 Prob > chi2 = 0.680

Note: ** indicates significance at the 5% level.

The estimated results of Models 5, 6, 7 and 8 are appropriate and usable. Because the study models are statistically significant at the 5% level, and also, the instruments used in this study models are appropriate. Table 7 shows that economic growth (EG) positively affects bank return on assets (β = 0.295), bank return on equity (β = 2.386), bank net interest margin (β = 1.504) and bank lending-deposit spread (β = 1.022) with a 5% significance level. Therefore, economic growth (EG) has a positive impact on bank efficiency.
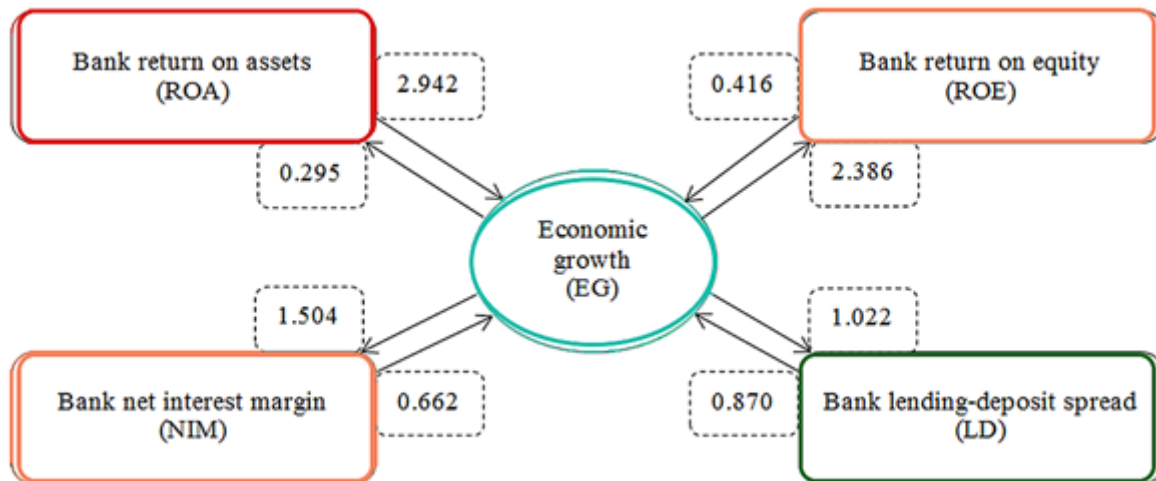

Figure 2: Study model results.

This study results illustrate a positive relationship between economic growth and banking efficiency in ASEAN countries. Accordingly, the bank efficiency will contribute significantly to promote the business activities of the companies, help allocate the investment capital effectively in the economy, thereby stimulating economic growth. And also, when the economy is growing smoothly, the demand for banking products and services will increase, thereby improving bank efficiency. This result is consistent with Patrick (1966), King and Levine (1993), Levine (2005), Ozturk (2008), Acaravci et al. (2009), Hassan et al. (2011). However, this article focuses on analyzing the relationship between economic growth and bank efficiency, this article does not consider the development of the banking system in terms of the amount of credit provided to the economy as mentioned in these previous studies. This is the difference in this study compared to the previous studies.

5. CONCLUSION

This article has achieved its objectives when it finds out a positive relationship between bank efficiency and economic growth in ASEAN countries. This study result is quite similar to the previous judgment in the previous studies. However, this article has achieved the great success by finding the simultaneous relationship of four indicators reflecting bank efficiency from different perspectives (ROA, ROE, NIM, LD) and economic growth (EG), instead of only considering the development of the banking system through the amount of credit provided to the economy as mentioned in the previous studies, this is a new feature of this study compared to the previous studies. Moreover, there is a lack of empirical studies on this issue in ASEAN countries. Therefore, this article is important for ASEAN countries. Accordingly, ASEAN countries will have the basis to propose policies to promote the development of the banking system associated with economic

growth more effectively and sustainably.

Although the study objectives have been achieved, this article cannot avoid certain limitations, such as: to ensure data similarity among countries included in the analysis, therefore, the number of study countries is still limited, several control variables that can affect the bank efficiency and economic growth have not been considered by the author. This can be interesting study directions for the next study.

6. DATA AND MATERIAL AVAILABILITY

Information regarding this study is available by contacting the corresponding author.

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