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DOMESTIC CREDIT AND ECONOMIC GROWTH IN ASEAN COUNTRIES: A NONLINEAR APPROACH

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ABSTRACT

The correlation between domestic credit and economic growth is an interesting research topic that attracts different views from many scholars. Particularly, most empirical studies hardly identify the nonlinear impact of domestic credit on economic growth. With this study, the author attempt to overcome the limitations of earlier studies by analyzing the nonlinear impact of domestic credit on economic growth in ASEAN countries during the period 2004-2017. By employing the Generalized Method of Moment (GMM), the study greatly succeeds in confirming the inverted U-shaped nonlinear impact of domestic credit on economic growth. Accordingly, the increase in domestic credit boosts the economy. However, domestic credit exceeds the optimal threshold (DC* = 97.5%) exerts a negative influence on economic growth. The results provide essential empirical evidence for ASEAN countries to launch credit policies with the aim of sustainable economic growth.

Disciplinary: Management Sciences (Finance and Banking).

1. INTRODUCTION

Domestic credit refers to financial resources provided to the private sector by the financial sector. More than that, domestic credit reflects the financial development of a country (Bui, 2019) and contributes to the efficient investment allocation (Diamond, 1984; Boyd & Prescott, 1986; Williamson, 1986; Greenwood & Jovanovic, 1990; Bencivenga & Smith 1991), the increase of investment (Botev & Jawadi, 2019), and most notably boosts the economy (Schumpeter, 1911; King & Levine, 1993; McKinnon, 1973; Shaw, 1973). In other words, the economy with a rapidly increased domestic credit develops better than other economies (Bayoumi & Melander, 2008). Hence, the positive relationship between domestic credit and economic growth has by many scholars around the world (Thierry et al., 2016). Nevertheless, Pagano and Pica (2012) argued that domestic credit is not always positively correlated with economic growth. It can even exert negative impact on economic growth (Levine, 2005; Cournède & Denk, 2015). In fact, the recent global

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financial crisis is a typical example of how the excessive increase and inefficient use of domestic credit lead to the waste of national sources, thereby negatively affecting economic growth. Therefore, it is clear that there exist different views on the correlation between domestic credit and economic growth which needs more empirical analyses. Thus, does the nonlinear effect of domestic credit on economic growth really exist? This question has not been satisfactorily answered by prior studies. It is Goldsmith (1969) who initiated the identification of optimal financial structure for the aim of boosting economic growth. Recently, Botev and Jawadi (2019) also investigated the nonlinear effect of domestic credit on economic growth but failed to determine the optimal threshold. Hence, to analyze the nonlinear relationship between domestic credit and economic growth is necessary.

In this study, the author concentrates on investigating the nonlinear effect of domestic credit on economic growth, thereby identifying the optimal threshold of domestic credit for boosting economic growth. Furthermore, its data are collected in ASEAN countries, which possess a relatively high speed of domestic credit and economic growth in recent years. However, a limited number of empirical studies have been conducted, so this study is expected to give first empirical evidence on the nonlinear relationship between domestic credit and economic growth in ASEAN countries. The findings are essential for them to develop managerial credit policies for sustainable economic development.

2. LITERATURE REVIEW

In this section, relevant research on the impact of domestic credit on economic growth will be briefly reviewed.

Domestic credit is an important indicator of the development of the banking sector as well as the financial development of a country. Schumpeter (1911) is one of the first economists that believed domestic credit plays an essential role in boosting economic growth through financing for investment and manufacturing. Most of recent empirical studies have found the positive influence of domestic credit on economic growth. For instance, Wolde-Rufael (2009) revealed the positive causal relationship between domestic credit and economic growth in Kenya from 1966 to 2005. Similarly, Khoutem et al. (2014) confirmed that domestic credit is essential in stimulating the growth of Tunisian economy in the period 1973-2008. With a wider perspective, Menyah et al. (2014) affirmed that domestic credit and trade liberalization are positively correlated to economic growth in Africa. By another analysis, Abdulsalam et al. (2015) reported that domestic credit contributes greatly towards economic growth in the Economic Community of West African States (ECOWAS). Samargandi and Kutan (2016) also found the positive influence of domestic credit on economic growth in the BRICS region from the first quarter of 1989 to the last quarter of 2012. At the same time, Thierry et al. (2016) showed domestic credit as a driver of economic growth in Cameroon between 1969 and 2013. In addition, Ibrahim and Alagidede (2018) found the positive nexus between domestic credit and the growth of 29 economies in the Sub-Saharan African region in the 1980-2014 period. This research also reported that economic growth is positively influenced by trade openness and negatively affected by inflation. The positive correlation between domestic credit and economic growth was also confirmed by Wang et al. (2019) with their analysis conducted in China from 2007 to 2016.

However, other scholars have argued that domestic credit is not always positively related to economic growth. Levine (2005) stressed that the excessive growth and unproductive use of domestic credit could lead to the credit boom in the short run and the negative effect on economic growth in the long run. Regarding OECD countries in the 1970-2003 period, Pagano and Pica (2012) concluded that the excessive rise in domestic credit would not exert a positive influence on economic growth. In the same vein, Cournède and Denk (2015) highlighted the negative association between domestic credit and economic growth among OECD and G20 countries.

With regard to determining the optimal threshold, it has been a big concern of many scholars. Nevertheless, almost none of the prior studies have identified the optimal threshold of domestic credit to stimulate economic growth. Indeed, Goldsmith (1969) is the first scholar that mentioned optimal financial structure in comparing the role of financial structure in the economic growth of Germany and the United Kingdom. Then, debates on the optimal financial structure to boost long-run economic growth have concentrated on four different views which are bank-based, market-based, financial service-based and financial law-based (Levine, 2005). However, the value of optimal threshold has not been agreed, especially the optimal threshold value of domestic credit. Recently, Botev and Jawadi (2019) found the positive effect of domestic credit on economic growth when investigating 100 countries for 1990-2012. Also, their research highlighted that economic growth is positively affected by trade openness and negatively influenced by inflation. However, the nonlinear effect of domestic credit on economic growth could not be found yet.

In general, there still exist many different views on the role of domestic credit in economic growth. Particularly, most empirical researchers have hardly investigated the nonlinear relationship between domestic credit and economic growth, thereby determining the optimal threshold of domestic credit in order to stimulate economic growth.

3. DATA AND METHODOLOGY

3.1 DATA

The study collects data from six ASEAN countries including Indonesia, Malaysia, Thailand, Singapore, the Philippines, and Vietnam. These economies share a big number of similarities and have grown significantly in recent years. Its data are obtained from World Bank between 2004 and 2017.

3.2 METHODOLOGY

The paper mainly examines the nonlinear impact of domestic credit on economic growth in ASEAN countries. In light of this objective, the author estimates the research model by employing methods that are appropriate for panel data including pooled regression (Pooled OLS), fixed effects model (FEM) and random effects model (REM). In order to determine which model is the best, the author conducts an F test for choosing the pooled OLS versus the FEM, and the Breusch–Pagan Lagrange multiplier test for choosing between the pooled OLS and the REM. With the chosen estimator, tests on multicollinearity, heteroscedasticity and autocorrelation issues are conducted. Then, the Generalized Method of Moment (GMM) which was employed by Botev and Jawadi (2019) is used to estimate the nonlinear link between domestic credit and economic growth. One of the advantages of the GMM is its appropriateness for financial data (Driffill et al., 1998). More than

*Corresponding author (Toan Ngoc Bui). E-mail: buingoctoan@iuh.edu.vn Volume 11 No.2 ISSN 2228-9860 eISSN 1906-9642 CODEN: ITJEA8 Paper ID:11A02N http://TUENGR.COM/V10A/11A02N.pdf DOI: 10.14456/ITJEMAST.2020.34

that, it helps reduce violations in regression assumptions and more especially, control for potential endogeneity (Doytch & Uctum, 2011).

Following previous researchers, the author determines the dependent variable of economic growth is measured by the gross domestic product (GDP) growth rate. Meanwhile, the independent variable is measured by domestic credit to the private sector (% of GDP). Moreover, squares of domestic credit are adopted to test the nonlinear relationship between domestic credit and economic growth as an independent variable, which is a novelty of this study. Inheriting studies of Ibrahim and Alagidede (2018), Botev and Jawadi (2019), inflation and trade openness are utilized as control variables.

Therefore, the research model is estimated by the following equation:

$$EG_{it} = \beta_0 + \beta_1 DC_{it} + \beta_2 DC^2_{it} + \beta_3 INF_{it} + \beta_4 OP_{it} + \varepsilon_{it} \quad (1).$$

The symbol ε_{it} is the model error. The symbols β_0, β_1, β_3, and β_4 are the model coefficients for each variable. Table 1 gives detail of variables for Equation (1).

Table 1: Summary of variables

Variable name	Code	Source	How to measure
Dependent variable			
Economic growth	EG	World Bank	GDP growth (annual %)
Independent variables			
Domestic credit	DC	World Bank	Domestic credit to the private sector (% of GDP)
Squares of domestic credit	DC^2	World Bank	[Domestic credit to the private sector (% of GDP)]^2
Control variables			
Inflation	INF	World Bank	Inflation, consumer prices (annual %)
Trade openness	OP	World Bank	The sum of imports and exports normalized (% of GDP)

4. RESULT

In the research period, the ASEAN economies have grown on an average of 5.331% (Table 2). In particular, the Philippines, Vietnam, and Malaysia reached the above-average economic growth which specifically is at 6.685%, 6.812%, and 5.897% respectively (Figure 1) in 2017.

Table 2: Descriptive statistics of all variables

Variable	Mean	Min	Max
Economic growth (EG)	5.331	-1.514	15.240
Domestic credit (DC)	83.749	24.606	149.335
Inflation (INF)	4.295	-0.900	23.116
Trade Openness (OP)	159.010	37.421	441.604

Also, Table 2 shows that their domestic credit averages 83.749%. Particularly, some countries possessed the above-average domestic credit in 2017, namely Thailand (144.968%), Vietnam (130.722%), Singapore (128.212) and Malaysia (118.806%) (Figure 1).

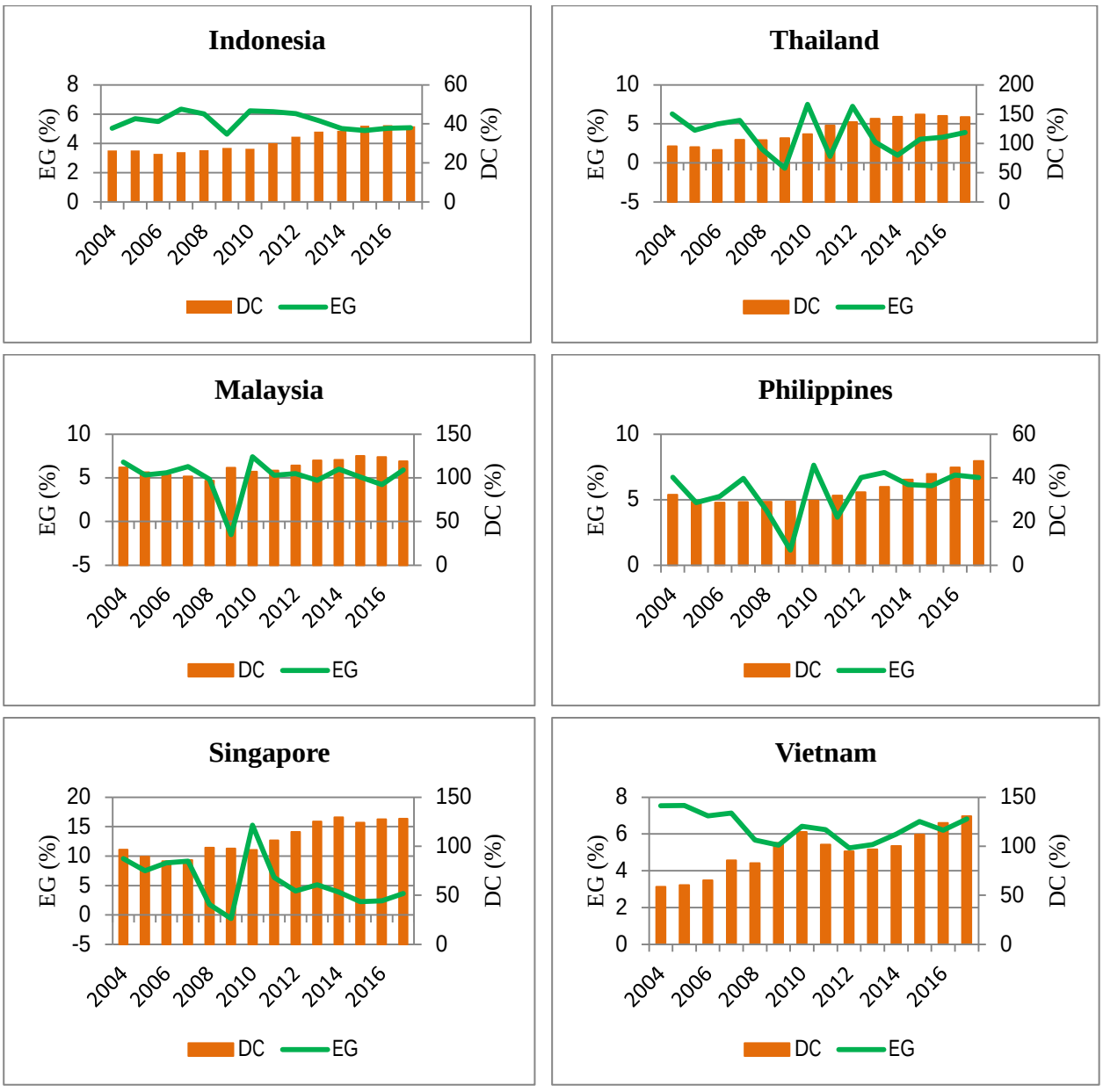

Figure 1: Domestic credit (DC) and economic growth (EG) in ASEAN countries

Next, the model is estimated by adopting the estimators, namely the Pooled Regression model (Pooled OLS), Fixed effects model (FEM) and Random effects model (REM).

Table 3: Results of Pooled OLS, FEM, REM models

EG	Pooled OLS	FEM	REM
Constant	3.927***	4.190	3.927***
DC	0.057	0.002	0.057
DC^2	-0.001*	-0.001	-0.001**
INF	0.026	-0.061	0.026
OP	0.004	0.018	0.004
R^2	16.21%	6.41%	16.21%
Significance level	F(4, 79) = 3.82 Prob > F = 0.007***	F(4, 74) = 2.20 Prob > F = 0.078*	Wald chi2(4) = 15.29 Prob > chi2 = 0.004***
F test	F(5, 74) = 1.06 Prob > F = 0.391		
Breusch and Pagan Lagrangian multiplier test	chibar2(01) = 0.000 Prob > chibar2 = 1.000		

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

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From Table 3, the Pooled OLS model is more appropriate because F (F(5, 74) = 1.06; Prob > F = 0.391) and Breusch-Pagan Lagrangian multiplier test (chibar2(01) = 0.000; Prob > chibar2 = 1.000) are show no statistical significance. Hence, the Pooled OLS model is applied.

Table 4: Results of heteroscedasticity and autocorrelation tests

Heteroscedasticity test	Autocorrelation test
chi2(13) = 20.77 Prob > chi2 = 0.078*	F(1, 5) = 0.802 Prob > F = 0.412

Note: * indicates significance at the 10% level.

Table 4 indicates there is no autocorrelation in the model (Autocorrelation test: F(1, 5) = 0.802; Prob > F = 0.412). However, the heteroscedasticity really exists (Heteroscedasticity test: chi2(13) = 20.77; Prob > chi2 = 0.078). Therefore, the Generalized Method of Moment (GMM) is applied to constrain the heteroscedasticity as well as control potential endogeneity issues in the model.

Table 5: Results of the GMM

EG	Coef.	P>|z|
Constant	-1.056	0.722
DC	0.195*	0.095
DC^2	-0.001*	0.082
INF	0.237*	0.100
OP	-0.005	0.427
Significance level	Wald chi2(3) = 14.57 Prob > chi2 = 0.006***	
Arellano-Bond test for AR(2) in first differences	z = -1.33 Pr > z = 0.182	
Sargan test	chi2(5) = 7.43 Prob > chi2 = 0.191	

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

The estimated results are statistically significant at 1% (Wald chi2(3) = 14.57; Prob > chi2 = 0.006). And also, result of Sargan test (chi2(5) = 7.43; Prob > chi2 = 0.191) shows that the adopted instruments are suitable (Table 5). This means that all results of the system GMM model are valid.

From Table 5, economic growth (EG) is found to be positively influenced by DC (0.195) and negatively associated with DC2 (-0.001) at the 10% level of significance. Thus, it affirms the inverted U-shaped pattern between domestic credit and economic growth. This gives a novelty to this study. In addition, the research reveals that inflation (INF) is positively (0.237) related to economic growth (EG) at the 10% significance level. Nevertheless, with the obtained dataset, the statistically significant association between trade openness (OP) and economic growth (EG) cannot be confirmed yet.

5. DISCUSSION

The result indicates that domestic credit (DC) exerts a positive impact on economic growth (EG). This is consistent with what have been previously found by của Wolde-Rufael (2009), Khoutem et al. (2014), Menyah et al. (2014), Abdulsalam et al. (2015), Samargandi and Kutan (2016), Thierry et al. (2016), Ibrahim and Alagidede (2018), and Wang et al. (2019). Besides, the study finds the negative influence of squares of domestic credit (DC^2) on economic growth (EG). Alternatively, there exists an inverted U-shaped nonlinear relationship between domestic credit and economic growth. This makes this study different from the earlier ones.

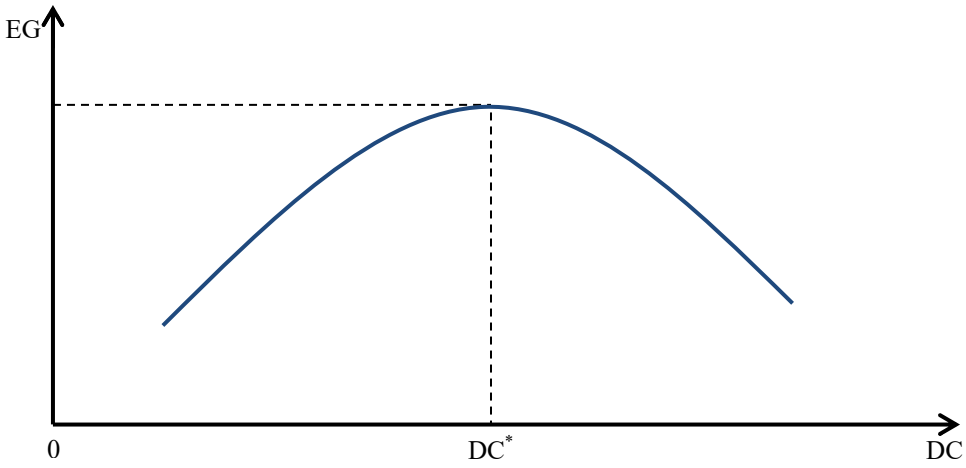

Figure 2: Nonlinear impact of domestic credit on economic growth

Consequently, the increase in domestic credit leads to a rise in economic growth. However, domestic credit is only positively associated with economic growth at the optimal threshold DC^*. When domestic credit exceeds this optimal threshold, the correlation between domestic credit and economic growth turns to be negative (Figure 2). Based on this, the mentioned research question is solved as follows: the inverted U-shaped pattern between domestic credit and economic growth means that domestic credit does not exert a permanently positive impact on economic growth. Meanwhile, economic growth reaches a maximum at the optimal threshold DC^*.

Hence, the estimated model is presented as follows:

$$EG_{it} = 0.195\ DC_{it} - 0.001\ DC^2_{it} + 0.237\ INF_{it} + \varepsilon_{it} \quad (2)$$

Following this, the second derivative is taken with respect to DC in order to determine the maximum. The result reveals the optimal threshold (DC^*) is 97.5%. in other words, if domestic credit values at 97.5%, economic growth will reach its maximum.

6. CONCLUSION

The paper achieves its objective by confirming the nonlinear impact of domestic credit on economic growth in ASEAN countries. The results emphasize that the increase in domestic credit will boost economic growth. However, an excess of domestic credit over the optimal threshold (DC^*) leads to credit abundance and eventually exerts a negative influence on economic growth or a decrease in economic growth alternatively. In other words, there exists an inverted U-shaped relationship between domestic credit and economic growth, which brings a novelty to this study. Based on this, the optimal threshold (DC^*) is determined to be 97.5%. It can be concluded that economic growth reaches a maximum when domestic credit values at 97.5% but economic growth will be negatively influenced if domestic credit exceeds this threshold. In addition, the study also reveals the positive correlation between inflation and economic growth.

Thus, domestic credit is not always correlated with economic growth. This relationship turns out to be negative when domestic credit exceeds the optimal threshold ($DC^* = 97.5\%$). This provides essential empirical evidence for ASEAN countries to have a comprehensive perspective on this correlation. Consequently, the ASEAN countries can develop flexible and efficient credit policies in combination with boosting sustainable economic growth. Despite gaining its objectives,

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the paper has its limitation when adopting a limited number of control variables because it only focuses on the impact of domestic credit on economic growth.

7. DATA AVAILABILITY STATEMENT

The used or generated data and the result of this study are available upon request to the corresponding author.

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