СОВРЕМЕННЫЙ ИНСТРУМЕНТАРИЙ АНАЛИЗА И УПРАВЛЕНИЯ ЭКОНОМИЧЕСКИМИ ПРОЦЕССАМИ

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DETERMINE THE EXTERNAL DEBT THRESHOLD OF THE SOUTHEAST ASIAN COUNTRIES: ANALYSIS USING LAFFER CURVE [1]

This paper research the relationship between external debt and economic growth. Using the debt Laffer curve theory, the authors determine the maximum debt level of the Southeast Asian countries. Secondary data period 2006–2014 of 10 countries of the Association of Southeast Asian Nations are collected from the Asian Development Bank and the International Monetary Fund website. The authors use the method of regression for balanced panel data with a fixed effect model. The research results indicate that there exists a nonlinear relationship between external debt and economic growth in the Southeast Asian countries, including five variables: budget balance to gross domestic product, the lag of gross domestic product growth, the ratio of total investment to gross domestic product, the ratio of external debt to gross domestic product and the ratio of debt payments on exports of goods and services. These five variables are significant statistics and explain the meaning 24.87 % of the model. The other two: trade openness and trade index are not statistically significant. On the other hand, the research results have found the maximum debt level of the Southeast Asian countries, which is 70.42 %. Based on the study results, the authors suggest some recommendations to help the government of the Southeast Asian countries to build up the maximum debt levels, in line with the socio-economic development goals of their countries in each period.

Keywords: Laffer curve, Laffer curve debt, debt overhang, external debt, economic growth, gross domestic product, budget deficit, Southeast Asian countries, developing countries, ASEAN Economic Community

1. Introduction

Over the years, developing countries, especially the Southeast Asia countries, are constantly faced with the situation of the budget deficit in order to achieve high economic growth with limited domestic savings. According to the statistics of the Asian Development Bank — IMF (2015), the average budget deficit of the countries in this area in 2012 was 0.74 %, it increased by 156 % compared to 2011. In 2013, it was 0.77 %, i. e. increased by 4.5 % compared to 2012 and was continuing to rise to 0.78 % in 2014[2]. Therefore, a capital source from loaning, especially from foreign loaning is considered as one of the important financial sources to these countries. However, Vietnam's external debt situation as well as other SE Asian countries are showing more worrisome signs. According to the statistics of the Asian Development Bank (2015), the external debt scale of some countries such as Thailand (44 % *GDP*), Indonesia (39.7 % *GDP*) and Philippines (47.3 % of *GDP*) is getting larger and larger[3]. The rapid rise of external debt in the context of the world economy is still in crisis and is making the external debt problem more serious. In that situa-

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[2] Data collected from the website of the Asian Development Bank (2015). Retrieved from: https://sdbs.adb.org/sdbs (date of access: 27.01.2017).

[3] Data collected from the website of the Asian Development Bank (2015). Retrieved from: https://sdbs.adb.org/sdbs (date of access: 27.01.2017).

tion, many financial experts said that the countries of Southeast Asia are facing big risks on external debt. On the other hand, in December 2015, ASEAN countries have established the ASEAN Economic Community, which aimed toward the comprehensive integration of the Southeast Asian economy, proceed to an economic-social-security community model like the European Union (EU). Besides, through the synthesis of the research on this topic, the authors see that the most of the works only use the linear regression model and still have not determined the debt threshold for each country or region. In this article, authors consider the non-linear relationship between external debt and economic growth through the debt thresholds theory application, which is emulated as Laffer Curve to determine the maximum debt threshold of the ASEAN countries, From that, we proposed some solutions to effectively manage and control the external debt of the countries in the area.

2. Research Data and Research Method

2.1. Research Data

The authors use the annual statistic of 2006–2014 of the Southeast Asian countries, including Brunei, Cambodia, Laos, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

Data source: IMF and ADB

2.2. Research Method

This article uses the quantitative analysis as the main analysis method, particularly — the balanced panel data regression analysis with a fixed effect model to evaluate the relationship between external debt and the economic growth of the Southeast Asian countries.

3. Theoretical Overview

3.1. The Basic Theory of "Debt Overhang"

In research on the potential negative effect of external debt toward economic growth, the common model that is being used is the "debt overhang" theory. Krugman [1] defines "debt overhang" as the situation in which the money that is expected to pay for external debt will decrease as the debt amount increase. "Debt overhang" theory says that if the future debt exceeds the affordability of a country then the expense plan to pay for the debt service will constrain the domestic investment, which will have a bad effect on the growth [2].

The Laffer Curve Debt

The argument of "debt overhang" theory can be seen by the Laffer curve debt (Fig.1). The Laffer curve shows that the larger the total debt is, the smaller the repaying capability is. On the up side

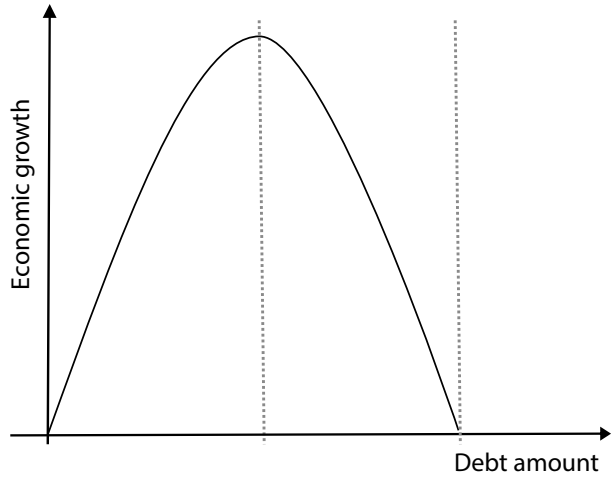

Fig. 1. *Debt Laffer curve Source: Krugman, 1988 [1]*

of the curve, the higher is the current amount of debt, economic growth, and debt repaying capability will also increase [1]; [2]. However, when the debt amount reaches the top of the curve, which is called the optimum debt, then at that point, the growth reaches its highest. This is the debt threshold that a country can hold without worry about its negative effect toward the economic growth. But the down side of the curve shows that when the debt exceeds this point, it will restrain the economic growth and the debt repaying is starting to be troublesome [1]; [2].

So, the above viewpoints show that debt may have a bad or good effect toward the economic growth. A considerable debt can stimulate the economic growth [3]. The governments can use debt as a tool to fund and supply the investment needs of national key projects, encourage the production development, stimulate the economic growth [4]; [5]. Though, if the debt is too large, exceeds the reasonable amount then it will have a negative effect on the economic growth rate: large debt will reduce private capital, which leads to the withdrawal of private investment; debt reduces nation's saving; debt causes inflation pressure; it causes distortion of economic activities as well as damage the social welfare [3]; [4]. So, how much is the reasonable debt so that when the real debt exceeds this amount, it will have a bad influence on economic growth?

Krugman [1] defines the debt overhang as the condition where external debt eludes the repaying capability of a country. At that time, repaying both the interest and the debt principal will increase the pressure on the national product; have a negative effect to the economic growth. Therefore, the government has to increase taxes to compensate the amount of debt that has to repay in the future, reduce the revenue expectation of private investors, which by then reduce domestic investment, and will have a bad influence to the economy.

Debt threshold theory is used in experimental research of Sachs (1989) [6], Savvides (1992) [7], Clements (2003) [8], Moss and Chiang (2003) [9], Mohamed (2005) [10], Frimpong and Coworkers (2006) [11].

3.2. Experimental Research on the Relationship between External Debt and Economic Growth

Moss and Chiang [9] state that the "excess debt" theory exists when the debt burden of a country is high. It will impair the incentive to invest because an investor thinks that the future debt repayment is like a tax on profits. Therefore, the large debt will hinder economic growth by explaining that the debt ratios such as debt to export, debt to government revenue, or debt to *GDP* are indicators that represent the expected taxes in the future and have a reverse correlation with investment and economic growth. The regression data tables of the restricted credit economies show that the debt/export ratio has a reverse correlation and also has a meaning toward the investment/*GDP* rate and the average per capita income growth, but the debt/revenue ratio has little correlation with both investment and growth.

Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8] research external debt, public investment and economic growth in low-income countries. The authors use FEM and GMM model based on the data table to analyze the influence of external debt to growth in 55 countries with low-income during 1970–1999. The research result has confirmed the debt threshold theory. Debt threshold is estimated at about 30–37 % *GDP*, while the debt repayment indicator reaches 115–120 % of exporting. On the other hand, the research shows that both of the models pointed out that the total investment has a positive effect toward economic growth. However, external debt higher than threshold will have bad influence and reduce the economic growth [10].

Caner and Grennes and Köhler-Geib [12] research government debt threshold in developed and developing countries between 1980–2008. The sample of this authors' group includes 26 developed countries and 75 developing countries of all regions of the world. With Hansen's OLS regression technique (2000) [13], the authors measures the relationship between real GDP growth rates (constant-price *GDP* at the year 2000) with the average real *GDP* variables per person, the government debt vs. *GDP* ratio, inflate ratio and the openness of the economy. The research result found out that government debt threshold vs. GDP for the developed countries in the sample is 77.1 % and 64 % for the developing countries. The research also shows an estimated result with the nation group in the sample with each percent increase of the government debt vs. *GDP*. The research also shows an estimated result with the nation group in the sample. If each percent increase of the government debt vs. *GDP* exceeds the debt threshold, the *GDP* growth rate will be reduced by 0,0174 percent point. However, under this threshold, each percent of debt increasing will increase the *GDP* growth rate by 0,0653 percent point. With the developing countries group, when exceeding the debt threshold, each percent increase of the debt ratio will reduce the *GDP* growth rate by 0,0203 point. And under the threshold, each percent increase of debt rate will increase *GDP* growth rate by 0,0739 percent point.

Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14] research external debt and economic growth. The research uses the data of 93 developing countries during 1969–1998. Through the research, the authors' group has proven that the influence of external debt has a reverse impact on average *GDP* per capita start appearing when the price of debt over export is 160–170 % and debt rate over *GDP* is 35–40 %. Frimpong and Oteng-Abayie [11] research external debt and economic growth rate in Ghana during 1970–1999. The authors' group has built a relationship between *GDP* and macro-economic variables such as external debt, domestic investment, debt services and the openness of the economy and foreign direct investment. Their result shows that in long-term, external debt, the openness of the economy and foreign direct investment contributes greatly to the economic growth of Ghana. However, the increasing of the external debt service and domestic investment is hindering the economic growth. They also proved the existence of overwhelming effect in this country.

4. Research Model

This article analyzes the relationship between external debt and economic growth at ASEAN countries based on the models by Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8], Frimpong and Oteng-Abayie [11], and Safia Shabbir [15]. These research are conducted in developing countries. Therefore, it fits to Vietnam's economy conditions.

Non-linear impact research model is constructed as follow:

$$Y_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 D_{it}^2 + \beta_x X_{it} + e_{it}, \qquad (1)$$

In which:

Y_{it} — variable that is dependent on real *GDP* growth rate, D_{it} — variables of external debt indica-

Table 1

Factors that affect economic growth

No.	Factors	Expectation	Measure	Code
			Dependent variable	
1	Real *GDP* growth rate		$(GDP_t - GDP_{t-1})/ (GDP_{t-1})$	*GDP*
			Independent variable	
2	Foreign debt to *GDP*	+/–	Foreign debt / *GDP*	*EXTD*
3	Total investment to *GDP*	+	Total Investment / *GDP*	*INVEST*
4	Balance budget to *GDP*	+	(Government budget Income — Outcome) / *GDP*	*FISBAL*
5	Trade index	+	Goodies and Services export price Index / Goodies and Services import price Index	*TRADE*
6	Trade Openess	+	(Export and Import turn over) / *GDP*	*OPEN*

Source: Pattillo and Co. (2002) [14], Clements and Co. (2003) [8].

Table 2

Variables descriptive statistic table

Variable	Observation number	Average value	Minimum value	Maximum value
GDP	90	6.11	–2.33	15.24
EXTD	90	39.91	8.67	101.26
INVEST	90	24.89	10.44	39.57
FISBAL	90	–8.00	–6.13	11.17
TRADE	90	101.15	61.3	243.46

Source: Calculated by the authors.

tors, included: external debt to *GDP* (*EXTD*), D_{it}^2 — squared variable of external debt to *GDP* (*EXTD*), X_{it} — macroeconomic variables included: Total investment to *GDP* (*INVEST*), balance budget to *GDP* (*FISBAL*) and trade index (*TRADE*), e_{it} — regression equation error.

5. Research Results and Discussion

5.1. Research Variables Description Statistics

Table 2 shows the average value, minimum value, maximum value and observation number that are used in the research. In particular, GDP growth rate ranged from 2.33 % to 15.24 %; average *GDP* growth rate is 6.11 %; the ratio of external debt over *GDP* ranged from 8.67 % to 101.26 %, the average value is 39.91 %.

5.2. Variables Correlation Analyze

Table 3 shows that there is no multi-collinear phenomenon between the independent variables with each other and with dependent variables. The strongest correlation is between *OPEN* and *FISBAL*, which is 0.66 % < 0.8 %, acceptable. (Wooldridge, 2013) [16].

The next section will present detailed research result about the relationship between external debt and economic growth in ASEAN countries.

5.3. Regression Result and Tests

5.3.1. Model's Theory Violation Test

Table 4.1 shows the result of the fixed error variance test, and Table 4.2 shows the result of the autocorrelation error variance test. The Prob. Chi-Square index of Table 4.1 = 0.0000 < significance

Table 3

The correlation between independent variables

	EXTD	*INVEST*	*FISBAL*	*TRADE*
EXTD	1.0000			
INVEST	0.0964	1.0000		
FISBAL	–0.4744	0.1551	1.0000	
TRADE	0.0306	0.2817	0.0395	1.0000

Source: Calculated by the authors in Eviews.

Table 4

Fixed and autocorrelation of error variance test

Table 4.1 Fixed of error variance test		
Chi-Square	Prob. Chi-Square	0.0000
Table 4.2 Autocorrelation test		
F-statistic	Prob. F (1,9)	0.0015

Source: Calculated by the authors in Eviews with significant value at the 5 % level.

Table 5

Non-linear regression measured result

Variables	*FEM* (*p*-value)	*GLS* (*p*-value)
EXTD	0.4392* (0.000)	0.4648* (0.000)
$EXTD^2$	–0.0026** (0.002)	–0.0033* (0.000)
INVEST	0.0517 (0.520)	0.1186** (0.008)
FISBAL	0.4755** (0.007)	0.5553* (0.000)
TRADE	–0.0077 (0.772)	–0.0132 (0.202)
Const	–6.3355 (0.165)	–7.09717 (0.091)
Observations	90	90
R^2	0.1161	0.2487

Source: Calculated by the authors in Eviews. * Significance at the 1 % level; ** Significance at the 5 % level.

level £ = 5 % and Prob. Chi-Square index of Table 4.2 = 0.0015 < significance level £ = 5 %. The result shows that the model has both error variance and autocorrelation phenomenon.

Therefore, through tests, we found out that the model violates the hypothesis that is changed by variance error. According to Wooldridge [16, p.269–286], the way to fix the error above when variance error changes and autocorrelation is to choose the generalized least square regression model — Generalized Least Squares (*GLS*).

The generalized least square method that applied to variables is changed from the classic hypothesis violating model into a new model that satisfy hypothesizes of OLS model [17]. Therefore, the variables that are measured by the new model are more trustworthy.

5.3.2. Non-Linear Regression Measured Result

The non-linear regression measured results are presented in the Table 5.

6. Discussion of the research result

The estimation result of the non-linear impact model of external debt on economic growth at ASEAN countries through GLS measurement method shows that there are four variables that have statistical value, and explained 27.65 % of model meaning. There are three variables — balance budget/*GDP* (*FISBAL*), total investment/*GDP* ratio (*INVEST*) and external debt/*GDP* (*EXTD*) which have a positive impact toward economic growth rate that has statistical value. The commercial openness (*OPEN*) has a reverse impact on economic growth. The remaining trade index variable (*TRADE*) does not have statistical value, consistent with the research of Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8].

External debt/*GDP* (*EXTD*) is measured by the percent ratio between total external debt over GDP. This is the index to estimate the debt situation and the external debt burden of a country. External debt over *GDP* represents the correlation between the total external debt and the capability to create the income from inside the country to repay the debt. The research result shows that external debt has a positive impact toward the economic growth. That proves that when the external debt of ASEAN countries increases by 1 % then economic growth increases by 44.55 %. This result is consistent with Keynes viewpoint and experimental research of Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8], Frimpong and Oteng-Abayie [15].

The Budget balance/*GDP* variable is used to control the effect of budget balance on growth, measured by the balance of government revenue minus the government expenditure divided to GDP. The research result shows that this variable has the same effect with economic growth and has statistical value at a significance level of 1 %. This positive correlation indicates that when the deficits of region's countries increase by 1 % then the impact toward economic growth increases by 60.70 %. This research result is indeed consistent with experimental research at developing country in SE Asia region of Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8], Schclarek [18].

The total investment/*GDP* ratio (*INVEST*) is the variable that represents the growth rate of the input factor that is capital in the production process. Investment efficiency is reflected in the creation of greater potential for the production, is the basis to develop the socio-economic infrastructure. Besides it also creates favorable condition to attract foreign investment capital to the country to ensure the comprehensive development of all areas, sectors, regions, contribute to a solid economic growth. To make clear the effect of domestic force to the economic growth, the authors used the total investment/*GDP* variable to represent the level of investment. The research result is appropriate with the research result of Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8], Schclarek [18], Frimpong and Oteng-Abayie [11].

From all of the above, we can conclude: external debt has a positive impact toward economic growth in developing countries in the SE Asia region, included Vietnam. But external debt can have a positive impact if the government constructed a reasonable debt threshold. If the debt exceeds this threshold, then loaning from a foreign country will have a negative impact toward economic growth [18]; [19]. The problem is how much this threshold is? To answer this question, the authors have used the debt threshold theory. From the regression result of the non-linear impact model of external debt toward economic growth by *SYS-GMM* method, the regression equation has the following form:

$$Y_{it} = -7.09717 + 0.4648 \times EXTD_{it} - 0.0033 \times EXTD_{it}^2 + 0.1186 \times INVEST_{it} - 0.5553 \times FISBAL_{it} + e_{it} \quad (2)$$

Derivative the (2) equations by *EXTD* variable and set it equivalent to 0 to find out the turning point of external debt where the impact of exter-

nal debt toward economic growth switch side, by /2 value, as follow:

$$Y_{it}^{t} = -2 \times 0.0033 \times EXXTD_{it} + 0.4648 = 0.$$

We have: – /2 = 70.42 %

So then, external debt threshold of ASEAN countries is 70.42 % *GDP*.

7. Conclusion and Suggestions

The experimental research proves the existence of Laffer curve debt and the non-linear relationship between external debt and economic growth rate of ASEAN countries during 2006–2014. The Laffer curve debt's top is the debt threshold and is measured at 70.42 % GDP, higher than average external debt/*GDP* of ASEAN countries (39.91 % *GDP*)[1]. Therefore, the countries in the region can increase their external debt while its still lower than the debt threshold to have a positive effect upon economic growth. On the contrary, at a higher than threshold debt, increase external debt may have a negative influence to the growth. This result fits with the research of Catherine Pattillo, Luca Ricci, and Helene Poirson Ward [14], Clements, Benedict and Bhattacharya, Rina and Nguyen, Toan Quoc [8], Schclarek [18], Frimpong and Oteng-Abayie [11].

From the above result, the authors make several suggestions in order to use external debt more efficient while reducing the negative impact:

First, there need to have an efficient way to control the debt accordingly to the eco-social development plan and the government budget-balancing plan in each time. It needs to establish a risk control system of debt list; determine the debt threshold in order to bring out the most efficient economic result. Countries with debt under a threshold such as Singapore (8.67 % *GDP*), Indonesia (25.5 % *GDP*) may think about increasing the debt. In contrary, countries with debt over the threshold like Laos (72.31 %) should adjust the government debt by increasing the domestic capital or control the government expedites. However, for external debt, to have its most efficiency use, countries in the area must actively set their external debt threshold in accordance to their investment needs into economic, debt interest rate and economic growth rate in each period. Also, they need to build a suitable strategy to loan and effectively use the loan to ensure their solvency in difference situations and reduce the risk, while always assess potential risks from Government debt, to ensure that the debt scale is consistent with economic growth rate, not to bring more debt burden for the country.

Second, it needs to build a public expedite control system in order to resolve the overspending of the government budget. The main reason for foreign loaning is because the government has not controlled good enough the public expenditure, which lead to the overspending of the government budget. To solve this problem, the government needs to combine the policies with each other such as domestic loaning and foreign loaning, increase special revenues from the tax, control public investment and spendings from the government budget.

If government borrows to offset the budget deficit through debt, especially external debt, then that will lead to the debt burden in the future and negatively affects the economic growth in the long termOn the other hand, the ability of the region's countries to repay the external debt in short-term is the main reason of the decline of private investment; which in turn reduce the available resource for the nation's productivity, hinder economic growth. Therefore, one of the lead solutions is to improve both the quantity and quality of the export activities . Good and service price of countries in the region is positively affecting the country's income.

There exists an indispensable relationship between invest and the growth of the economy. However, investment, especially public investment, needs a clear definition of the financial resource distribution in accordance with the priority of the development's strategy. Public investment should focus on the creation of a common condition for the development. It needs to adjust the investment structure toward the nation's important projects, especially the traffic infrastructure, large-scale city infrastructure, national projects and economic zone. To promote investment, countries in the region must diversify their invest capital sources, while attracting private capital. Therefore, the government needs to increase their accountability and the transparency in public expedites management, ensure the effectiveness of the public goods providing programs.

Third, to strengthen the coordination between fiscal policy and monetary policy is important. Balance government budget is a great balance, being both reason and result of other macroeconomic balances. Therefore, there is a need to increase the effectiveness of fiscal policy, reduce the government deficit step by step through a defined route with suitable steps, ensure the balance between the total investment capital from the social

[1] Data collected from the website of the World Bank. Retrieved from: https://data.worldbank.org/topic/external-debt?locations=Z4 (date of access: 27.01.2017).

while still ensure a good fiscal situation. To reestablish fiscal disciple, reduce the budget deficit not by increase earning, but by reducing the spendings on the basis of increasing the effectiveness of earning/spending are also required. Earnings that exceed estimates are not used to increase spendings but to offset the budget deficit.

To ensure the effectiveness in the coordination of the two policies, their application has to be tied with solid targets. It needs to strengthen information trading between the policy's management agencies right from the policy-making stage. To establish an effective coordination among ministries in managing the macroeconomic policy, in monitoring and maintaining the great balances of the economy; effectively response before the adverse impact to the economy are also required.

It needs to promote media's work, form an information receiving system about the policies to timely fix the inadequacies during the execution of the policies. To renew the macroeconomic managing method through establishing the beforehand warning system to identify the risk of financial insecurity is also required.

Conclusion: External debt is a necessary capital source for socio-economic development, especially for developing countries. However, it is not advisable to borrow external debt at any cost, nor can the external debt be viewed as a last resort to promote the growth in the present without paying attention to the sustainability during the development of the country's socio-economy. Analyzing the debt threshold of developing countries in SE Asia region, draws out the common, the inevitable the relationship between external debt and economic growth. This analysis provides scientific arguments for debt borrowing strategy to serve the economic development of each country in this region. Furthermore this analysis allows assessing the financial security of the ASEAN Economic Community.

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