Doctoral Dissertation

The Impact of Public Debt on Economic Growth in ASEAN:
An Empirical Analysis of External and Domestic Public Debt
in Different Groups of ASEAN Countries

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CHAPTER I INTRODUCTION

Association of Southeast Asia Nations (ASEAN) is one of the fastest growing regions of the world, with a large market and a considerable amount of total population. For this reason, ASEAN is promised to be one of the regions considered to be the destination of foreign investors. However, over three recent decades of economic development, the total amount of public debt of 10 ASEAN countries (Cambodia, Vietnam, Thailand, Laos PDR, Myanmar, the Philippines, Malaysia, Singapore, Brunei Darussalam, and Indonesia) had increased significantly (World Bank, 2018). Since the economy needs intensive investment from the private and public sectors, the government should play a vital role in providing infrastructure projects for economic development. One of the main funding sources for public investment is from public debt. Over more than 30 years, both the total amounts of external public debt and domestic public debt increased for these countries. However, the proportion of public debt in term of percentage of GDP has decreased gradually except Vietnam, Malaysia, Laos, Singapore, and Brunei; it has happened because GDP amount of most member countries of ASEAN has increased dramatically over the period of the 1980s to 2010s and with a faster rate in comparing with the speed of increasing public debt amount. In fact, in 2016, the public debt of Singapore was more than 110% of GDP; gross government debt to GDP ratio of Vietnam, Laos, and Malaysia was about 60.66%, 58.88%, and 56.22%, respectively (IMF, 2018). Most of the money borrowed from international and domestic markets was invested in infrastructure providing such as transportation, education, health care, and other necessary systems.

Public debt is one of the essential elements of fiscal policy that the country often coordinates the economy. Some countries borrow money to fund the fiscal deficit due to over-expenditure or insufficient revenue; on the other hand, some other countries borrow money to invest or to develop the domestic bond market. Government borrowings might be a resource

for promoting economy by pushing up capital accumulation in the long-run (Bulow and Rogoff, 1989; Gill and Pinto, 2005). At a low and reasonable level of public debt, the government has a better chance to borrow more to conduct expansionary fiscal policies and increase public investment to promote economic growth. However, other researchers such as Barro (1979) and Corden (1989) suggest that the high public debt in the long-run leads to an expected increase in the tax rate when the government has to pay a large part from its revenue for debt service. This expectation of tax increase discourages private investment and capital accumulation of those countries. Krugman (1988), Sachs (1989), and Elmendorf and Mankiw (1999) have a similar argument about the negative impact of high public debt on private investment and national savings. Moreover, the capital flight may happen if the country faces the debt overhang problem or the high risk of a debt default (Calvo, 1998).

ASEAN is a diverse region in terms of per capita income level, the pattern of economic growth and development strategy as well as budget principles. Specifically, ASEAN countries can be divided into three main groups of countries based on per capita income, which are high-income, upper-middle-income, and lower-middle-income groups. According to the criteria of the World Bank, there are two high-income countries (Singapore and Brunei), two upper-middle-income countries (Malaysia and Thailand), and six lower-middle-income countries (the Philippines, Indonesia, Vietnam, Laos, Myanmar, and Cambodia) (World Bank, 2018). Economic development patterns of different income groups in ASEAN are different. High-income countries: Singapore and Brunei depend on current account surplus and trade openness. Singapore is an industrial country by the export-led growth strategy. Brunei is a tiny country with half of a million people, an oil exporting economy. Upper-middle-income countries: Malaysia and Thailand are export-oriented economies with a long history of development from agricultural nations to export goods producers. Lower-middle-income countries: Indonesia, the Philippines, Vietnam, Laos, Cambodia, and Myanmar are less developed members in ASEAN.

Lower-middle-income group can be divided into two sub-groups: one includes Indonesia and the Philippines, the other consists of Vietnam, Laos, Cambodia, and Myanmar (V-L-C-M).

The question about the impact of public debt on economic growth has been studied by many economists and policymakers. However, the various pieces of research have specific approaches whose results are rather not consistent. Kumar and Woo (2010) find that public debt and economic growth have a non-linear relationship: On average, an increase in public debt per GDP by 10 percent point leads to a decrease in economic growth around 0.2 percent point in one year. However, with countries having a high level of public debt (over 90 percent of GDP), government debt tends to have a significantly negative impact on real per capita GDP growth. This decline of economic growth may happen since higher initial debt causes lower investment and slowdown in the growth of labor productivity. Pattillo, Poirson, and Ricci (2011) suggest the nonlinear relationship between debt and growth with the inverted U-shape. They test a nonlinear relationship between public debt and economic growth, reporting that through factor accumulation and total factor productivity, public debt can indirectly influence growth. On average, doubling debt in the high debt countries will reduce growth by one percentage point. In contrast, debt in low debt level countries tends to have positive impacts on total factor productivity and, on average, negative but not significant effects on capital. There is a bunch of studies on the impact of public debt and fiscal deficit on the economic growth of ASEAN countries (Phuong, 2019[1]). Most of the studies focus on the impact of the public debt of single countries such as Malaysia, the Philippines, Indonesia, Vietnam, and Laos. For example, Lee and Ng (2015), Rahman (2012), Mohd Daud, Admad, and Azman-Saini (2013) study the relationship between public debt and economic growth in Malaysia. Patenio and Tan-

[1] In the paper of "The Impact of Public Debt on Economic Growth: A literature Survey and Implications for ASEAN Countries" (Phuong, 2019), I conducted the survey on theoretical and empirical studies on the impact of public debt on economic growth, and then listed some important implications for ASEAN countries.

Cruz (2007) and Naeem (2015) examine the impact of public debt on economic growth in the Philippines. Other researchers such as Azam, Emirullah, Prabhakar and Khan (2013), Vileth (2016), Van and Sudhipongpracha (2015), and Ha and Oanh (2017) investigate the correlation between government debt and economic growth in other single countries in ASEAN. However, the findings are not consistent even though all these countries are developing countries. There are very few researches on the impact of public debt on the economic growth of the whole ASEAN or country groups in ASEAN. Wibowo (2017) investigates the impact of gross public debt on the economic growth of eight countries in ASEAN: Thailand, Malaysia, Indonesia, the Philippines, Vietnam, Laos, Cambodia, and Myanmar. His finding shows a positive correlation of public debt on growth; however, none of the causal links between fiscal deficit and growth was found. Given the context that, in December 2015 the ASEAN Economic Community (AEC) was established as the target of regional economic integration, the macroeconomic policies of all members should be consistent. Debt blueprint is one of important necessary guidelines that will guide ASEAN nations to reach the consensus of AEC. Therefore, studying the public debt issue in ASEAN is very relevant in that it may help member's governments integrate a debt policy for AEC in the near future. The impact of public debt on the economic growth of ASEAN countries is an incompletely answered question because the economic situation of these countries is very diverse. In the past, there was the Asian financial crisis which affected the Asian economy including some ASEAN countries such as Thailand, Malaysia, Indonesia, and the Philippines. The AEC drives countries together in the context of regional integration creating a common economic market in which risks were also shared. Is public debt one of the threats to the regional economy or the driving force for the economic development of ASEAN countries? To answer this question, we need to study the economic development situation of each group of countries in the region.

It is necessary to evaluate the impact of public debt (external public debt and domestic public debt) on economic growth while considering other socio-economic factors such as human capital, population growth rate, current account level, economic structures of different income-groups in ASEAN. The dissertation is targeted to answer the following questions: (1) Are the impact of external public debt and that of domestic public debt on economic growth the same or different? (2) Does the effect of public debt depend on public debt structures which are reflected by the share of domestic and external public debt in GDP? (3) How are the impacts of public debt on economic growth different in the groups of countries with different income levels and different institutional arrangements and economic conditions?

The objectives of the dissertation include the followings: (a) to provide a better understanding the relationship between public debt and economic growth from both theoretical and empirical perspective by conducting a comprehensive literature survey of existing researches on the impact of public debt on economic growth ; (b) to investigate economic structures and public debt structure in each ASEAN countries in order to understand the diversity of economic growth patterns in ASEAN; (c) to discover the accurate impact of public debt on economic growth in different groups of countries by studying the augmented Solow growth model and applying it to an empirical panel data analysis on public debt and economic growth in ASEAN.

The dissertation combines the standard method of analyzing economic growth by using the Solow growth model in dynamic panel data and the method of historical and institutional analysis on the diversity of economic growth patterns, development strategies and budget principles in ASEAN. In order to apply Solow growth model to examine the impact of public debt on per capita income growth in ASEAN, the dissertation divides ASEAN into different groups based on income levels, development strategies and budget rules. The advantage of the

research is to develop an econometric analysis based on the standard growth model in the context of growth patterns and public debt structures in ASEAN.

The dissertation proceeds as follows. After Chapter 1- Introduction, Chapter 2 provides the related literature on the debt-growth relationship in both theoretical and empirical perspectives. Chapter 3 describes the diversity of economic growth and public debt structure of ASEAN countries over the last 30 years. At the first section of this chapter, the dissertation describes the diversity of the economies and public debt in ASEAN countries; and then at the following section, the dissertation provides detailed information on economic conditions and public debt structure of each ASEAN country. Chapter 4 gives some basic frameworks of growth theory and empirical model. This chapter considers the impact of public debt on economic growth from the perspective of the neoclassical growth model. At the beginning of this chapter, the dissertation builds an empirical model used in analyzing panel data on public debt and per capita GDP growth from the Solow growth model. Second, the dissertation attempts to apply the empirical model in examining the impact of public debt on economic growth in different income-groups of ASEAN countries. The dissertation would like to contribute into the existing literature on the relationship between public debt and economic growth of ASEAN by studying the detailed process of public debt impact on economic growth with a panel data analysis based on the Solow growth model. Chapter 5 describes data and methodology, then reports and interprets analytic results. In this chapter, the research applies the comparative analysis of economic conditions and debt structure to precisely assess the impact of public debt on per capita income growth in different income groups in ASEAN including high-income, upper-middle-income, and lower-middle-income countries. Finally, Chapter 6, with the conclusion, suggests some recommendations for public debt management policies in ASEAN.

CHAPTER II LITERATURE REVIEW ON THE IMPACT OF PUBLIC DEBT ON ECONOMIC GROWTH

2.1 Theoretical Explanations on the Impact of Public Debt on Economic Growth

What do we know about the logical link of public debt to economic growth from existing theoretical literature? The issue has not been well explored. However, we can formulate the theories for this question. In this chapter, the dissertation first discusses the explanations in which low level of government debt has a positive effect on growth and second write up a theory where high debt to GDP ratio is likely to be correlated with lower growth. Third, the thesis lists several explanations that combine both these effects and show that debt may have a nonlinear impact on economic growth.

2.1.1 Positive Impact of Public Debt on Economic Growth

The dissertation starts with a short survey of what theoretical explanations tell us about the positive impact of public debt on economic growth. In traditional neoclassical explanations, the average public debt would create a favorable environment for the government to borrow more for public spending, and to increase transitional growth because of the low-risk level of default. The lenders are willing to lend if they have enough information on whether the debtor has the ability to repay the total debt. Moreover, if the marginal product of capital is higher than the interest rate, the borrowing country would benefit from debt (Eaton, 1993). The debtors need to maintain their reputation to continue borrowing to finance their public spending and investment (Bulow and Rogoff, 1989). With the assumption that the government makes the fiscal deficit by decreasing tax revenue and the remaining constant level of public spending, Elmendorf and Mankiw (1999) argue that the economy in short-run is demand determined therefore if the government decides to reduce tax and keep the same amount of spending which means an increase in fiscal deficit and public debt, the aggregate demand will increase and

therefore economic output will rise. This mechanism happens because of in the short-run, wages and prices are sticky, a shift in aggregate demand will push the utilization of factors of production in the economy.

In principle, the governmental borrowings help to finance the public goods that will create more welfare and promote economic growth in short-run. There are three methods to finance the spending of government: taxation, debt, and printing money (Gill and Pinto, 2005). According to Gill and Pinto (2005), government debt may be the best choice for the government to facilitate growth improvement by investing in the vital mass of infrastructure projects when tax revenue is limited or when another alternative as printing money will lead to an inflation issue. Gill and Pinto (2005) also mention that the positive effect of public debt on growth only happens when governments do their role well, and the returns from public projects exceed the cost of borrowing.

From the above short part of the theoretical literature on the positive effect of public debt, we can conclude that the positive impact of public debt on economic growth is driven mainly by expansionary fiscal policy in the short run. On the other hand, the long-run effect on growth is entirely different when the level of public debt continues increasing to a high level over time. It can be seen that the level of public debt plays an important role in driving the impact of public debt on economic growth. However, the existing theoretical literature has not indicated which the threshold (turning point) that public debt impact would change the sign on economic growth from positive to negative. With the assumptions that marginal product of capital or returns from public projects exceeds interest rate or cost of borrowings, the theoretical literature argues that sovereign debt will promote economic growth.

2.1.2 Negative Impacts of Public Debt on Economic Growth

The following part will deal with the theoretical explanation of why public debt affects economic growth negatively by pointing out some different approaches.

First, to have details formulation representing the link of public debt to economic growth in long-run, this dissertation starts with a model built by Elmendorf and Mankiw (1999). According to Elmendorf and Mankiw, in the long-run, the price and wage are flexible. They define a mechanism through which fiscal deficit will have a negative effect on long-run output based on the private sector's budget constant and national output equation that is:

$$Y = C + S + T$$

$$Y = C + I + G + NX$$

In which Y denote national income; C private consumption; S private saving; T taxes less government transfer payments; I is domestic investment, G is government expenditure, NX is the net export of goods and service.

When combining both equations, they get: $S + (T-G) = I + NX$

Above equation states that total of private savings and public saving equals a total of investment and net exports.

In principle, national current account balance has to equal the negative of the capital account balance. The national current account balance is the sum of net exports plus net investment income by domestic investors and net transfers. However, the authors ignore the two last pieces since they are small. Then net exports are approximately equal to net foreign investment NFI which is calculated as an investment by domestic citizens in foreign countries minus domestic investment conducted by international citizens: NX = NFI.

Substituting NX = NFI into the third above equation: $S + (T-G) = I + NFI$

The left side of this equation represents national savings computed by total private savings and public savings, and the right side indicates the kinds of investment at home plus abroad. This equation can be considered as a representation of a market for loanable fund one is supply side; one is the demand side. If the government increase public debt by creating a fiscal deficit and decreasing public savings, the above equation may be satisfied by a decrease in domestic investment or net foreign investment. Both decreases in domestic investment and NFI will lower national output and income.

There are some other researchers have developed the theory about the negative link of public debt on growth through some other approaches. There are some critical issues to be considered: political economy considerations, uncertainty, and debt overhang theories. For example, to achieve debt sustainability Barro (1979) suggests that, the government needs to raise taxes because a high level of public debt can lead to higher cost of servicing debt and higher amounts of tax in the future to finance it. High debt causes the risk for investment because one part of future returns will be taxed to cover the cost of debt service. With the same point of view, Cordent (1989) supposes any activities related to cost in the future and require a part from output to service them will be discouraged because the money from investing will be taxed away by lenders. Besides, the investors are always afraid of the risk of default when the government does not have appropriate policies to control the level of public debt when it is so high. As a result of a reduction in investor's expectation, the volume of investment will be smaller; therefore, the economy will not have enough necessary resources to develop. Another implication is that it will be difficult for the government to conduct the macroeconomic policies or economic reforms due to high public debt, as it has to pay more attention to inhibit the increasing level of debt or debt repudiation. Poor macroeconomic policy environment will influence the efficiency of investment with a negative effect on economic growth.

Another explanation for the adverse effect of debt on the outcome of the economy is likely because of the unstable issues caused by high debt level. Amount of investment in the country depends much on the investment environments, in which investors see the risk and returns clearly. Once the investors realize the uncertainties of the place where they will invest, they will choose to continue keeping money with them rather than investing in that place (Serven, 1997). In the environment with high uncertainty, the investors prefer investing in the area with quick returns by trading activities rather than in the high-risk areas, long-term and irreversible investment. As a result of uncertainty, the misallocation of investment will happen with lowering efficiency in total capital accumulation. This reason suggests that high public debt level relates to low growth through the efficiency of investment and capital accumulation. Alestina and Tabellini (1989) argue that the over-borrowing can accompany low economic growth due to capital flight when the cost of high debt services cannot be internalized. A high accumulated external debt may lead to government instability in developing countries; then, capital flight is considered as insurance when the capitalists are facing the politico-economic uncertainties.

Debt overhang theory is one of the important explanations which describe the adverse effect of a high level of public debt on economic growth. Debt overhang theory focuses on two main aspects: investment and fiscal policies. First, a large number of debt stocks would lower economic growth by reducing the investment channel. Since public debt may be higher than the repaying ability of the country in the future, the country has to spend a prominent part of the output to finance the debt services. Moreover, the return from investing has to confront with investment and then lower economic growth (Krugman, 1988). Investment is the primary channel in the debt overhang theories which focuses on the impacts of high public debt level on economic growth. The explanation argues that in the future, debt is likely larger than the country's repayment, then the debt service will be an increasing part of its output level. A part

of investment returns will be taken way by increasing marginal tax by the external creditors. Therefore domestic and international investment is discouraged (Krugman, 1988; Sachs, 1989). Also, the debt overhang theory which focuses on the fiscal aspects of the fundamental problem of debt. With the heavy accumulated debt stocks, there is a general expectation that the government will have to spend more on debt service. Therefore, the share of productive public investment will be reduced, or the government has to choose to increase some kinds of tax rate like inflation tax, for instance (Agénor and Montiel, 1996). In general, public debt may influence economic growth through investment volume or the effectiveness of investment including the government investment and private investment from both domestic and foreign investors.

In general, public debt affects the long-run economic growth negatively through some channels such as investment and uncertainty, political considerations. Many researchers have pointed out the logic of this problem but have not yet identified how high public debt it is. If public debt continues to rise to the point where the government is not able to pay back its debt, the government is facing a debt overhang problem. In this case, the high probability of default will be seen clearly as a harm factor to the economy; capital flight problem may happen.

2.1.3 Non-linear Impacts of Public Debt on Economic Growth

There is a small part of theoretical literature arguing that public debt has non-linear effects on the economy when combining the elements of positive and negative impacts. In these explanations, the main channel through which debt has a nonlinear relationship with growth is investment. Besides, productivity may adjust these nonlinear effects. Cohen (Cohen and Sachs, 1986; Cohen, 1991; Cohen, 1992) suggests an endogenous growth model in which capital accumulation plays a vital role in driving economic growth. According to Cohen, at the low level of public debt, the country has more opportunities to access the capital flow from

domestic investors as well as an international financial market due to low risk of debt reputation. These changes lead to economic growth to become higher because the country has capital sources from borrowing to invest. After a period of favorable borrowing, the country's economic growth will be lower due to the cost of debt service is increasing significantly. However, the country can still control the reduction of growth or even make it higher by stopping borrowing from the international market. If the country is not able to have a better ability to have an optimal rescheduling policy, debt overhang effects will influence negatively on growth. Moreover, the high level of public debt is related to the problem of capital flight (Calvo, 1998). In the relationship between debt and economic growth, higher debt creates the tax burden to the country, and if the economy cannot grow fast to get enough resources to repay a certain amount of debt, the government needs to increase the level of debt. Due to these negative effects, return on investment will be lower, and thus the investors will become hesitant to invest in the heavily indebted country.

Finally, the nonlinear impact of public debt level on economic growth can be explained by the models of debt inverted U-shape curve. The debt inverted U-shape curve can better explain the causal relationship between public debt and economic growth (Pattillo, Poirson, and Ricci, 2002). The debt inverted U-shape curve argues that on the left or "good" side of the curve, along with an increase in the face value of debt service, there is also an increase in debt repayment. On the other hand, on the right or wrong side of the curve, with a higher face value, high debt will lead to a reduction in expected repayment. The peak of the curve is the critical point where debt stock can have a negative effect on investment, and productivity, which requires the larger cost to trade off with future benefits. This point may also indicate the level of debt stock at which public debt starts to have a negative effect on growth. Again, the level of public debt may have nonlinear effects on growth under the view of the debt inverted U-shape curve, in which higher debt services will be financed by the distorted taxation which will

hinder the investment environment, with lower efficiency and productivity. This theory may be advanced when combining the positive effect and adverse effect of public debt on economic growth, but it does not show the method to identify the threshold which debt impact would change the direction from positive to negative.

Overall, we can conclude that public debt level is the central matter when considering its impact on economic growth. At first, a low and reasonable level of public debt can create a good environment for further borrowing, and the government can conduct expansionary fiscal policy, increase public investment boost up the economic growth. However, the positive effect only happens when public spending from borrowing source is invested in productive activities, and its return is higher than its borrowing cost. On the other hand, when public debt continues rising to a certain level that needs to be paid attention due to its negative effect on growth. When the level of public debt reaches a particular high level to affect the instability and risk of default of government, the investment into that country will fall, which in turn will reduce economic growth. Because of higher debt, the government has to pay the higher cost; the expected tax will increase, investors hesitate to invest in high debt countries. The country with a high level of debt may have a weak macroeconomic policy, under uncertainties which are explained by debt overhang theory and capital flight theory. Combining two elements of debt effect on growth, the debt inverted U-shape curve is a critical theory to explain the nonlinear effect of debt on growth. There is a crucial issue that the existing theoretical literature has not yet figured out the mechanism to identify the critical point of debt level. Long-run and short-run economy according to Elmendorf and Mankiw (1999) that is the flexibility of price and wage is decide the effect of public debt on growth; however, some neoclassical economists consider the level of public debt is key of matter which strongly affects investment and then drives economic growth.

2.2 Empirical Literature on the Impact of Public Debt on Economic Growth

2.2.1 General Literature Survey on the Impact of Public debt on Economic Growth

There are a large number of researchers who have studied the impact of public debt empirically. They use a variety of samples from developed economies, developing countries and low-income countries over different time periods. For example, Dreger and Reimers (2013), Checherita-Westphal and Rother (2012), Mencinger, Aristovnik, and Verbic (2014) use the data of European countries but through different periods; their findings are similar with each other that public debt has a non-linear effect on economic growth. Specifically, Dreger and Reimers (2013) collect data from 12 EURO members, Denmark, Sweden, the UK, Turkey, US, and Japan with a total of 18 countries. The research uses the panel regression and fixed effects model. Checherita-Westphal and Rother (2012) use a cross-sectional sample in 12 countries of EURO area over the periods of nearly 40 years (1970-2008) to test the relationship between the government debt and growth by using the quadratic equation based on debt. The critical estimation technique used in these studies is a fixed effects to reach unbiased results for linear and nonlinear models. Besides, the authors also use the system GMM, IV and 2-SLS as estimators for their research. Another important part of testing the effects of debt on growth is robustness checking by using the restricted samples and year dummies together with controlling the relevant variable such as private debt. The results show the channels through which the effects of public debt on growth are nonlinear are the total factor productivity, private saving, and public investment. The shape of the relationship between public debt and growth is inverted U-shape (concave) with the turning point around 90-100% of GDP. This threshold is the average for 12 countries and confidence area may go to a lower level as 60-70% of GDP. Similarly, Mencinger, Aristovnik, and Verbic (2014) address the question arising from the relationship between high public debt and growth. They use data set taken from 25 sovereign countries in the EU to discover the non-linear and concave effects of public debt on growth.

By dividing, the sample into two sub-groups: ‘old” members who joined the EU in the period of 1980-2010 and “new” members who were EU member states from 1995 to 2010. The authors apply the fixed effects panel regression to solve heterogeneity and endogeneity problems which cause the biases. The results show that the impacts of public debt are significantly non-linear on economic growth. Further, the authors suggest debt-to-GDP turning point where public debt starts to have negative effects on growth, is between 80-90% of GDP for “old” members and 50-54% of GDP for “new” members. The nonlinear effect of public debt on growth is also found in the study of Panizza and F. Presbitero (2014). However, there is no evidence of the causal effect on the growth of public debt after using robustness tests. They test the adverse causal effects of public debt on growth by using the instrumental variable approach and fixed effects for OECD countries. Finally, they conclude that impacts of debt on growth are not apparent and there is not enough evidence to drive to a conclusion about the causal link between public debt and growth or in other words this link does not exist.

Not only using samples from developed, but other researchers also use data from developing countries and find similar results. For details, in the study of Clements, Bhattacharya, and Nguyen (2003), the authors choose the relationship between the external debt and growth as well as the channels through which external debt influences GDP growth to study. They use data from 55 low-income countries from 1970 to 1999. The authors use two models to examine this relationship and find out the main channels through which debt influences growth. The models are fixed effects and system of the general method of moments (SGMM). The result gives some ideas to support the debt Laffer curve theory. If the debt level is lower than a specific threshold around 50% GDP for the face value of debt, 20-25% of GDP for net present value or 100-105% export for the present value of external debt, the growth will increase. However, if the debt level is higher than this threshold, the growth will be decreased. The research shows that the debt can influence growth through investment and efficiency of

resource use. Similarly, Pattillo, Poirson, and Ricci (2002) suggest the non-linear relationship between debt and growth with the Laffer curve. The authors use panel data of 93 developing countries over the period 1969-1998. The result is that the average impact and marginal impact of debt become negative at the specific thresholds. For example, the threshold is identified based on the percent of GDP and export around 35-40% and 160-170%, respectively. Moreover, in the end, the work also shows that investment is not the primary channel through which debt affects economic growth (Pattillo, Poirson, and Ricci, 2002). Poirson, Pattillo, and Ricci (2004) investigate the channels through which debt affect economic growth. Its results suggest that through factor accumulation and total factor productivity, the debt can influence growth indirectly. The data covers 61 developing countries from 1969 to 1998. The estimation methodologies are simple OLS, instrumental variables, fixed effects, differenced and system GMM to build up spline regression. On average, doubling the debt in the high debt countries will reduce the growth 1 percent point. In contrast, debt in low debt level countries tends to have positive impacts on total factor productivity and average negative effects on capital but not significant (Poirson, Pattillo, and Ricci, 2004).

The topic of public debt's effect on growth is also discussed under the perspective of multiple regimes by Kourtellos, Stengos, and Tan (2013). The research uses the data from 82 countries and a dataset of the 10-year period panel in 1980-1989, 1990-1999, and 2000-2009. Their empirical analysis adopts structural threshold regression (STR) and Solow growth model which includes variables such as population growth, average investment to GDP ratio, secondary schooling, and policy variables such as openness, inflation rate, and size of Government. The findings show that in countries with the Low-democracy regime, higher public debt leads to lower economic growth; in countries with the High-democracy regime, public debt does not have a significant effect on GDP growth (Kourtellos, Stengos, and Tan, 2013).

While using a mixed sample including developed countries and developing countries, other studies also find the non-linear impact of public debt on economic growth. For example, Reinhart and Rogoff (2010) examine the relationship between economic growth, inflation, and external debt in 44 countries (20 advanced economies and 24 emerging market economies) through the period of two hundred years. The research's finding shows that if public debt is higher than the threshold of 90% of GDP, there is a negative impact of debt on growth. However, when it is lower than the threshold, the relationship between debt and economic growth will be weak. This study focuses on the total public and external debt besides private debt. The dependent variables are economic growth and inflation. This result supports the idea of Debt Laffer curve theory. In additions, Kumar and Woo (2010) explore the impact of a high level of public debt on economic growth in the long–run. Data used in this paper is taken from developed and developing countries in nearly 40 years 1970-2007. The authors explore the non-linear relationship between government debt and growth, and the threshold level of public debt. Besides, this paper also discovers the channels through which debt's impact can be valid for economic growth. To check the robustness of results, the authors use the additional variables together with the primary variables such as real GPD per capita, initial government debt, log of average years of secondary schools in population, trade openness, the initial government consumption share, investment's relative price, inflation, fiscal deficit, population size, banking crisis. Kumar and Woo (2010) divide public debt into four levels: below 30% of GDP, from 30-60% of GDP, from 60-90% of GDP, and higher than 90% of GDP. The authors consider various estimations to test the relationship between debt and growth such as OLS, FE, robust regression between estimator (BE), and system GMM (SGMM). This paper solves the endogeneity problem by using lagged methods in first differences regression models by overlapping five-year periods. Running single cross-country regression is also helpful to evaluate the impact of debt on growth for more extended time periods. The findings of this

paper show that public debt and economic growth have a non-linear relationship: on average, a public debt per GDP ratio increase by 10 percent point leads to a decrease around 0.2 percentage point of economic growth per year. However, for the countries having a high level of public debt (over 90% of GDP), government debt has a significant adverse impact on real per capita GDP growth. This decline of economic growth may happen since higher initial debt causes lower investment and slowdown in productivity growth of labor.

2.2.2 Literature Survey on the Relationship between Public Debt and Economic Growth in ASEAN countries

Above part indicates some empirical literature on the topic of the impact of public debt on economic growth; generally, this part shows the existing empirical evidence from ASEAN countries on this issue. There are several studies on the relationship between public debt and economic growth taking a sample of ASEAN members both sample from single countries and a country group. For example, Lee and Ng (2015) study whether public debt influences economic growth in Malaysia from 1991 to 2013. They found that public debt and budget deficit have a negative and significant impact on economic growth through some channels such as public savings and decreased investment. On the other hand, Rahman (2012) uses quarterly data from 2000 to 2011 to examine the impact of the Malaysian government public debt on economic growth. His results reveal that in the long run, domestic public debt is not good for the level of economic growth, but external debt has no significant impact on changing GDP growth. The findings also indicate that in the short-run, both domestic and external debt has no significant influence on Malaysian economic growth. Mohd Daud, Admad, and Azman-Saini (2013) used the external debt data and economic growth of Malaysia from 1991 to 2009 to analyze the existence of a relationship between those variables. Their results show a non-linear correlation between external debt and improvement of economic growth. The threshold level for external debt is at RM 170,757 million, below this level, an increase in external debt is

associated with an improvement of economic growth. Even for one single country particularly Malaysia, the empirical study's results of the impact of public debt on economic growth are different from research to research, and not clear.

Using the data from other single countries, Patenio and Tan-Cruz (2007) examine the relationship between external debt service and economic growth from 1981 to 2005 in the Philippines. The study shows that external debt servicing does not affect very much economic growth since debt service payment in the Philippines is not that high for occurring debt overhang problem. However, Akram (2015) studies whether public debt holds back the economic growth of the Philippines. His findings show that public external debt has a negative correlation with GDP growth and investment; however, on the other hand, domestic debt has a negative correlation with investment but positive relationship with GDP growth. He recommended that the government should not see the positive effect of domestic public debt on economic growth as a good sign because of its consequences for the investment. The results of this study are not yet clear about the channel in which public debt exerts a positive influence on economic growth.

In additions, Azam, Emirullah, Prabhakar, and Khan (2013) analyze the impact of external public debt on the economic growth of Indonesia using time series data from 1980 to 2012. Their result indicates that external debt negatively affects economic growth while controlling the other variables such as exports, gross savings, infrastructure, and inflation rate. On the same direction of impact of external public debt on economic growth, Vileth (2016) investigates the effects of external debt and debt service on Lao PDR economic growth using the data from 1996 to 2015 in the paper "External Debt and Economic Growth: Case of Lao PDR." The finding reveals the negative impacts of external and debt service on GDP growth, but the effect sizes are different. External public debt and debt service in Laos have increased over time from 1996 to 2015, which affects economic growth slightly decreased in 2015.

To test the impact of external public debt on growth, another study of Ha and Oanh (2017) uses Vietnamese public debt quarterly data from 2000 to 2012. They found that external debt has non-linear (inverted U-shaped) correlation with economic growth with the threshold level of 28 percentage point of GDP. They suggest the Vietnam government should pay attention to the level of external debt and choose the new loans at low cost. The threshold of external debt should be considered since beyond 28% of quarterly GDP; the external debt is likely to have a negative impact on the GDP growth. In other direction, Van, and Sudhipongpracha (2015) study effect of government budget deficit on the economic growth of Vietnam between 1989 and 2011. Their findings reveal that the budget deficit has no direct impact on Vietnam economic growth and its productivity. In additions, foreign direct investment is a crucial factor in improving Vietnam economic productivity in the period from 1989 to 2011.

There are very few studies about the relationship between public debt and economic growth for the whole ASEAN region. Wibowo (2017) test the impact of public debt on economic growth. However, he used the data of only eight countries: Indonesia, Laos, Vietnam, Myanmar, Malaysia, Philippines, Thailand and Cambodia. His findings show the positive and significant effect of public debt on GDP growth, but that effect lasts for a few years. The data of public debt was taken from World Bank International Debt Statistics for gross public debt in general. Gross public debt is the sum of external public debt and domestic debt. Therefore, the effect of gross public debt may be the sum of the effect of external debt and domestic debt. The disadvantage of this study is that it does not classify kinds of public debt.

2.3 Summary of Literature Survey on Impact of Public debt on Economic Growth

Two following tables summarize the empirical literature around the link between public debt and economic growth. It is easy to be seen that most of the findings suggest the non-linear effects of public debt on economic growth when these studies focus on a wide range of

countries. The majority of empirical studies using data from developed countries are taking the total public debt to GDP as the variable representing public debt (Dreger and Reimers, 2013; Chechrita-Westphal and Rother, 2012; Mencinger, Aristovnik and Verbic, 2014; Cecchetti, Mohanty, and Zampolli, 2011; Reinhart and Rogoff, 2010; Kumar and Woo, 2010), and the majority of empirical literature which use data from developing economies are taking external debt to GDP as the main variable for public debt (Clements, Bhattacharya, and Nguyen, 2003; Pattillo, Poirson, and Ricci, 2002). There are very few studies taking into account the relationship between domestic public debt and economic growth due to limited data. When we investigate the impact of public debt on growth, the dissertation suggests that we should explicitly distinguish the kinds of debt to external public debt and domestic public debt since the effects of these kinds of debt on growth are different elements which may vary according to the economic conditions and other fundamentals. Empirical literature part, in general, indicates that public debt in single countries mostly has negative impacts on economic growth especially for ASEAN developing countries such as Malaysia, Philippines, Laos, and Vietnam. The main reason that the level of public debt in those countries is high enough to affect economic growth negatively. However, for the samples of wide range countries, public debt levels vary from country to country, from low level to high level; therefore, the impact of public debt on economic growth has U-inverted shape. A crucial thing to be considered when studying this topic is through which channel public debt affects economic growth. The rare empirical literature has used econometric techniques such as instrumental variable to examine the causal relationship between public debt and economic growth.

Table 2.1 Summary some empirical literature on the link of public debt on growth

Data Sample	The result of Empirical Study on the effect of public debt on economic growth			
	No effect	**Positive effect**	**Negative effect**	**Non-Linear effect**
Advanced Countries			1. Panizza and F. Presbitero (2014) use the OECD sample. They conclude that there is no evidence to confirm that debt has a causal effect on growth. The data used for debt is a debt to GDP ratio data.	1. Dreger and Reimers (2013) use debt to GDP ratio as a variable representing for Debt. They found that the threshold of nonlinearity depends on macroeconomic conditions. 2. Chechrita-Westphal and Rother (2012) argue that government debt to GDP has a non-linear relationship with growth through channels of private savings, public investment and total factor productivity. 3. Mencinger, Aristovnik, and Verbic (2014) use debt to GDP ratio in the sample of EU countries. The thresholds are different: 80% - 94% for old member states and 53% -54% new member states. (these results are fit with general theoretical assumptions of Elmendorf and Mankiw 1999) 4. Cecchetti, Mohanty, and Zampolli (2011) use data of18 OECD countries from 1980 to 2010 to find the nonlinear effect of debt on growth with thresholds for each kind of debt: government debt (92% - 99%), private debt, corporate debt, and household debt.
Developing - Low-Income Countries				1. Clements, Bhattacharya, and Nguyen (2003) examine the link between external debt with growth. Channels are investment and efficiency of resource use. 2. Pattillo, Poirson, and Ricci (2002): investigate the impact of external debt on growth in developing countries. High debt appears to reduce growth mainly by lowering the quality of investment 3. Poirson, Pattillo, and Ricci (2004) study what the channels through which external debt affects growth are. They find out the channels of capital accumulation and total factor productivity.
Mixed advanced and Developing Countries				1. Reinhart and Rogoff (2010) argue that the impact of debt is weak for the debt to GDP ratios below a threshold level of 90%. If debt ratios are higher than this level, median growth starts to fall by 1%, and average growth decreases considerably more. 2. Kumar and Woo (2010) argue that channel is private capital accumulation for emerging economies, for advanced countries, channels are private saving, investment.

Table 2.2 Summary empirical literature on the link of debt on growth in ASEAN

Data Sample	The result of Empirical Study on the effect of public debt on economic growth			
	No effect	**Positive effect**	**Negative effect**	**Non-Linear effect**
Malaysia			1. Lee and Ng (2015) test the impact of public debt and budget deficit on economic growth 2. Abd-Rahman (2012b) argue that domestic has a negative impact on growth in long-run	1. Mohd Daud, Admad, and Azman-Saini (2013) study the link of external debt with growth
Philippines			1. Patenio and Tan-Cruz (2007) study effect of external public debt service on growth 2. Akram (2015) examines the effect of external public debt and domestic public debt on growth.	
Indonesia			1. Azam, Emirullah, Prabhakar, and Khan (2013) investigate the effect of external debt on economic growth	
Vietnam	1. Van and Sudhipongpracha (2015) study effect of the deficit on growth			1. Ha and Oanh (2017) examine the impact of external debt on growth
Lao P.D.R			1. Vileth (2016) tests external public debt and debt service on economic growth	
ASEAN (Malaysia, Thailand, Indonesia, Vietnam, Laos, Philippines, Myanmar, Cambodia)		1. Muhammad (2017) investigate the impact of gross public debt on growth		

CHAPTER III ECONOMIC GROWTH AND PUBLIC DEBT IN ASEAN COUNTRIES

3.1 Diversity of the Economies and Public Debt Structures in ASEAN

3.1.1 Macroeconomic Overview of ASEAN Countries

The Association of Southeast Asian Nations (ASEAN) was established in 1967 in Bangkok – Thailand, initially including five countries: the Philippines, Malaysia, Indonesia, and Singapore. Since 1999, ASEAN has had ten members: Indonesia, Malaysia, the Philippines, Singapore, Thailand, Cambodia, Myanmar, Vietnam, Lao PDR, and Brunei Darussalam. The purposes of ASEAN are to maintain peace and stability in the region, to promote political, socio-cultural and economic cooperation, and to advance sustainable development. Most of the countries in the ASEAN region are developing countries; these countries need more intensive investment into infrastructure system. That is the main reason why over the past 30 years, the amount of public debt of all ASEAN countries rose dramatically (CIA, 2010). In December 2015, ASEAN Economic Community (AEC) was established, which opens a huge market of over 622 million people with a size of about USD 2.6 trillion, the seventh largest market in the world.

Table 3.1 shows the Gross National Income (GNI) per capita of all ASEAN countries in 2010 and 2016. In 2016, Singapore lead ASEAN countries with GNI per capita was 51,007 USD (constant 2010 USD), the second position in ASEAN belonged to Brunei. Cambodia and Myanmar are the two poorest countries; GNI per capita was just over one thousand USD in 2016 (World Bank, 2018). In 2010, Cambodia and Myanmar were in Low-income group of the World Bank; however, in 2016 they are out off this group. That is the reason they will not receive much financial support from international organizations as before.

Table 3.1: GNI per capita of ASEAN Countries

Country	GNI per capita, PPP (current international $)		GNI per capita (constant 2010 US$)		
	2010	2016	2010	2016	
Vietnam	4,150	6,040	1,260	1,658	Lower-middle-income
Cambodia	2,360	3,510	750	1,009	
Philippines	6,610	9,390	2,567	3,318	
Myanmar	3,650	5,530	987	>1,263 (2015)	
Indonesia	8,040	11,220	3,031	3,841	
Lao PDR	3,870	6,270	1,069	1,566	
Malaysia	20,020	26,900	8,783	10,727	Upper-middle-income
Thailand	12,660	16,070	4,863	5,592	
Singapore	70,240	85,020	46,305	51,007	High-income
Brunei Darussalam	78,340	83,010	35,010	33,401	

Source: World Bank, 2018

Table 3.2: Classification of ASEAN countries by GNI per capita

Lower – middle – income Economies ($1,006 to $3,955)	**Upper – middle – income Economies ($3, 956 to $12, 235)**	**High – income – Economies ($12, 236 or more)**
Cambodia, Lao PDR, Vietnam, Myanmar, Indonesia, The Philippines	Malaysia, Thailand	Brunei Darussalam, Singapore

Source: World Bank, 2018

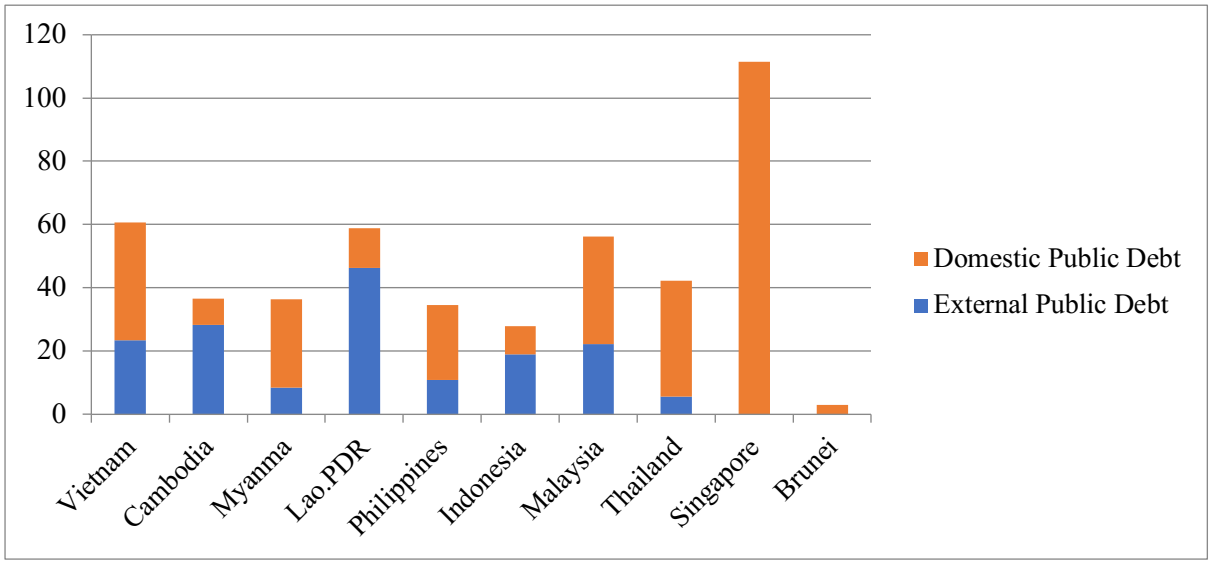
3.1.2 Public Debt Structure in Different Income Groups of ASEAN Countries

According to the classification criteria of the World Bank, and the data from Table 3.1 and Table 3.2, we can divide ASEAN into three groups: Lower-middle-income economies (Cambodia, Lao PDR, Vietnam, Myanmar, Indonesia, and the Philippines), Upper-middle-income economies (Malaysia and Thailand), and High-income-economies (Brunei and Singapore). Depending on the economic and political situation of each member country, the structure and level of public debt vary from country to country. Public debt in Southeast Asia is very diverse among member countries: Singapore and Brunei have only domestic public debt, while Cambodia's public debt almost is external public debt, and the rest of ASEAN having both types of debt: domestic and external public debt. In details, Singapore has no external public debt; the ratio of public debt to GDP is the highest level in ASEAN over 110% of GDP in 2016. Similarly, the external public debt was estimated to equal zero in Brunei Darussalam (IMF Article IV, 2017). Brunei has the lowest public debt to GDP ratio in ASEAN, over 3% of GDP in 2016. Singapore and Brunei are high-income countries having rich and prosperous domestic financial resources; therefore, they do not borrow from abroad and use internal resources for economic development. These countries do not want to be dominated by external sources, as well as they want to minimize the financial risk to their country. However, Singapore and Brunei have very different debt management policies. The risk of the high level of public debt in Singapore is approximately zero since assets back all its borrowings. Singapore government does not borrow to spend. Instead, it invests all borrowing proceeds.

Figure 3.1 shows that the debt structure in ASEAN country members is various, for example, Brunei Darussalam and Singapore have no external public debt while Cambodia has a large proportion as external public debt and a very small part as domestic debt, other countries have both external public debt and domestic debt. Therefore, the impact of public debt on each member country's economic development varies depending on the type of debt. Most of the

studies about the link between public debt and ASEAN country member's economic growth use the data of external debt, budget deficit, and gross public debt. There are two papers considering the impact of domestic debt on ASEAN member's economic growth in the long-run, and those effects are different depending on macroeconomic conditions.

Figure 3.1: Public debt structure of ASEAN members in 2016



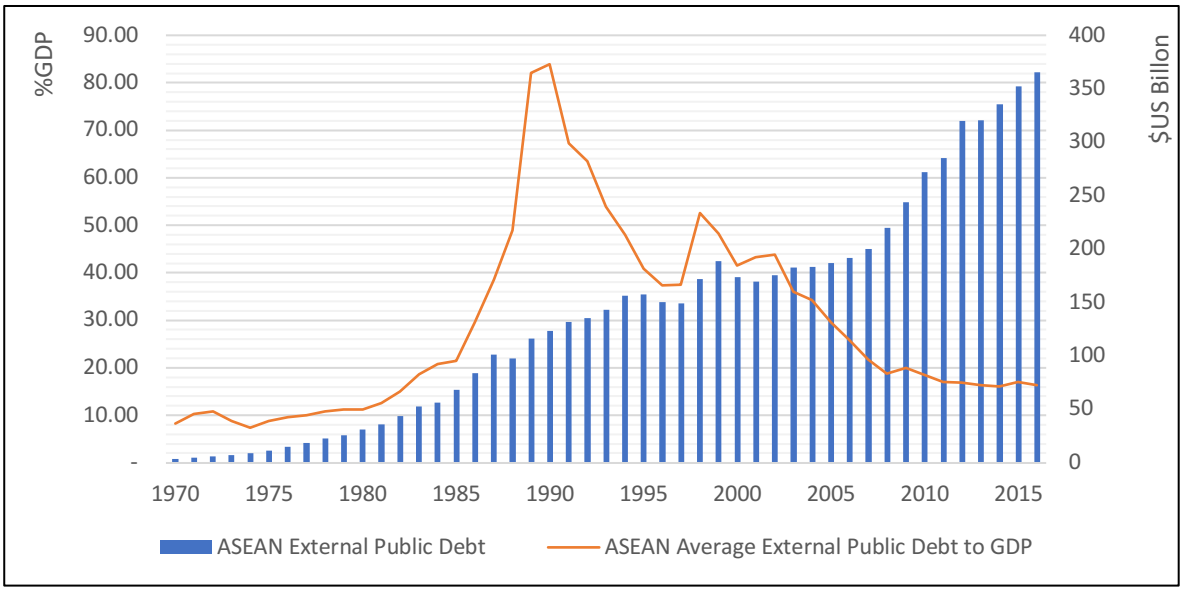
Source: IMF and World Bank, 2014

The total external public debt for all ASEAN countries has approximately equaled to total external public debt of eight countries shown by the following data in Figure 3.2 (not including Singapore and Brunei). Figure 3.2 reveals the level of external public debt to GDP ratio and the total amount of external public debt of ASEAN. The ratio of external public debt to GDP had increased over the period 1970-1990 and then decreased from 1990 to stable level on average around more than 16% GDP over 2011-2016. Although the external public debt to GDP has decreased, the total amount of external public debt increased regarding quantity. These opposite shifts indicate that the growth rate of external public debt is slower than economic growth.

Figure 3.3 shows the level of the gross government debt to GDP ratio of all ASEAN members from 1990 to 2016. Overall, public debt to GDP ratio of lower-middle-income and

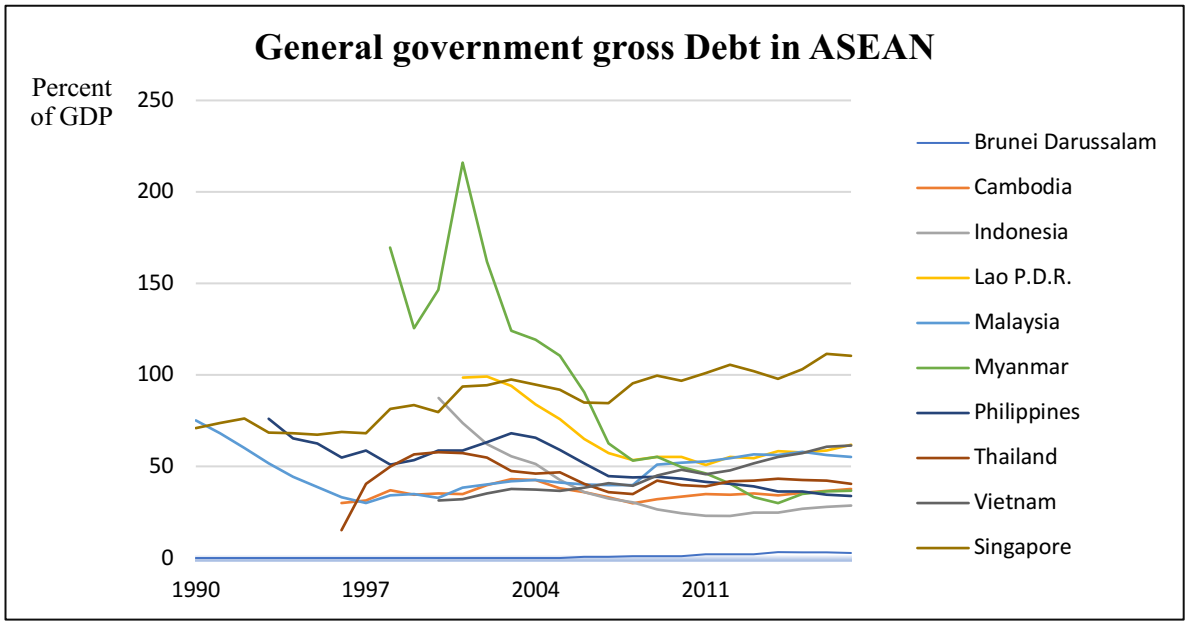
upper-middle-income countries had declined over the period 1990 to 2008, and then, have started rising from 2008 up to the present. Singapore has been the country which had the highest ratio of public debt to GDP in ASEAN, followed by Lao PDR, Vietnam, and Malaysia for recent years. The amount of gross public debt in general and external public debt increased significantly over 30 past years. Furthermore, the ratio of public debt to GDP rose in 2016 in comparing with data of gross public debt to GDP in 2015 except for Thailand and the Philippines.

Figure 3.2 External public debt of ASEAN



Source: World Bank, 2018

Figure 3.3 General government gross debt of ASEAN members in 1990-2016



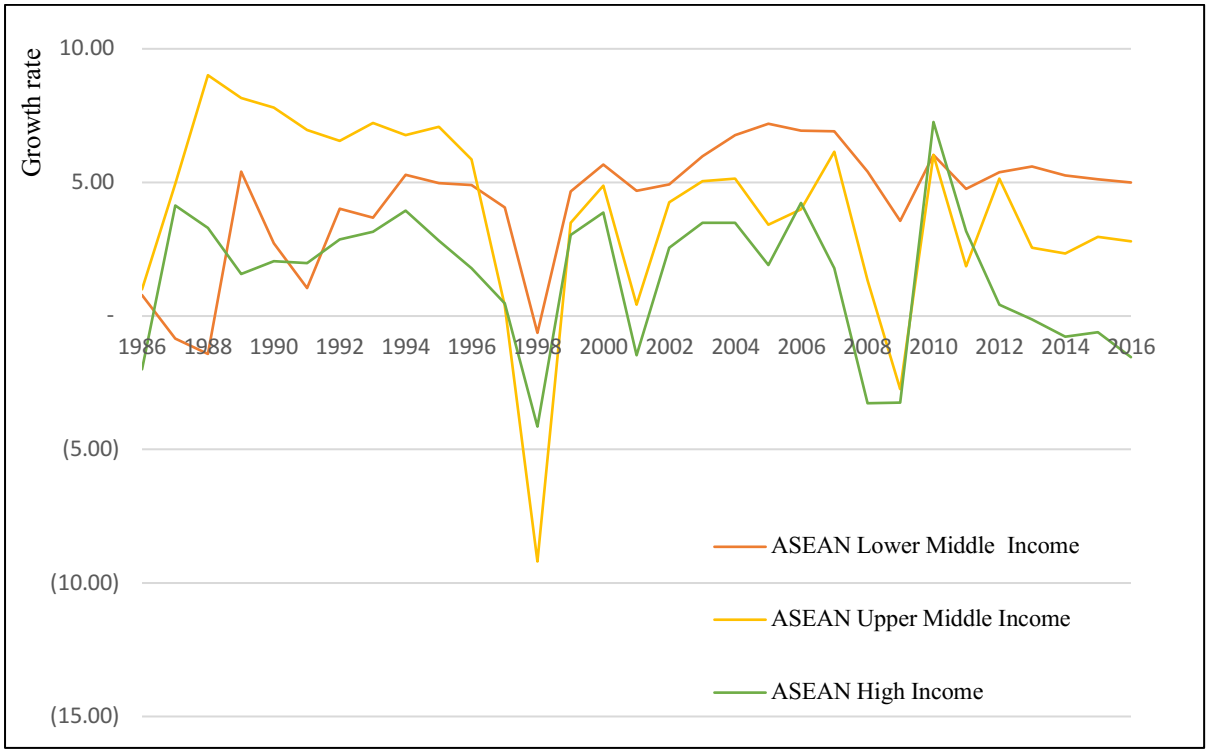
Source: World Bank, 2018

Table 3.3 GDP per capita growth rate of ASEAN countries

Country Name	1998	2009	2016	Average (1985-2016)
Vietnam	4.42	4.37	5.09	4.90
Cambodia	2.28	(1.40)	5.29	5.52
Lao PDR	2.07	5.76	5.53	4.37
Myanmar	4.48	9.84	4.91	5.88
Philippines	(2.74)	(0.46)	5.26	1.90
Indonesia	(14.35)	3.24	3.83	3.42
Malaysia	(9.66)	(4.27)	2.67	3.37
Thailand	(8.73)	(1.19)	2.93	4.20
Singapore	(5.49)	(3.56)	0.68	3.78
Brunei Darussalam	(2.80)	(2.92)	(3.77)	(1.05)

Source: World Bank, 2018

Figure 3.4 Average GDP per capita growth of ASEAN



Source: World Bank, 2018

Economic growth in ASEAN depends much on the global economic situation, especially the group of High-income countries and Upper-middle-income countries. Table 3.3 and Figure 3.4 show that four last countries: Vietnam, Laos, Cambodia, Myanmar (so-called VLCM) in the group of lower middle-income countries suffered from both the Asian financial crisis 1997-1998 and the global financial crisis 2008-2009 least. In 1998, the six countries in the ASEAN region had negative growth, while, only four other countries as Vietnam, Laos, Cambodia, and Myanmar (VLCM) positively growing. The global financial crisis strongly hit Upper-middle-income group (Thailand and Malaysia) and High-income group (Singapore and Brunei) due to a decrease in world demand and crude oil prices. Overall, the average economic growth rate in ASEAN over period 1985-2016 was high in comparing with other regions in the world, Myanmar had the highest average economic growth level about 5.88% per year, the second position in the ranking list belongs to Cambodia about 5.52% per year, and the third one belongs to Laos about 4.37% per year.

Some economic factors are affecting public debt as well as the growth of ASEAN countries such as trade balance, public investment, national savings, the budget deficit. These factors vary among ASEAN countries, which make a difference in the level of public debt and public debt management policies which are subject to the political system. The dissertation firstly describes some economic factors as above mentioned and then goes details in public debt management policies and national issues in each country in ASEAN.

The current account balance levels of different groups of countries are different. For example, high-income countries have the highest current account balances, followed by upper-middle-income countries, and lower-middle-income countries. Table 3.4 and Figure 3.5 show the level of the current account balance of ASEAN countries. Singapore and Brunei had the highest average level of the current account balance to GDP ratios over the 1985-2016 period: 14.9% and 33.55%, respectively. The countries in the lower-middle-income group had a

negative average level of the current account balance over the period of 1985-2016. High-income countries have large amounts of foreign currency from exports, so they do not have foreign borrowing needs. Net public investment in ASEAN countries is also different from country to country. Singapore has the lowest level of net investment to GDP ratio in non-financial assets in ASEAN. The VLCM group has a very high level of public investment since those countries are developing countries have just been out of low-income group recently; therefore, they need to invest a significant proportion of GDP into infrastructure system. Figure 3.6 reveals the level of net investment in non-financial assets of the public sector in several years. Though Malaysia is in Upper-middle-income group, net investment in non-financial assets to GDP ratio was high in comparing with Thailand, about more than 3.5% GDP in 2016. That may be the reason that the public debt level of Malaysia has been high in ASEAN recently. Besides, net investment in non-financial assets of the public sector, gross savings to GDP of ASEAN countries affects the level of public debt and economic growth. Figure 3.7 indicates the level of gross saving of ASEAN member in 1998, 2009, and 2015. Singapore and Brunei had the highest levels of gross savings to GDP ratio in ASEAN. The VLCM group had the lowest level of gross savings to GDP ratio. That can be the reason that the VLCM governments have to borrow to finance public spending and investment.

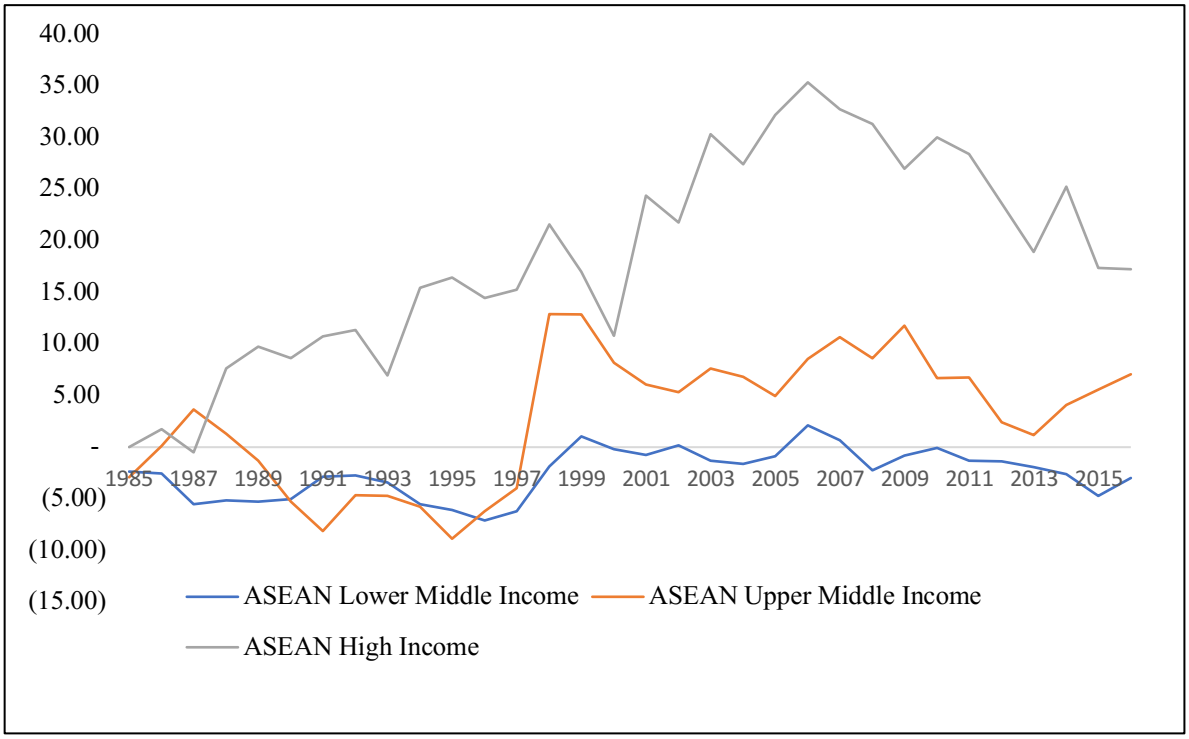
Figure 3.8 shows the net lending/net borrowing of ASEAN countries from 1996 to 2016. The net lending/net borrowing of the high-income countries has remained positive since 2003; most of the time, Brunei has been a lender, while Singapore has maintained its budget balance, at stable deficit level around 0%. In the upper-middle-income group, Thailand's budget deficit has been gradually improving since 2009, while Malaysia's deficit has been increasing since 2010. However, for the lower-middle-income countries, net lending/net borrowings level has remained negative for a long time, fluctuated in business cycles, and varied among countries.

Table 3.4 Current Account Balance to GDP ratio of ASEAN members

Country	1998	2009	2016	Average (1985-2016)
Vietnam	(3.95)	(6.23)	4.01	(1.31)
Cambodia	(5.56)	(7.13)	(8.87)	(5.92)
Lao PDR	(5.98)	(1.04)	(7.81)	(5.29)
Myanmar		2.67	(3.18)	0.53
Philippines	2.14	5.02	(0.39)	(0.10)
Indonesia	4.03	1.85	(1.80)	(0.37)
Malaysia	13.20	15.72	2.33	5.06
Thailand	12.53	7.88	11.85	0.64
Singapore	21.56	16.85	19.03	14.90
Brunei Darussalam		37.06	15.49	33.55

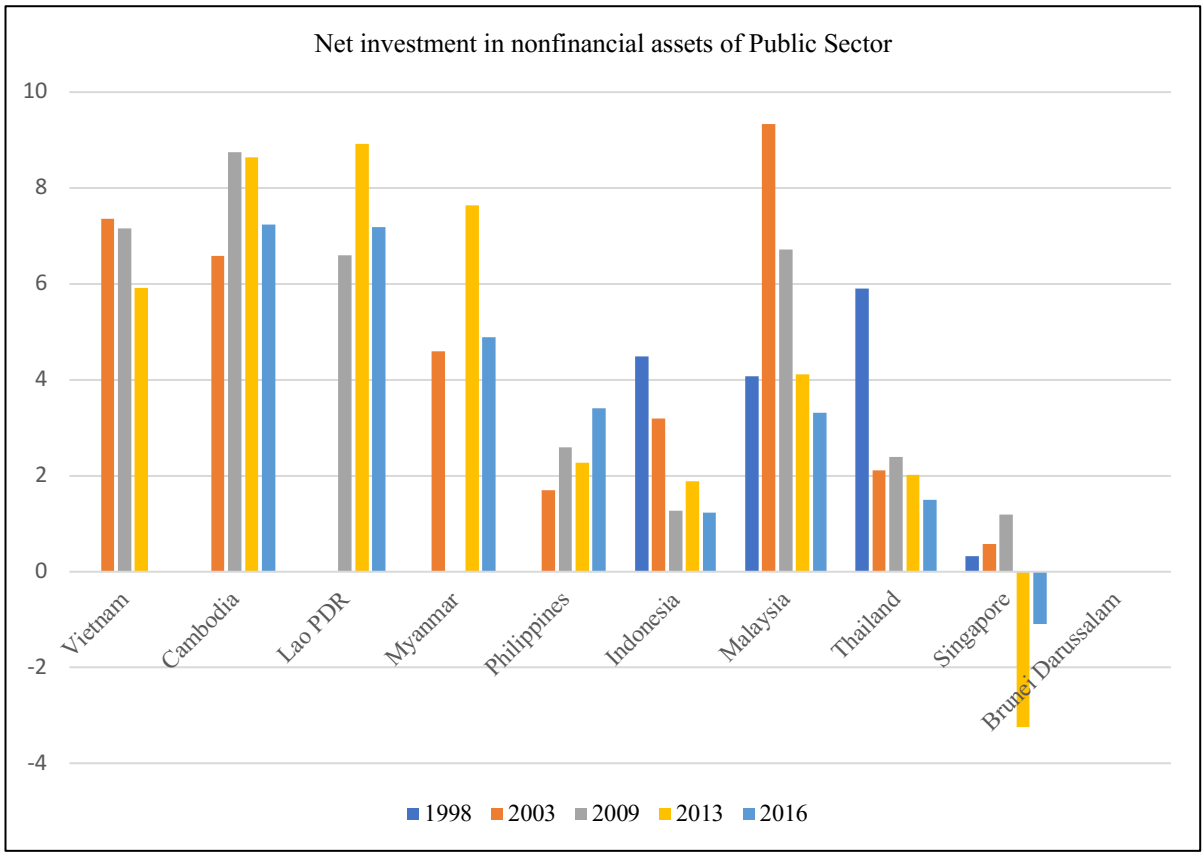
Source: World Bank, 2018

Figure 3.5 Current Account Balance to GDP ratio of ASEAN over 1985-2016



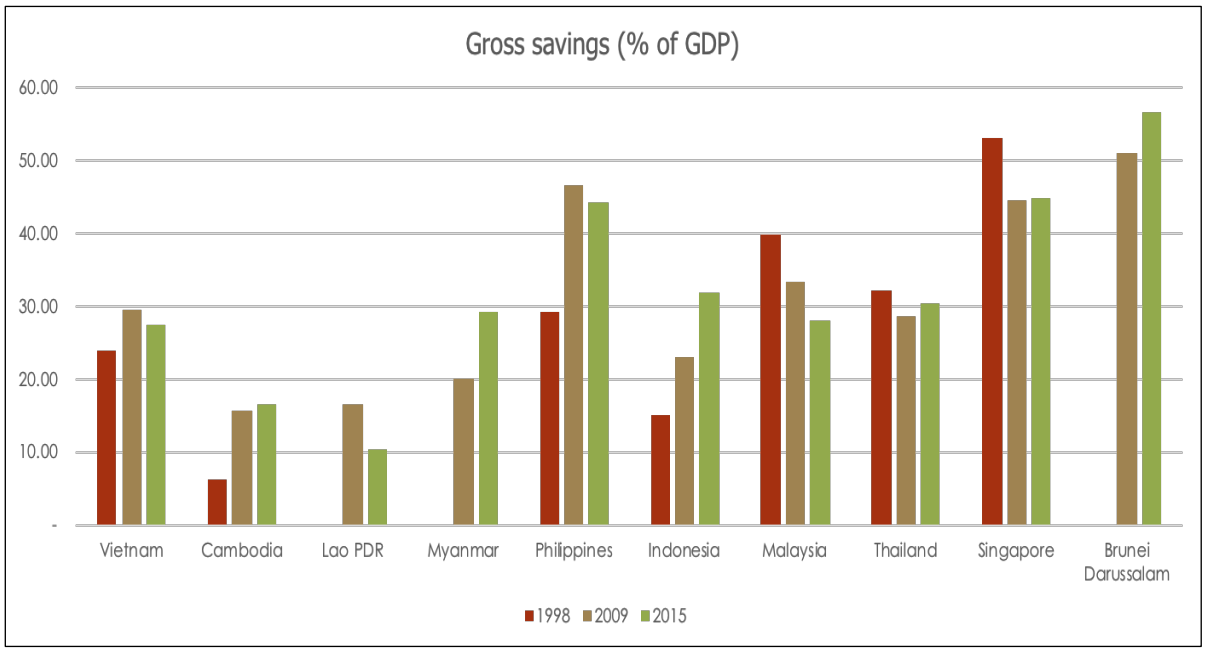
Source: World Bank, 2018

Figure 3.6 Net Investment in nonfinancial assets of the public sector of ASEAN members (In percent of GPD.



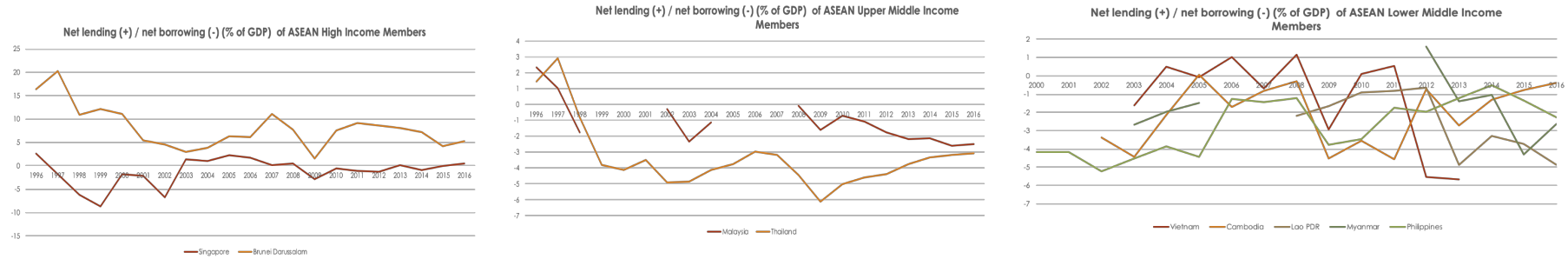
Source: World Bank, 2018

Figure 3.7 Gross savings to GDP ratio of ASEAN members



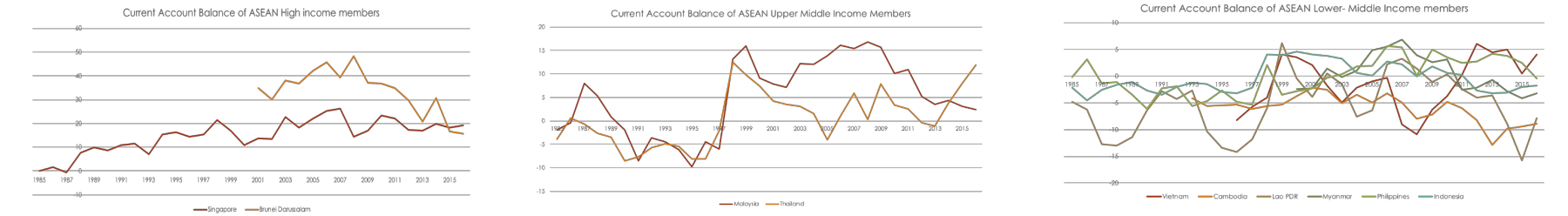
Source: World Bank, 2018

Figure 3.8 Net lending (+) / net borrowing (-) (% of GDP) of ASEAN members



Source: World Bank, 2018

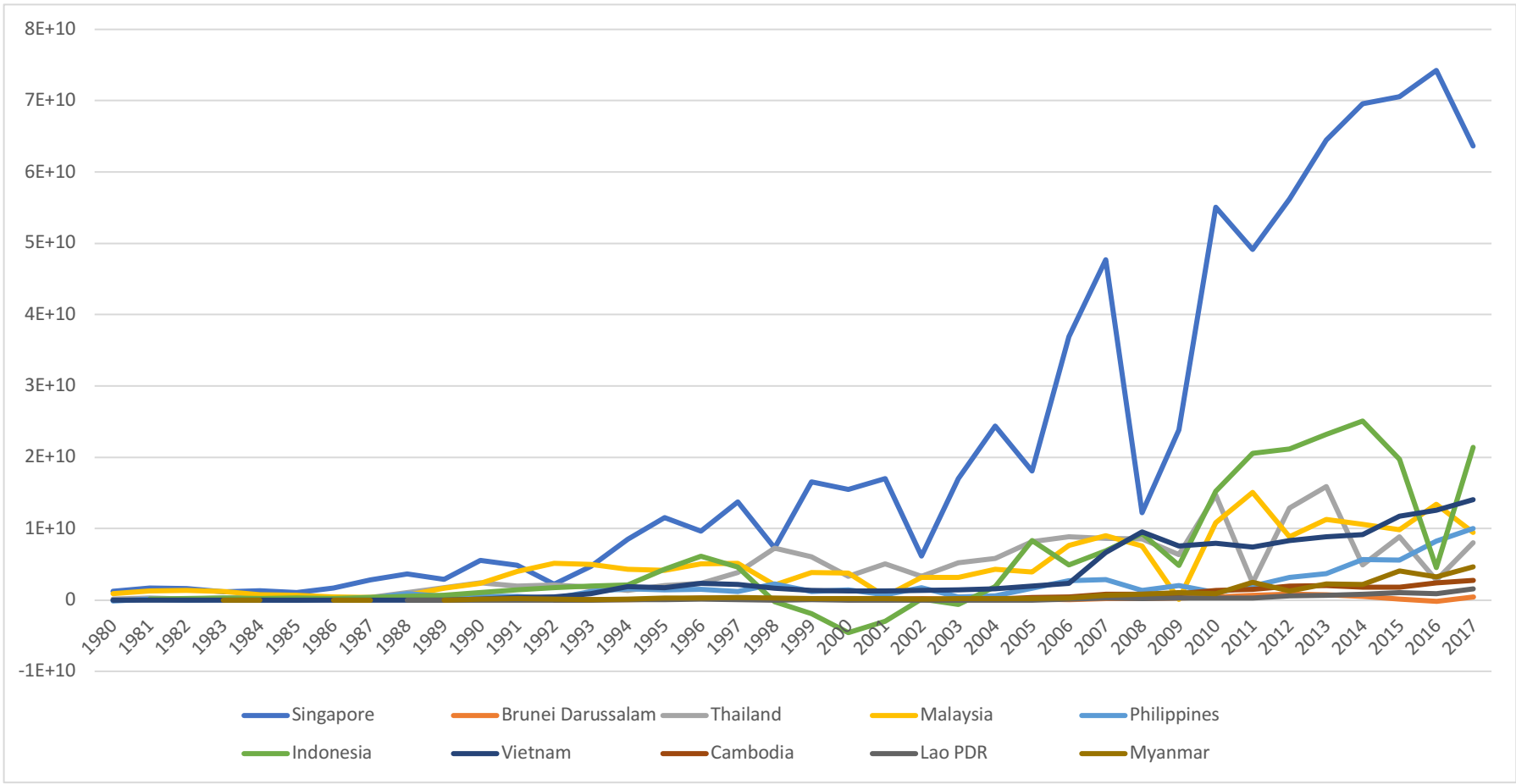
Figure 3.9 Current Account Balance of ASEAN members



Source: World Bank, 2018

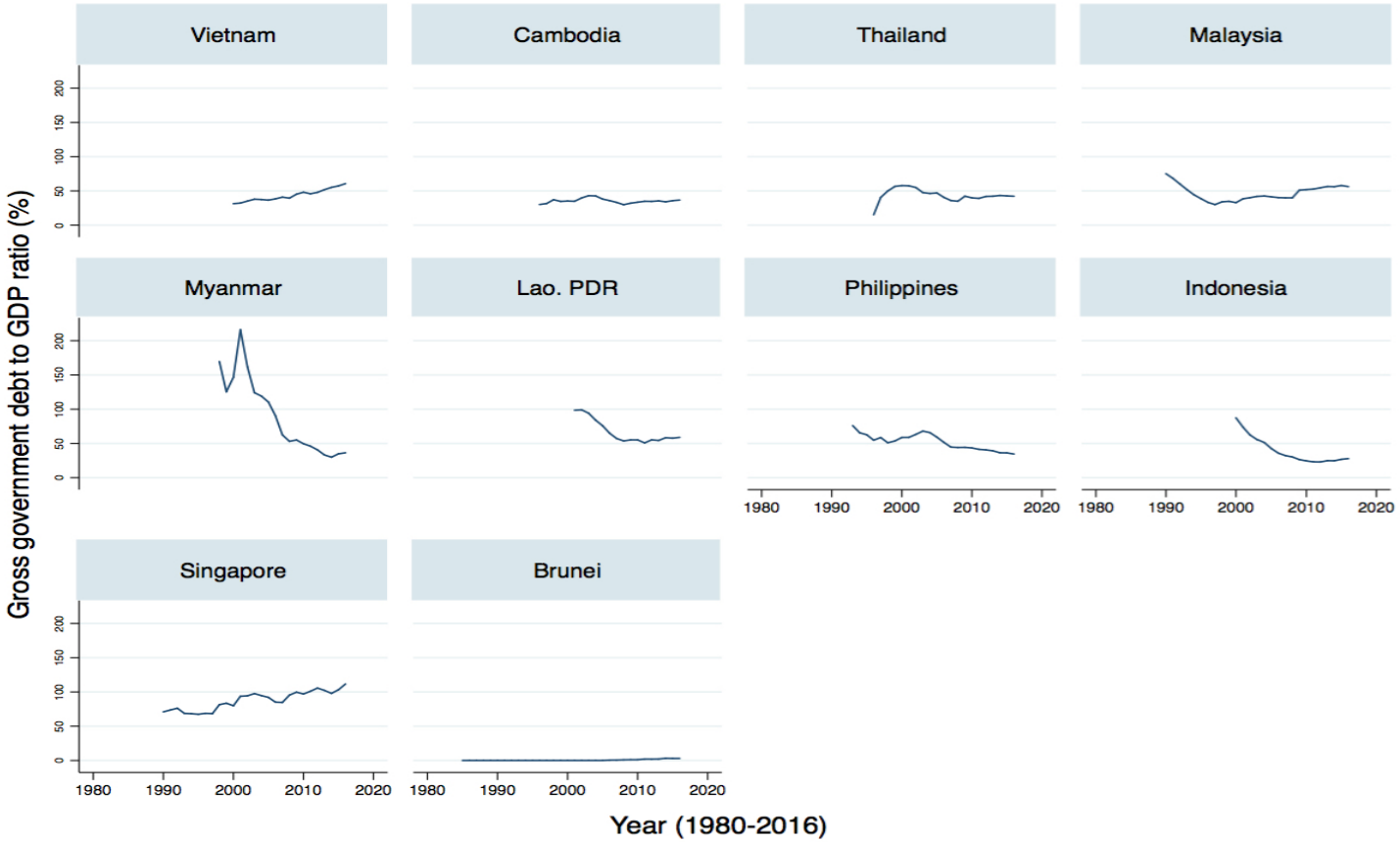
Figure 3.9 indicates current account balance of ASEAN group members. High-income countries (Singapore and Brunei) have the positive and high current account balance ,while lower-middle-income countries including Vietnam, Laos, Myanmar, Cambodia, Philippines, and Indonesia have negative and low current account balance to GDP ratio. The upper-middle-income countries had a negative current account balance in the 1990s, and after the Asian financial crisis, the economies started development making these countries become exporting countries.

Figure 3.10 FDI net inflow of ASEAN members from 1980 to 2017



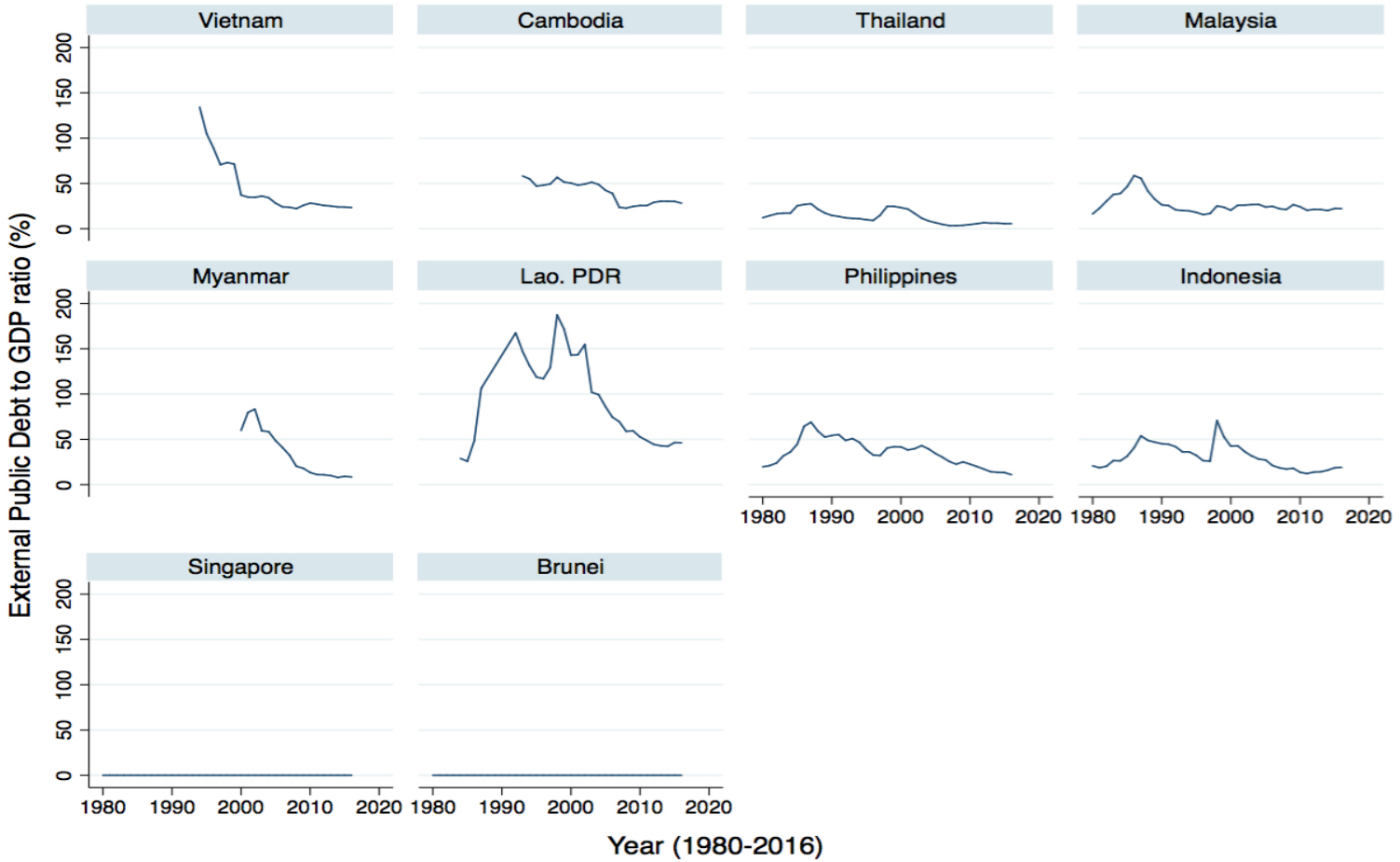
Source: World Bank, 2019

Figure 3.11 Gross public debt to GDP ratio of ASEAN countries



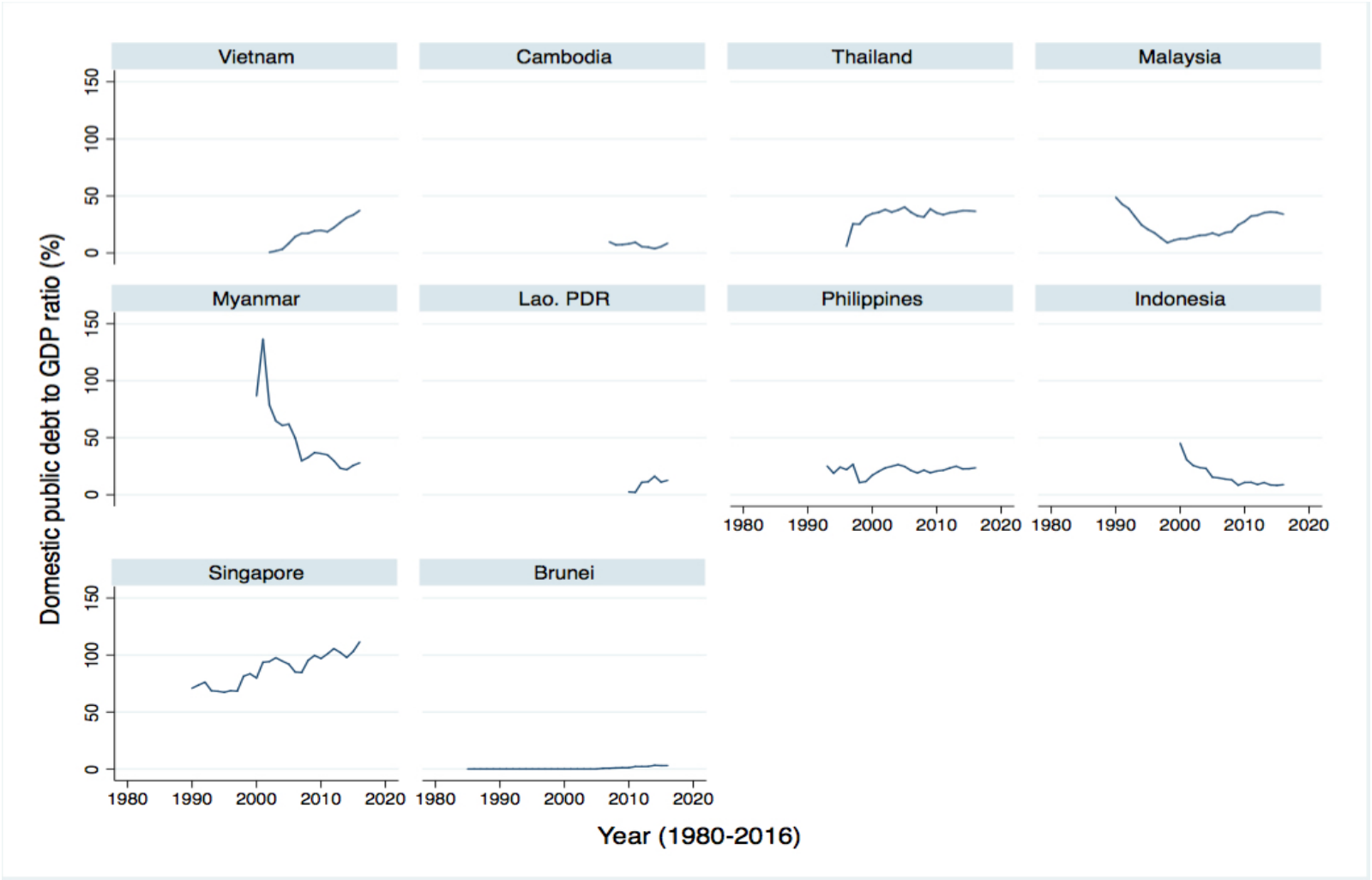
Source: IMF, 2018

Figure 3.12 External public debt to GDP ratio of ASEAN countries



Source: World Bank, 2018

Figure 3.13 Domestic public debt to GDP ratio of ASEAN countries



Source: Author calculated

Figure 3.10 indicates FDI inflow of ASEAN countries from 1980 to 2017. In general, FDI net inflow to these countries gradually has increased since 1980 except some crisis periods such as the Asian financial crisis 1997-1998 and global financial crisis 2008-2009. Singapore has the highest level of FDI even though this country had the smallest amount of population in comparing with other countries in ASEAN. Laos, Myanmar, Cambodia, and Brunei have the lowest level of FDI due to lack of infrastructure and strong fundamentals supporting investment.

Figure 3.11, Figure 3.12, and Figure 3.13 show the ratios of DEBT to GDP of ASEAN countries over 1980s-2010s. Overall, the public debt of high-income countries is from a domestic source, to promote the domestic capital market. Middle-income countries including Thailand and Malaysia have stable trends of borrowings especially external borrowing. Rest of ASEAN including lower-middle-income countries, the borrowings from the international market has been decreasing because of the development of the domestic capital market and reduction of external risks.

3.2 Economic Conditions and Public Debt Structures of Each ASEAN Country

3.2.1 Lao People's Democratic Republic

Lao PDR is presently one of the lower-middle-income countries in Asia. Laos and Vietnam are two of few countries in the world having one-party communist states. The economy began decentralizing control and promoting private enterprise in 1986; its GDP growth rate has been highest in Asia, averaging about 7.7% per year for the last decade. However, Laos remains a nation with underdeveloped infrastructure, especially in rural areas, limited land-line telecommunications. In 2016, agriculture accounts for about 20% of GDP but employs 73% of the total labor force. The unemployment rate was at a low level according to

The World Factbook 2018, about 1.55 in 2016. On the other hand, 22% of the population is below the poverty line, a high level in ASEAN.

The budget deficit of the Laos government was high at 5.6% of GDP in 2017. The public debt policy performance of Lao PDR has risen from moderate to the category which raises the risk of debt concern (IMF Article IV, 2017). The ratios of external public debt and publically guaranteed (PPG) debt to GDP were significantly higher compared to other lower-middle-income countries in Asia. Both domestic public debt and external public debt rose significantly over the past 30 years. The public debt level of Laos has been breaching indicative benchmark for some years. The PPG debt ratio reached 65.8 percentage points of GDP at the end of the year 2015 higher than 62.5 percent at the end of 2013. The increase in public debt of Laos is due to an increase in domestic debt which was issued in bills and bonds, higher borrowings from China and Thailand which was invested into power generation projects and the sovereign bonds which were issued in Thai market. Most of the public debt was issued in foreign currencies especially in US dollar. Therefore, the vulnerability of public debt highly depends on the exchange rate depreciation. In particular, domestic debt increased from 11.6 percent of GDP in 2013 to 14.1% of GDP at the end of 2015. Most of government borrowing was spent on big public infrastructure projects. Hydropower and mining projects have been financed by external public debt. However, the returns from these projects will help reduce the risk of debt burden in the long run. The share of domestic public debt in total public debt in Laos remains relatively low due to high-interest cost. Domestic public debt consists of bonds and lendings to local government to finance infrastructure projects in the past. As the domestic financial market develops, the share of domestic public debt is likely to rise.

In 2016, compensation in the public sector increased sharply, which led to a sharp increase in government expenditures and fiscal deficit. In FY 2015, the Lao PDR government tried to contain wage bill and reduce spending on capital projects. According to IMF Article

IV (2017), the public debt to GDP ratio under pressure of external economic shocks, higher borrowing cost, and currency devaluation. The government is attempting to maintain macroeconomic stability by improving domestic revenue collection, controlling public debt level.

3.2.2 Vietnam

Vietnam has started transforming since 1986, from a highly agrarian and centrally planned economy to a more industrial and market-based economy. Vietnam's economy has developed from one of the poorest nations in the world to a lower-middle-income economy (World Bank, 2018). Vietnamese per capita income has risen significantly since "Doimoi-1986", its GDP growth rate reached 6.8% in 2017 due to the increase in domestic demand, and exports. A large part of the population reside in rural, 40.3% of the labor force are working in agriculture, the unemployment rate was at 2.2% in 2017, a low level in comparing with other countries in ASEAN, only 8% of Vietnam population is below the poverty line. Vietnam has a stable political system, a young population, strong FDI inflows, stable currency, and relatively low inflation rate. Vietnam government is actively taking part in global economic integration while acknowledging the need for reforming state-owned-enterprises, increasing business transparency, reducing non-performing loans level in the banking sector (The World Factbook, 2018). Vietnam has experienced rapid demographic and social change, increasing population reached 97 million in 2018 from 60 million in 1986. However, the population is aging rapidly, the middle class is accounting for 13% of the total population, and expected to reach 26% by 2026. Vietnam is ranked 48 out of 157 nations in the world in term of the human capital index, second in ASEAN just behind Singapore. Vietnam is a more educated and healthy society than 30 years ago, and learning outcomes are high achieved in primary school where the performance of student exceeds that of many OECD countries (World Bank, 2018). Infrastructure system in Vietnam has improved dramatically. In 2016, 99% of the population

used electricity for daily life such as lighting up, up from 15% in 1993. Rural access to clean water has improved to 70% in 2016 from 17% in 1993, while those in urban areas is above 95%. These changes created a fundamental for increasing FDI inflow to Vietnam.

Vietnam has just been in the World Bank's group of lower-middle-income economies since 2009. Through the period from 1990 to 2016, the total debt of Vietnam had increased significantly reached 62.4 percent of GDP in 2016 (IMF Article IV, 2017). This rise was reflecting on the previous primary deficit, easy fiscal stance, and the output gap. Vietnam has run a deficit to stimulate growth. The budget deficit has continuously been high over the last decade in comparing to that of the previous period. Government expenditure in the certain period has helped to increase the aggregate demand of the economy, boost the economic growth in Vietnam. However, when government spending exceeds a particular threshold, it will hinder economic growth because of ineffective resource allocation, private sector crowding-out, and corruption. In Vietnam, government spending increased from 22% in 1990 to more than 30% GDP in 2010. The percentage of investment expenditure in total public expenditure was quite low, dropping from 30.2% in 2003 to 22.0% in 2011 (Vietnam General Statistics Office, 2017). Public investment and SOE's investment mayan have an impact on public debt through several channels: (i) government borrowings for investment, (ii) SOE's loan publicly guaranteed, (iii) local authorities' loans. Public investment spreads across a variety of areas, for example, national security and defense, health, education, mining, entertainment industry, and transportation such as roads, bridges, airports, seaports, etc. Public investment may crowd-in private investment in the economy and that is one of the sources of economic growth. Presently, the public debt level in Vietnam has been lower than the maximum level of 65 percent of GDP that the National Assembly has been imposed. Although external public debt and public debt have been under the thresholds which are prescribed by the Vietnamese government, the current government debt level has reached to the level that

requires attention since domestic debt has been increasing rapidly. The interest rate for domestic public debt was very high compared with external debt; that issue would lead to higher interest cost.

3.2.3 Myanmar

Myanmar has experienced some important changes over the past five decades. In the 1950s, Myanmar was the least developed countries, the average annual growth rate was about 6%. However, in the 1960s and 1970s, due to the military rule of economic management and the "Burmese Way to Socialism", the economy deteriorated, real GDP growth was 3% to 4% per year. The 1980s was the worst decade of economic development of Myanmar while the annual average growth rate was 1.9%. In 1988, a new regime came, and the "Burmese Way to Socialism" was abandoned, the "market-oriented" approach was adopted for Myanmar to become a modern country. In the first half of the 1990s, economic growth reached 6% per year. In the past, the economy mainly relied on agriculture which was shown by the share of agriculture in GDP of 47.9% GDP in 1938/39 and of 43.4% GDP in 2007. With nearly two-thirds of the population engaged in agriculture, this sector was the key to the economic growth of Myanmar. Recently, the share of industrial and services in total value added % of GDP has been improved sharply, reached more 35% and 39% GDP in 2016.

According to the World Bank, Cambodia and Myanmar have been off the group of low-income countries since 2015 in ASEAN (World Bank, 2017). Myanmar has currently been one of the fastest growing economies in the ASEAN; the GDP growth rate was 7.3% in 2015 and 6.4% in 2016 (The World Bank, 2018). Poverty situation in Myanmar has declined from 44.5% in 2004 to 25.6% in 2016 which is still high in comparing with other countries in the region. The country needs much support from international organizations and foreign countries to develop infrastructure. In Myanmar, some necessary infrastructure and services remain a

challenge to access in both rural and urban areas. Myanmar is one of the world top countries influenced by global climate changing and natural disaster such as floods, cyclones, earthquakes, landslides. Public sector deficit of 2016 increased to 3.2% of GDP from 1.1% in 2015; the government is trying to cut spending and maintain support to priority public services such as education and health. The public debt of Myanmar in the fiscal year 2015-2016 was about 34.1 percent of GDP, in which domestic debt accounted for 18.1 percent of GDP and external debt accounted for 16 percent of GDP (IMF Article IV, 2017). The public debt of Myanmar remains low in comparing with some other regional countries. Myanmar government has been undertaking a policy to keep the level of deficit lower than 5 percent of GDP per year to maintain debt sustainability. Also, the Myanmar government has just adopted Public Debt Law in 2016 to strengthen public debt management.

3.2.4 Cambodia

Cambodia is one of the low-middle-income economies in Asia which has experienced robust economic growth over the last few decades about 8% on average over the period 2000-2010, and about 7% since 2011(World Bank, 2017). The economic growth has been supported by a market-oriented economy as well as the young population. Cambodia economy growth mainly depends on tourism, garment, construction, and agriculture sectors. Textile exports accounted for 68% of total export in 2017 to the main markets such as the United States and the European Union. The economy deeply relies on textile sectors which brings vulnerability to the economy; the current account deficit was about 9% of GDP in 2016. Cambodia is one of the poorest nations in ASEAN; long-term economic developing is facing various challenges such as corruption, limited human resource, large inequality in income, and limited jobs. The unemployment rate was at a low level of around 0.3% in 2017, but 16.5% population live below the poverty line (The World Factbook, 2018). Cambodia's transition from the low-income country will reduce the eligibility for international assistance and will challenge the

government to find other finance sources for development. Cambodia is a small and open economy. Infrastructure gaps between Cambodia and other developing countries remain high, especially in health education, electricity, and road infrastructure. To have enough financial source to fill in the public investment in infrastructure projects, the government is planning to increase the share of PPPs in these projects. This plan aims to limit fiscal cost and keep its government debt low.

Public debt in Cambodia has been at a low level of debt distress risk in recent years. In Cambodia, domestic debt currently remains at a negligible level, just a small amount of bonds that were issued in the early 2000s and some administrative claims with no interest. Ministry of Economy and Finance has established one specific department to manage the public debt issue with the level of liabilities and risks. The Cambodian authorities assert that over the medium term, they will maintain the ratio of debt to GDP below 30%. The total external public debt of Cambodia in 2016 was 31.9% GDP in which 10.3% GDP was multilateral debt, and 21.7% GDP was bilateral debt, mainly from China (IMF Article IV, 2017). China is the largest bilateral creditor, accounting for 70% of total bilateral debt stock which includes debt from Russia and the US. The Cambodian government will start issuing domestic government bonds from 2022, to provide additional fiscal financing for public spending. Most of change in public sector debt was contributed by primary deficit and automatic debt dynamics including two parts: contribution from interest rate/growth differential and contribution from real exchange rate depreciation and residual including asset changes. Primary deficit is the difference between gross revenue and expenditure including expense and net acquisition of nonfinancial assets.

3.2.5 Philippines

From 1965 to 1986, the public debt of the Philippine was increasing to a very high level due to domestic expansion and reforms. The fiscal expansion policies led to increases in current

account deficit and balance of payment problem. External public debt of the Philippines rose from $360 million to $26.2 billion by the end of 1985. The increasing public investment crowded in private investment, economic performance was strong due to the rise of export. The main creditors of the Philippines were IMF and World Bank. By 1986, total external public debt to GDP had peaked at more than 60% GDP (World Bank, 2018). From 1986 to 1992, the new president of the Philippines tried to reduce to public debt level by the support of the US and the IMF. In the period of 1992 to 1998, president Ramos was able to uplift his economy by focusing on human capital and competitiveness. The annual average economic growth was high around 7% until the Asian financial crisis in 1997. Over the period of 1998-2010, the total amount of external public debt of the Philippines continuously increased by the weakening of the Pesco against the US dollar and government overspending. The government had the policy to control borrowing and increase revenue to improve the public debt issue in the Philippine by 2009.

The Philippines economy has recently been through a high rate growth period; the average rate was over 6% per year from 2011 to 2017. The country has a large proportion of remittances from more than 10 million overseas workers and migrants; therefore, the international reserves remain at a comfortable and stable level which creates good conditions for economic development. The Philippines government is expanding spendings in infrastructure programs and human capital development, conducting tax reform policies, improving the competitiveness of Filipino products on the world market. The unemployment rate remains at a high level about 5.5% in 2016 and 5.7% in 2017. Population proportion below the poverty line of Philippines was about 21.6% in 2017, more than 60% of the population live in rural area, that is a challenge for the Philippines government to raise rural resident incomes (The World Factbook, 2018). Though the Philippines is a lower-middle-income country of the World Bank's group, the public debt of the Philippines was at a moderate level. The efforts of

the Philippine government to improve tax administration and expenditure effectiveness have helped to ease its public debt burden and tight fiscal issue, the public debt level was 33.8% of GDP at the end of 2017 which decreased from 68 percent of GDP in 2003 since the economy developed rapidly and had some primary surpluses (IMF Article IV, 2017). Public debt in percent of GDP has been declining recently, which demonstrates that the government attempted to create fiscal space for financial priorities. In general, government debt in the Philippines has been at a sustainable level that would not bring much risk to the economy.

3.2.6 Indonesia

Indonesia is the largest economy in ASEAN; the economic growth rate has been slowdown since 2012 due to the decrease in exporting commodities. Indonesia's real GDP growth rate was approximately 5 % and 5.1% in 2016 and 2017, respectively. Indonesia has had a large amount of FDI inflow, which is the second place just after Singapore in ASEAN. Foreign investment has been stimulating economic growth through some main industries such as oil and mining industry, automotive industry, and the textile industry. Japan is the main export partner; after Japan, China became the second largest export destination in 2014. The US is also the main partner of Indonesia. Indonesia exports clothing, machinery, natural rubber, footwear, petroleum, and transportation equipment.

Indonesia had a high level of unemployment rate, about 5.6% in 2016. Indonesia is still struggling with poverty (population proportion below the poverty line is about 10.9%), inadequate infrastructure, corruption, and unequal resource distribution among its provinces (The World Factbook, 2018). Although the level of public debt is reducing sharply, Indonesia spends a small part of its expenditure on infrastructure and secondary school.

Indonesia's annual budget deficit was about 4.3 % of GDP in 2017 and the government has lowered its debt to GDP ratio from 100% after the 1999 Asian financial crisis to almost

30% today (The World Factbook, 2018). Since the Asian financial crisis 1997-1998, Indonesia's public finance has been transformed. As one of the important policies budget deficit was carefully controlled. In 2005, the government decided to cut fuel subsidies to have extra money for development spending. A reduced public debt level leads a declining debt service payments, more money for public investment to improve its public services.

Total central government debt of Indonesia at the end of 2016 was quite low around 28 percent of GDP reduced from 87 percent in 2000 (IMF Article IV). External debt amount has risen rapidly in the past five years. Also, both external debt and public debt were projected to rise slightly but remain at a reasonably low level. Indonesia has undertaken several reforms impressively over the last decade in public debt management by development and publication of debt management strategy and the establishment of Debt Management Office (DMO). This office manages all issues related to public debt in Indonesia and then recommend the necessary policies to control the debt level. Moreover, the Ministry of Finance and Bank Indonesia has promoted closer collaboration to control the official liquidity and loan cost to conduct better debt management.

3.2.7 Thailand

Thailand and Malaysia are only two upper-middle-income economies of ASEAN (World Bank, 2018). Thailand is the second-largest economy in ASEAN, after Indonesia in term of nominal GDP. Thailand's per capita GDP ranks in the middles of ASEAN, after Singapore, Brunei, and Malaysia. Thailand's economy has been stimulating by industries and services. Thailand is the ASEAN leader of automotive production, employing 417,000 workers, accounting for 10% of Thailand's GDP. Thailand's economy depends heavily on exports which accounts for about two-thirds of GDP. With the well-developed infrastructure and pro-investment policies, a free-enterprise economy, Thailand produces electronics,

agricultural commodities, processed foods, and automobiles and parts for export. The industry and service sectors produce approximately 90% of GDP, only 10% of GDP produced by the agricultural sector which employs about one-third of the labor force (The World Factbook, 2018). The unemployment rate of Thailand was lowest in ASEAN about 0.8% in 2016 and 0.7% in 2017. The real GDP growth rate of Thailand economy was 3.2% in 2016 and 3.7% in 2017. The budget deficit in 2017 was about -2.5% of GDP, that pushed the public debt level increased.

Public investment in Thailand started to increase sharply in 1957, mostly in infrastructure; then, Thailand enjoyed a period of rapid growth in 1958. From 1958 to 1984, Thailand experienced many serious problems such as the high budget deficit, decreasing foreign investment, inflation, and increased oil prices. The government tried to promote economic growth by encouraging exports and tourism. From 1985 to 1997, Thai baht was devalued which made Thailand's exports more competitive and Thailand became more attractive for FDI especially from Japan. Economic growth reached a peak of 13.3% in 1988. From 1987 to 1996, Thailand had current account deficit and shortage of capital. External borrowing increased sharply (66% of that was short-term debt). In 1997, Thailand could no longer protect its currency and decided to float it. To overcome the 1997 Asian financial crisis, Thailand accepted a loan from the IMF with several conditions which were cutting government spending and keeping high-interest rate. In 1999, Thailand had the first positive GDP growth since the crisis. After the crisis, Thailand experienced several changes in the political system and a serious flood in 2012. Since 2012, Thailand has planned to develop further the country's infrastructure such as the water-management system and logistics. The Thai government has issued the policy to keep the level of public debt under 50 percent of GDP, which is a stable threshold for the stability of the economy against potential shocks. The downward trend of GDP since the 2000s except for a substantial increase in FY2009, the lower government

revenue caused by a tax cut for fuel, the increased borrowing for water projects, and government guarantee for SOEs' loans have pushed up the level of public debt in FY 2016 to reach level of 42.2 percent of GDP (IMF Article IV, 2017). In general, the external public debt of Thailand has remained at a stable level under medium stress scenarios. The authorities have had balance the central government budget since 2018 and kept the level of public debt at an average level which is lower than 50 percent of GDP. A flexible macroeconomic policy of exchange rate and low public debt continue providing favorable conditions for economic development.

3.2.8 Malaysia

Malaysia is one of the two upper-middle-income countries in ASEAN (World Bank, 2017). Malaysia's economy has been transformed from a producing country of raw materials into a multi-sector emerging economy. Malaysia is now attempting to reach high-income position by 2020 and to promote further the value-added production by attracting more investment in high technology industries and services. Main exported products of Malaysia are electronics, oil, gas, and palm oil. These products also are the strong driver of the Malaysia economy. In 2015, the total amount of exports was approximately 73% of GDP. The real GDP growth rate in Malaysia was 4.2% and 5.4% in 2016 and 2017, respectively. Malaysia government aims to achieve a balanced budget by 2020 given its recent budget deficit was 2.9% in 2017 (The World Factbook, 2018).

In the mid-1980s, the Malaysian government focused on the development policies to stimulate its economic growth by the First Industrial Master Plan in ten years from 1985 to 1995 which was subjected to developing heavy industries mainly. However, these projects require high costs; the debt to GDP ratio had risen from 43% in 1980 to 101.7% in 1987. Another reason that Malaysian debt to GDP ratio peaked was due to the significant appreciation

of Yen and the denomination of a large proportion of external debt in Yen. From 1987, the Malaysia government operated a fiscal surplus for the period of 1993-1997; the ratio of debt to GDP reduced to 32% in 1997; the Malaysian economy enjoyed high economic growth. During the Asian financial crisis 1997-1998, the Malaysia currency depreciated, but the impact on the debt level is relatively tiny. That is due to the small portion of external public debt in comparison with domestic debt. After the Asian financial crisis, the total public debt amount has risen fivefold, from RM 112,119 billion in 1993 to RM 539,858 billion in 2013. Malaysia is currently the upper-middle-income country owning a high level of public debt which government debt to GDP was 56.6% in 2016, the third position in ASEAN. External public debt was accounted for more than 22% of GDP, while domestic public debt was about 34.05% GDP in 2016 (World Bank, 2018).

The infrastructure of Malaysia has been developed which ranked on top of Asia. The telecommunication network is the second developed in ASEAN, after Singapore. The country has 200 industrial parks along with many specialized parks. About 95% of the population can access fresh water. Energy production in Malaysia is mainly based on oil and gas. The transportation network of Malaysia is well developed in Asia with the comprehensive road network and railways. Malaysia has two ports which are ranked in the top 20 biggest ports in the world. FDI inflow into Malaysia has increased in term of amount along with the highly developed of infrastructure, in the top four in ASEAN for a long time and it has been slowing down recently.

The government of Malaysia sets up the limitation for the federal debt at 55 percent of GDP. Malaysia has been spending priorities to reduce the level of public debt gradually against the cases of declining revenues and increasing necessary spending. Government gross debt has sharply risen over the past years reflecting the primary deficit and deep falling of oil price. The debt borrowed by the SOEs has increased in recent years and was expected to increase in the

medium term. Total public debt of Malaysia was 56.6 percent of GDP in 2016; it was decreasing in comparing with 57.95 percent of GDP in 2015 (IMF Article IV, 2017).

3.2.9 Singapore

Singapore is a high-income economy which depends heavily on exporting electronics, petroleum products, medical and optical equipment, and on its vibrant transportation, financial sectors. Singapore economy contracted 0.6% in the year 2009 because of the global financial crisis but has continued to grow just years later, 2% in 2016 and 2.5% in 2017. The unemployment rate in Singapore is at a low level, approximately 2.1% in 2016 and 2.2% in 2017.

Singapore has not officially had external public debt, and total gross debt has been rising gradually and reached 113 percent of GDP in the fiscal year 2016 (IMF Article IV, 2017). Even though its public debt level is currently highest among ASEAN countries, the risk of debt unsustainability is quite low, compared to others in ASEAN since the gross government assets are more significant than the total amount of governmental borrowings. The Singapore government issues debt as a tool to promote domestic capital markets and to support investment for mandatory saving programs. Singapore's public debt includes a significant proportion of Special Singapore Government Securities (SSGS) issued to support the Central Provident Fund (CPF). Special issues of SGS are non-tradable bonds issued to meet the investment needs of CPF; the Government fully guarantees these special securities. Singapore government has not borrowed to finance deficit spending since the 1980s according to the Singapore Constitution and the Government Securities Act.

3.2.10 Brunei Darussalam

Brunei is on the northern coast of Borneo which owns rich energy source such as crude oil and natural gas. Brunei has an excellent infrastructure, good health care system where its

citizens pay no personal taxes, enjoy free medical service and education. Brunei is a small country, with its economy depends much on exporting crude oil and natural gas. Brunei Darussalam is one of the countries with the highest income per capita and the lowest ratio of public debt in ASEAN, the second in ASEAN and the No.9 in the world. Exporting crude oil and gas accounts for almost 65% of GDP and 95% of the total export amount with Japan as the leading partner. Brunei has a very high level of gross national savings which was 48.8% of GDP in the year of 2017, Brunei's GDP was mostly produced by industry and services sector which account for 56.5% and 42.3% of GDP, respectively (The World Factbook, 2018). Real GDP growth rate was about minus 1.3% in the year 2017 and was minus 2.5% in the year of 2016. Due to high gross national saving and current account balance, public debt in this nation has been quite low, approximately 3.01 percent of GDP in 2016, a 0.06 percent rise from 2015, all from the domestic source; it has no external public debt.

In general, most of ASEAN members have had their particular policies to maintain public debt at reasonable levels such as limitations for public debt to GDP ratio in Vietnam, Thailand, and Laos PDR, and so on or limitations for the budget deficit in Myanmar. Public debt structure of ASEAN countries are different, Singapore and Brunei do not issue domestic public debt; Cambodia has only external public debt and no domestic debt; while other countries have both external and domestic public debt. Since the AEC was established at the end of 2015, public debt management policies within ASEAN members should be consistent and unified. The member countries need to support each other in debt management and in promulgating debt policies that will not negatively influence others. ASEAN may be divided into three groups: lower-middle-income group, upper-middle-income group, and high-income group. Lower-middle-income group includes Vietnam, Laos, Cambodia, Myanmar, Indonesia, and the Philippines. These countries are developing countries which have a low level of the

current account, weak gross savings, a large investment in non-financial in public sector especially last VLCM group (Vietnam, Laos, Cambodia, and Myanmar), and high level of poverty. These factors contribute to the level of public debt and economic growth of ASEAN. Singapore and Brunei are high-income nations having a high level of current account surplus, a high level of gross savings, and a low budget deficit; they only need to borrow from the domestic sources to promote their domestic capital market. Other factors such as poverty and the proportion of economic compositions also affect the growth and public debt level. Once we control each country's individual factors, we can compare the level of impact of public debt on economic growth among ASEAN countries. Furthermore, the empirical literature on the impact of public debt on growth in ASEAN countries shows that the level of external public debt is an important issue that the ASEAN government should pay more attention. Most of the literature argues the negative link of external public debt with economic growth; other studies show different results, the data and research method on debt issue should be more specific and unified especially the data of domestic debt and external debt. Since the existing literature is too focused on external debt but neglected in domestic debt; further studies are needed in the distinction between domestic and external debt. Depending on the macroeconomic conditions of each ASEAN member countries, the empirical studies for all members should be conducted to have a comprehensive overview of public debt management policy in ASEAN.

CHAPTER IV THEORETICAL FRAMEWORK OF ECONOMIC GROWTH AND EMPIRICAL MODEL

This chapter covers several basic frameworks of the growth model and how public debt variables included in the growth model. First, it starts with the standard Solow growth model with Cobb-Douglas production function. The standard Solow model predicts that countries with different saving rates and different population growth rate will correspondingly converge to the different steady state of per capita income. Second, we explain the augmented Solow growth model with the presence of human capital in the production function. Mankiw, Romer, and Weil (1992) examine the convergence shown in the Solow model by developing from the standard model version to apply panel data with the human capital variable with some assumptions on technology. Third, we apply the augmented Solow model to panel data, follow Islam (1995) that technology is correlated to saving rate and population growth to produce a dynamic growth model which controlling country fixed effects. Finally, we add the debt variables in the dynamic growth model to analyze the impact of public debt on economic growth while controlling other determinants of growth.

4.1 The Solow Growth model with Cobb-Douglas production function

First of all, we begin with the standard Solow model to have a simple starting point to quickly understand how input factors affect the production of the economy. Taking the saving rate and population growth rate as exogenous, Solow (1956) argues that these two variables determine the steady state of income per capita. Since different countries have different savings rates and population growth rates, steady states vary across countries. The higher rate of saving, the higher per capita income; the higher rate of population, the lower per capita income.

The aggregated production form is Cobb-Douglas:

$$Y(t) = K(t)^{\alpha}(A(t)L(t))^{1-\alpha}$$

Where $Y(t)$ is aggregate level of output; $K(t)$ is capital at time t; $L(t)$ is labor force at time t, and $A(t)$ is the level of technology at time t, technology is *labor-augmenting*. Assume that this production function is concave, output is constant return to scale and diminishing return to input factors.

Constant returns to scale (CRTS): $F(cK, cAL) = cF(K, AL)$ for any $c \geq 0$

The second assumption is related to the marginal product of each input factor that output is diminishing return to each factor. In other words, if K increase one unit, and other factors are constant, the marginal output will decrease.

We can replace $Y(t)$ in intensive form by taking $c = \frac{1}{AL}$

$$\frac{Y(t)}{A(t)L(t)} = [\frac{K(t)}{A(t)L(t)}]^{\alpha}[\frac{A(t)L(t)}{A(t)L(t)}]^{1-\alpha}$$

From an economic perspective, it is more interesting to consider output per capita rather than the aggregate output of the whole country because it reflects how wealthy a country is. Therefore, economists focus on per capita income or per worker terms in most of their studies on growth. This use of the output variable is also useful and necessary to conduct cross-country comparison and to have a better understanding of how countries are developing. Because of these reasons, we define output as per worker, sometimes as per capita.

Output per unit of effective labor is a function of capital per unit effective labor

$$y(t) = k(t)^{\alpha}$$

Where k as the stock of capital per effective unit of labor $k(t) = K/AL$, and y as output per effective unit of labor $y(t) = Y(t)/A(t)L(t)$

Assume that $L(t)$ and $A(t)$ grow exogenously at rate g and n:

$$L(t) = L(0)e^{nt}$$

$$A(t) = A(0)e^{gt}$$

Consider saving rate as s, δ is the rate of depreciation, the evolution of k is defined by

$$\dot{k}(t) = sy(t) - (n + g + \delta)k(t)$$

$$= sk(t)^{\alpha} - (n + g + \delta)k(t)$$

Steady-state of k is defined as follow: $k^* = \left[\frac{s}{n+g+\delta}\right]^{1/(1-\alpha)}$

Steady-state output: $y^* = k^{*\alpha} = \left[\frac{s}{n+g+\delta}\right]^{\alpha/(1-\alpha)}$

The core of the Solow model is to predict the impact of saving and population growth on income per capita.

Income per capita at steady-state is:

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(0) + gt + \frac{\alpha}{1-\alpha}\ln(s) - \frac{\alpha}{1-\alpha}\ln(n + g + \delta) \qquad (1)$$

Assume that g and δ are constant across countries. g reflects primarily the advancement of knowledge.

The above model predicts that the saving rate has a positive impact on per capita income and population growth rate has an adverse effect on output per worker.

4.2 The Augmented Solow model

Human capital is an essential factor because it strongly affects productivity, worker's skills and consequently on output. Mankiw, Romer, and Weil (1992) consider that human capital has the same role as the physical capital in the production function. As people in the economy pursue higher education degrees and training, they possess more skills, become more productive. These differences in skills and productivity are including in the expanding of human capital scope. Such differences in human capital can partially explain the difference in income per capita across countries.

Assume that every worker supplies the same amount of labor; capital can be divided into physical capital and human capital. The production function is taking the form of Cobb-Douglas function as below.

$Y(t) = K(t)^{\alpha} H(t)^{\beta} (A(t)L(t))^{1-\alpha-\beta}$,

Where H is human capital, s_k is the fraction of income invested in physical capital and s_h is the fraction of income invested in human capital. Assume that $\alpha + \beta \leq 1$, which implies that the production function is decreasing returns to all capital.

The evolution of the economy is defined by

$$\dot{k}(t) = s_k y(t) - (n + g + \delta)k(t)$$

$$\dot{h}(t) = s_h y(t) - (n + g + \delta)h(t)$$

Where $y = Y/AL$, $k = k/AL$, and $h = H/AL$, all are quantities per unit of effective labor.

The steady state of the economy is defined by:

$$k^* = \left[\frac{s_k^{1-\beta} s_h^{\beta}}{n + g + \delta}\right]^{1/(1-\alpha-\beta)}$$

$$h^* = \left[\frac{s_k^{\alpha} s_h^{1-\alpha}}{n + g + \delta}\right]^{1/(1-\alpha-\beta)}$$

Income per capita:

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(0) + gt - \frac{\alpha + \beta}{1 - \alpha - \beta}\ln(n + g + \delta) + \frac{\alpha}{1 - \alpha - \beta}\ln(s_k) +$$

$$+ \frac{\beta}{1 - \alpha - \beta}\ln(s_h)$$

Combining above equation with the equation of steady state of human capital given in above equation, we have an equation for income per capita as a function of physical capital, saving rate, the rate of population growth and level of human capital in steady state:

$$\ln\left[\frac{Y(t)}{L(t)}\right] = \ln A(0) + gt + \frac{\alpha}{1-\alpha}\ln(s_k) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta) + \frac{\beta}{1-\alpha}\ln(h^*) \qquad (2)$$

Equation *(2)* is almost identical to equation *(1)* except for the part of human capital $\frac{\beta}{1-\alpha}\ln(h^*)$ which was left in the error term. Therefore, omitting human-capital term would bias the coefficients on saving and population growth variables.

Mankiw, Romer, and Weil (1992) argue that $A(0)$reflects technology, resource endowments, climate, and institutions and so on. $A(0)$ may differ across countries.

Mankiw, Romer, and Weil (1992) assume that

$$\ln A(0) = a + \epsilon$$

Where a is constant, and ϵ is a country-specific shock. The authors make a strong assumption that s and n are dependent of ϵ

gt is constant over time and across countries. Therefore:

$$\ln\left[\frac{Y(t)}{L(t)}\right] = a - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta}\ln(s_k) + \frac{\beta}{1-\alpha-\beta}\ln(s_h) + \epsilon \qquad (3)$$

The model with human capital and country-specific shock indicate two possible methods to modify the Solow growth model.

4.3 Augmented Slow Model for the Panel Data Analysis

In this part, we modify the M-R-W augmented Solow model (3) by applying Islam's (1995) approach. Mankiw, Romer, and Weil (1992) assumed that $\ln A(0) = a + \epsilon$, $A(0)$ represent the technology, resource endowments, climate, institutions and so on, ϵ is assumed to be independent of the explanatory variables, s and n. However, Islam (1995) highlights that

$A(0)$ term is an important determinant of steady state of per capita income and it seems to be correlated to population growth rate and savings rate[2]. With similar savings rate and population growth rate, a country can directly improve its long run per capita income by the component of $A(0)$.

Let y^* be the steady state level of income per effective worker, and let $y(t)$ be its actual value at any time t. Approximating around the steady state, the pace of convergence is given by

$$\frac{d \ln\ y(t)}{dt} = \lambda[\ \ln(\ y^*) - \ln y(t)\ ]$$

Where $\lambda = (n + g + \delta)(1 -\ \alpha - \beta)$. This equation implies that

$$\ln y(t_2) = (1 - e^{-\lambda\tau}) \ln y^* + e^{-\lambda\tau}\ \ln y(t_1)$$

Where $\mathrm{y}(t_1)$ is income per effective worker at some initial point of time.

moreover, $\tau = (t_2 - t_1)$

$$\ln y(t_2) - \ln y(t_1) =\ (1 - e^{-\lambda\tau}) \ln y^* - (1 - e^{-\lambda\tau}) \ln y(t_1)$$

$$\ln y(t_2) - \ln y(t_1) =\ (1 - e^{-\lambda\tau})(\ln y^* - \ln y(t_1))$$

We have y^* is determined by s and n, which are assumed to be constant for the entire intervening time period between t1 and t2 and hence represent the values for the current year as well. Substituting for y^*gives

$$\ln y(t_2) - \ln y(t_1) = \left(1 - e^{-\lambda\tau}\right)\frac{\alpha}{1 - \alpha - \beta}\ln(s_k) + \left(1 - e^{-\lambda\tau}\right)\frac{\beta}{1 - \alpha - \beta}\ln(s_h)$$

[2] "A(0) is defined not only in the narrow sense of production technology, but also to include resource endowments, institutions, etc., it is not entirely convincing to argue that saving and fertility behavior will not be affected by all that is included in A(0)" (Islam, 1995, p.1134)

$$-\left(1-e^{-\lambda\tau}\right)\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta)-(1-e^{-\lambda\tau})\ln y(t_1)$$

Therefore, in the Solow model, the growth of output is a function of the initial level of income and fundamentals of steady state. Note that: income per effective labor

$$y(t)=\frac{Y(t)}{A(t)L(t)}=\frac{Y(t)}{L(t)A(0)\,e^{gt}}$$

so that

$$\ln\ y(t)=\ln\left(\frac{Y(t)}{L(t)}\right)-\ln A(0)-gt=\ \ln\hat{y}(t)-\ln A(0)-gt$$

where $\hat{y}(t)$ is the per capita income $\frac{Y(t)}{L(t)}$,

Substitute $\hat{y}(t_2)$ and $\hat{y}(t_1)$ into the above equation, we get the evolution of per capita income as bellows:

$$\ln\hat{y}(t_2)-\ln\hat{y}(t_1)=$$

$$=\left(1-e^{-\lambda\tau}\right)\frac{\alpha}{1-\alpha-\beta}\ln(s_k)+(1-e^{-\lambda\tau})\frac{\beta}{1-\alpha-\beta}\ln(s_h)$$

$$-\left(1-e^{-\lambda\tau}\right)\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta)$$

$$-(1-e^{-\lambda\tau})\ln\hat{y}(t_1)+\left(1-e^{-\lambda\tau}\right)\ln A(0)+g(t_2-e^{-\lambda\tau}t_1)$$

if we collect terms with $\ln\hat{y}(t_1)$ on the right-hand side, we get:

$$\ln\hat{y}(t_2)=\left(1-e^{-\lambda\tau}\right)\frac{\alpha}{1-\alpha-\beta}\ln(s_k)+(1-e^{-\lambda\tau})\frac{\beta}{1-\alpha-\beta}\ln(s_h)$$

$$-\left(1-e^{-\lambda\tau}\right)\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta)$$

$$+e^{-\lambda\tau}\ln\hat{y}(t_1)+\left(1-e^{-\lambda\tau}\right)\ln A(0)+g(t_2-e^{-\lambda\tau}t_1)$$

The above equation represents a dynamic panel data model with $(1-e^{-\lambda\tau})\ln A(0)$ as the time-invariant individual country effect term. As mentioned before,$A(0)$ is not independent with population growth rate n and savings rate s_k, s_h. We may use follow dynamic growth model:

$$y_{it}=\gamma y_{i,t-1}+\sum_{j=1}^{3}\beta_j\,x_{it}^{j}+\eta_t+\mu_i+\nu_{it} \qquad (4)$$

where:

$$y_{it}=\ln\hat{y}(t_2)$$

$$y_{i,t-1}=\ln\hat{y}(t_1)$$

$$\gamma=e^{-\lambda\tau}$$

$$\beta_1=\left(1-e^{-\lambda\tau}\right)\frac{\alpha}{1-\alpha-\beta}$$

$$\beta_2=\left(1-e^{-\lambda\tau}\right)\frac{\beta}{1-\alpha-\beta}$$

$$\beta_3=-\left(1-e^{-\lambda\tau}\right)\frac{\alpha+\beta}{1-\alpha-\beta}$$

$$x_{it}^{1}=\ln(s_k)$$

$$x_{it}^{2}=\ln(s_h)$$

$$x_{it}^{3}=\ln(n+g+\delta)$$

$$\mu_i = \left(1 - e^{-\lambda\tau}\right) \ln A(0)$$

$$\eta_t = g(t_2 - e^{-\lambda\tau} t_1)$$

and ν_{it} is the transitory error term that varies across countries and time periods and it has mean equal to zero. Panel data estimation of this equation now provides the kind of environment necessary to control for the individual country effects. Islam (1995) is the first economist implementing panel regression which estimate human capital augmented Solow model using the M-R-W model and allow country fixed effects to correct omitted variable bias.

4.4 Public debt and Economic Growth: Empirical studies

Many previous studies on the impact of public debt on economic growth have used the above dynamic model with country-specific fixed effects (as well as time-specific fixed effects). For example, Elbadawi et al. (1997), Pattillo, Poirson, and Ricci (2011), Kumar and Woo (2010), Cecchetti, Mohanty, and Zampolli (2012), and Checherita-Westphal and Rother (2012) use the dynamic growth model in the form of the equation (4).

These researchers added debt variables into the right-hand side of the equation (4) as additional regressors. In this section, we rewrite the dynamic growth model in the form that we see the relationship between public debt and economic growth more taking account of the time lag of public debt effect.

$$GROWTH_{i,t,t+5} = \gamma y_{i,t} + \boldsymbol{\beta} X_{i,t} + \phi DEBT_{i,t} + \eta_t + \mu_i + \nu_{it} \qquad (5)$$

Where: $GROWTH_{i,t,t+5}$: 5-year average growth of real GDP per capita in percentage[3]

term $GROWTH_{i,t,t+5} = \left(y_{i,t+5} - y_{i,t}\right) * 100/5$

$y_{i,t}$: Log of real per capita GDP at time t

$X_{i,t}$: Set of other regressors to explain growth such as to represent human capital, physical capital, and so on.

$DEBT_{i,t}$: Public debt in term of percentage of GDP

μ_i : Country specific fixed effect

η_t : Time-fixed effect

v_{it} : Residuals, an unobservable error term

X variables:

- National gross savings (as a share of GDP),
- Change in population (annual population growth rate)
- Schooling (Number of years spent in secondary educations and returns on education, a proxy for the level of human capital)
- Log of lag real per capita GDP
- Trade openness (Sum of export and import over GDP)
- Inflation rate (a measure of macroeconomic stability)

[3] The advantage of using 5-year average growth as dependent variable is to exclude the short-term effect of business cycle and that would allow us to concentrate on the medium-term growth rate (Cecchetti, Mohanty and Zampolli, 2011)

- Total dependency ratio (a measure of population structure and aging)

Most of existing empirical studies which use the dynamic growth model suggest the non-linear inverse U-shape impact of public debt on economic growth. If the public debt to GDP is smaller than a certain level or threshold, an increase in public debt pushes up economic growth. When public debt level to GDP ratio is over the threshold, a higher public debt to GDP level decreases per capita income GDP.

CHAPTER V EMPIRICAL ANALYSIS

5.1 Regression Models and Data

5.1.1 Regression models

As presented in the previous chapter, we use the dynamic growth model to investigate the impact of public debt on economic growth by augmenting the Solow model. As we would like to examine both linear effect and non-linear effect of public debt on economic growth, we use both linear and quadric forms of debt to GDP ratio as additional variables in the dynamic growth model. **T**o explore the linear specification of the relationship between public debt and growth, whether it is negative or positive, the study follows Pattillo, Poirson, and Ricci (2011)[4] and Cecchetti and Zampolli (2011)[5] by using the following growth models.

The linear specification:

$$GROWTH_{i,t,t+5} = \varphi + \gamma y_{i,t} + \boldsymbol{\beta} X_{i,t} + \phi DEBT_{i,t} + \eta_t + \mu_i + \nu_{it} \quad (5)$$

Also, the quadratic specification:

$$GROWTH_{i,t,t+5} = \varphi + \gamma y_{i,t} + \boldsymbol{\beta} X_{i,t} + \phi DEBT_{i,t} + \theta DEBT_{i,t}{}^2 + \eta_t + \mu_i + \nu_{it} \quad (6)$$

In the above models, $GROWTH_{i,t,t+5}$ represents dependent variable, 5-year average growth of real per capita GDP; $y_{i,t}$ represents for log of initial income; $X_{i,t}$ is a set of control variables; $DEBT_{i,t}$ is debt variable; i indicates country; and t denotes time (year). In this model, ν_{it} is

[4] Pattillo, Poirson and Ricci (2011) use linear and non-linear specifications to check the impact of public debt on per capita growth. Quadratic specification supports the inverse U-shape relationship between public debt and growth and helps to identify the marginal impact of public debt on growth on average. In the inverse U-shape, the coefficient for debt squared variable is negative and the coefficient of debt variable is positive.

[5] Cecchetti, Mohanty and Zampolli (2011) use five-year forward average growth rate as dependent variable in the overlapping five-year growth model to check the impact of public debt to GDP ratio, debt to export ratio on per capita income growth rate.

error term, η_t is country specific fixed effect, μ_i is time fixed effect, and φ is constant number. Control variables are population growth, inflation rate, the openness of the economy, the index of human capital per person, total dependency ratio, and total investment. The main explanatory variables are gross public debt, external public debt and domestic public debt. Where γ, $\boldsymbol{\beta}$, ϕ, θ are unknown parameters which are estimated by using the fixed effects estimator.

By using the quadratic model, the study estimates the average marginal effect of debt on growth or critical threshold for public debt $DEBT_{i,t}$. Over this threshold level, public debt starts to change the sign of impact on economic growth.

$$\frac{\partial GROWTH}{\partial DEBT} = \phi + 2\theta D \quad (7)$$

Therefore, when $\frac{\partial GROWTH}{\partial DEBT}$ = 0, $DEBT$ will equal -$\phi/2\theta$. The level of (-$\phi/2\theta$) is the turning point of the effect of debt, at which the direction of impact on growth starts to change.

5.1.2 Data Description

The study uses the panel regressions for 10 ASEAN countries, including Laos PDR, Myanmar, Malaysia, Thailand, Vietnam, the Philippines, Indonesia, Cambodia, Brunei Darussalam, and Singapore. The data are taken from various sources to examine the potential relationship between public debt and growth, most of which are from the World Economic Outlook (WEO) database which is reported by the IMF staffs. The data for some variables such as population and its growth, total investment to GDP ratio, gross national savings to GDP ratio, inflation rate, and general government gross debt were collected from WEO. Data for external public debt is from International Debt Statistics (IDS) of the World Bank for the period from 1980 to 2016. The data on trade openness were calculated by summing up export and import data which were collected from the World Development Indicators (WDI) maintained

by the World Bank. The data for per capita GDP growth and per capita GDP were also taken from WDI of the World Bank. The data for the index of human capital for persons for ASEAN countries were obtained from the Federal Reserve Economic Data of the Federal Reserve Bank of St. Louis[6].

There are ten countries and 37 years (1980-2016) to be cover; the data are organized as time series cross-sectional panel. This complete data set would consist of more than three hundred observations. However, the number of observations is less than that due to some missing values for some variables for specific countries.

The dissertation created time dummy variables, for several years of the period 1980-2016. First, we created a time set variable including 36 years, and then checked the statistical significance of each year in the models. There are some sub-periods such as the Asian financial crisis 1997-1999 and the global financial crisis 2008-2010 which negatively affected the economic growth of ASEAN in the past.

Since the main target of this study is to discover the impact of public debt on growth, per capita GDP growth is the dependent variable used in the models of study. According to the previous researches on the effect of public debt on growth, real per capita GDP growth was used to measure economic growth. As mentioned before, using per capita GDP is popular because it is easy to compare the level of living standard across countries. For example, Clements, Bhattacharya, and Nguyen (2003), Dreger and Reimer (2013), Pattillo, Poirson, and Ricci (2011), Kumar and Woo (2010) test the model of growth in relationship with public debt, in which annual per capita GDP growth is the variable that needs to be explained. The second important variables are public debt variables, which are measured in percentage of gross

[6] We have tried to the average schooling years of ASEAN countries from Barro and Lee, 2013; however, this data set of schooling is 5-year interval and the results become not significant.

domestic product (GDP) such as the gross public debt to GDP ratio, the external public debt to GDP ratio, and the domestic public debt to GDP ratio. They represent the public debt policies which are parts of fiscal policies of ASEAN member governments.

There are some control variables in the model, according to the literature such as initial income per capita, savings, investment, population growth, human capital, openness, current account balance, gross national savings, and inflation rate. The description of all variables is summarized in Table 5.1.

Table 5.1 Description of variables

Variables	Description	Data Source
Per capita income Growth	5-year average growth of real per capita GDP (%)	World Bank Development Indicator (WDI) from the World Bank database.
Gross public debt to GDP ratio	Total accumulated debt that requires payment and payment of interest and principal by the government to the creditor at a date and dates in the future[7] (as percent of GDP)	The World Economic Outlook (WEO) from IMF database.
External public debt to GDP ratio	Public and publicly guaranteed debt comprises external obligations of debtors[8] (as percent of GDP)	International Debt Statistics of the World Bank.
Domestic public debt to GDP ratio	Domestically borrowed by the government or publicly guaranteed for repayment by a public entity (as percent of GDP)	International Debt Statistics of the World Bank.
Initial per capita income	Per capita income is per capita income at time t (in the log)	World Bank Development Indicator (WDI) from the World Bank database.
Total investment	Total investment is the sum of public investment and private investment (as percent of GDP)	The World Economic Outlook (WEO) from IMF database.
Population growth	The population growth rate is the annual growth rate of population (%)	World Bank Development Indicator (WDI) from the World Bank database.
Human capital	Index of human capital per person, based on years of schooling (Barro/Lee, 2012) and returns to education (Psacharopoulos, 1994) (index per person)	Federal Reserve Economic Data (FRED) of the Federal Reserve Bank of St. Louis[9]
Openness	Openness is the sum of export and import amount (as a percent of GDP)	Export to GDP ratio and import to GDP ratio data are collected from WDI on the website of the World Bank database.
Inflation rate	measured by the consumer price index[10] (%)	The World Economic Outlook (WEO) from IMF database.
Total dependency	The total dependency ratio is the age-population ratio of dependent people who are not in the labor force and working people who are the labor force of the economy[11](%)	World Bank Development Indicator (WDI) from the World Bank database

[7] Gross government debt includes debt liabilities in the form of Special Drawing Right, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable (IMF, 2018).

[8] External public debt includes the national government, political subdivisions and autonomous public bodies, and external obligations of private debtors that are guaranteed for repayment by a public entity

[9] Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182, available for download at www.ggdc.net/pwt

[10] Inflation rate reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

[11] Total dependency ratio is to measure the population structure and aging of an economy.

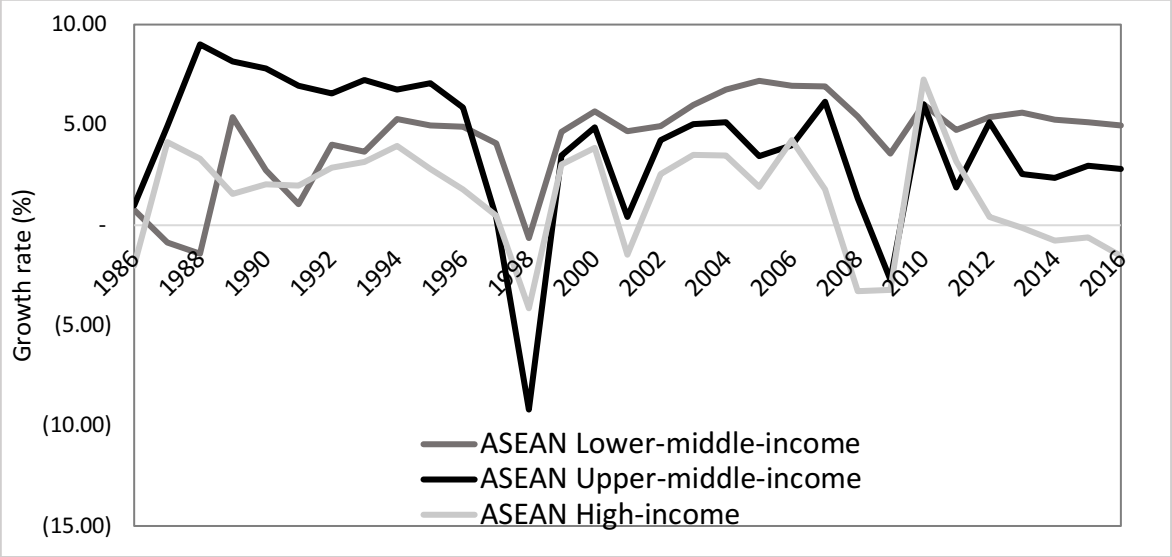
5.2 Empirical Results

5.2.1 Linear Relationship between Public Debt and Economic Growth

The panel data are used to estimate the impacts of public debt on economic growth. First, to choose the appropriate model (random effects model or fixed effects model) in investigating the relationship between public debt and growth in ASEAN, the study used the Hausman test with null-hypothesis that random effects (RE) model is consistent. The p-value reported in the Hausman test is 0.0000, which is lower than 5%. Therefore, the study rejected using the estimation of random effects and accepted that the fixed effects model is appropriate estimation in the model used to test the relationship of public debt on economic growth in ASEAN including lower-middle-income, upper-middle-income, and high-income countries.

Over the past period, several shocks occurred in ASEAN such as the Asian financial crisis from July 1997 and the international financial crisis from 2008. Figure 5.1 shows the average growth rate of different income groups in ASEAN from 1986-2016. In 1998 and 2009, the average per capita GDP growth was -3.4% and -0.2%, respectively in recession. Therefore, the dissertation uses the fixed effects model by adding time dummy variables to examine more correctly the relationship between public debt and per capita GDP growth. Figure 1 reveals that ASEAN had large fluctuation in per capita growth in 1998-1999 with the main reason derived from devaluation of Thai baht leading to currency crises and instabilities of Thailand, the rest of ASEAN such as the Philippines, Indonesia, Malaysia, and other Asia countries such as South Korea and Hong Kong (Lauridsen, 1998). The global financial crisis 2008-2009 triggered by American housing price crisis in 2007 then expanded to other areas from Europe to Asian countries. This crisis has influenced the Asian area, making the stock market lose a point and difficult to access international capital flow. As results, these instabilities of the global economy had negatively associated with economic growth of ASEAN countries.

Figure 5.1 Average per capita GDP growth of three income-groups in ASEAN



Source: Author's calculations[12]

The model used to examine the linear impact of public debt on growth with time dummy variables is the fixed effects model (including country-fixed effect). The following table reveals the results of testing the equation (1) that gross public debt has an adverse effect on per capita GDP growth at 10% of significance (Table 5.2). With a one percentage point increase of GDP of gross public debt leads to a reduction of 0.057 percentage point of per capita GDP in growth. Domestic public debt also has no negative linear correlation with per capita GDP growth. When external public debt rises by one percentage point GDP, per capita GDP growth will decrease about 0.04 percentage points.

[12] Average growth rate is calculated as weightened average for each income group.

Table 5.2 Regression Results of Linear Relationship between Public Debt and GDP growth over 1980-2016 (in a sample of 10 countries)

Variables	Gross public debt (1)	External public debt (2)	Domestic public debt (3)
Gross public debt	-.0571**		
External Public debt		-.0401**	
Domestic debt			-.0152
Initial per capita income	-10.3633**	-2.7218**	-6.8487
Population growth	-1.0629***	-.6230**	-.9647**
Total investment	.1136***	.0543	.1089**
Current account balance	.0363	.0051	.0494
Human capital	3.9530	-2.0602	-.8976
Inflation rate	.0379	-.0798***	.0219
Trade openness	.0135	-.0056	.0038
Total dependency ratio	-.0631	.0554	.0293
R-squared	0.6311	0.6217	0.6309

Note: Levels of significance: *** p< 1 percent, ** p< 5 percent, * p< 10 percent. Time dummies are not reported. (1) refers to the model where the debt indicator is the gross public debt to GDP ratio; (2) refers to the model with external public debt to GDP ratio as the debt indicator; (3) refers to the model with the domestic public debt to GDP ratio.

Source: Author's calculations

As can be seen in the above results, the negative impact of gross public debt mostly was caused by the adverse effects of external public debt. In the previous empirical studies, the negative relationship between external public debt and economic growth was examined by Lee and Ng (2015), Patenio and Tan-Cruz (2007), Naeem (2015), Azam, Emirullah, Prabhakar, and Khan (2013) with data of ASEAN member countries. Moreover, the negative relationship between public debt and growth was also found by Kourtellos, Stengos, and Tan (2013) by using data of Low-democracy regime countries. The new study by Panizza and F. Presbitero (2014) shows that public debt negatively correlated with growth by using the fix effects estimator for OECD countries; however, there is not enough evidence to conclude that public debt has a causal link with economic growth. Since the results in Table 5.2 suggest the negative

link between gross public debt and per capita GDP growth which was mainly decided by the negative relationship between external public debt and GDP growth, it is necessary to separate external public debt and domestic public debt when we discuss the correlation between public debt and growth.

Table 5.3 shows the results for different income-groups in ASEAN in the model to investigate the linear impact of public debt on economic growth (The detailed results of estimations are shown in the Appendix). The findings suggest the significant adverse effect of gross government debt in the sample of 10 ASEAN members, 8 ASEAN members (excluding Singapore and Brunei) and the sample of upper-middle-income countries (including Thailand and Malaysia). The significant effect of external government borrowings is found in the sample of 10 ASEAN members and the sample of the Philippines and Indonesia at the significance level of 5%. This result also indicates that external public debt is negatively correlated with economic growth in those two countries. When the level of external public debt to GDP ratio decreases, per capita income growth will be higher in these countries. On the other hand, the positive impact of external public borrowings is obtained in the sample of Vietnam, Laos, Cambodia, Cambodia, and Myanmar. The results suggest different impacts of external public debt on economic growth in the lower-middle income group in ASEAN. However, to better understand the link of external public debt and economic growth in different income groups, the dissertation uses the quadratic model of non-linear effect; since most of existing empirical studies suggest the non-linear correlation between public debt and growth.

Table 5.3 Linear Effect of Public debt varies in different groups over 1980-2016 (Fixed Effects Estimator)

Group/Countries	Gross public debt	External public debt	Domestic Public debt
ASEAN (10 countries)	-.0571**	-.0401**	-.0152
Group 8 Countries (Not including Singapore and Brunei)	-.0606**	-.0326	-.0474
Group 6 lower-Middle-income countries	-.0371	.0053	-.0804
V-L-C-M	-.5909	0.0434**	-0.0528
Singapore, Brunei	-0.240	-	-0.240
Thailand, Malaysia	-.2743**	-.0652	-.0827
The Philippines and Indonesia	-.0187	-.2560***	-.0649

Note: Levels of significance: *** p< 1 percent, ** p< 5 percent, * p< 10 percent. For sub-group V-L-C-M, the -time-period is 1990-2016 due to the availability of public debt data.

Source: Author's calculations

5.2.2 Non-linear Relationship between Public Debt and Economic Growth

As stated in the previous sections, to test the non-linear impacts of public debt on growth, we estimate the equation (6) by adding another debt indicator, which is the squared public debt to GDP ratio into the equation (5). First, we estimate the equation (6) for the whole ASEAN sample, then divide ASEAN into small groups which have similar economic structure. The results are shown in Table 5.4 for ten ASEAN members, and Table 5.5 for different groups of countries.

As seen in Table 5.4, the squared term of external public debt to GDP ratio has had statistically significant positive impacts on the growth of per capita GDP at 10% of significance. On the other hand, the variable of external public debt to GDP ratio was statistically significant at the level of 5% with a negative coefficient. Therefore, the study suggests there is a U-shape correlation between external public debt and per capita GDP growth. The threshold which is calculated by the equation (7) is 88.64% GDP. Under 88.64%

GDP, external public debt is negatively correlated with per capita GDP growth rate. The results were illustrated in Table 5.4 show that gross public debt and domestic public debt has no non-linear correlation with per capita GDP growth for the sample of 10 ASEAN countries. In details, the results show that the squared term of domestic public debt has negative impacts on per capita GDP growth at 5% of significance with a coefficient of minus 0.0013. However, this table is not showing the statistically significant effect of variable gross public debt to GDP, domestic public debt to GDP ratios on economic growth. This means that public debt and domestic public debt have no statistically significant non-linear effect on economic growth in the sample of 10 ASEAN members.

Table 5.4 Regression Results regarding Non-linear Relationship between Public Debt and Growth over 1980-2016 (10 ASEAN countries, Fixed Effects Estimator)

Per capita GDP growth	Gross public debt (1)	External public debt (2)	Domestic public debt (3)
Gross public debt to GDP ratio	.0017	-	-
External public debt to GDP ratio	-	-.1241**	-
Domestic public debt to GDP ratio	-	-	.0723
Gross public debt to GDP ratio squared	-.0005	-	-
External public debt to GDP ratio squared	-	.0007*	-
Domestic public debt to GDP ratio - squared	-	-	-.0013**
Initial per capita income	9.2479**	-3.3779***	-5.3947
Population growth	-1.1618***	-.5634*	-1.2340***
Total investment	.1101***	.0522	.0929**
Current account balance	.0303	.0206	.0313
Human capital	4.0020	-.9861	.8987
Inflation rate	.0379	-.0789***	.0243
Trade openness	.0137	-.0051	.0053
Total dependency ratio	-.0273	.0402	.1959
R-squared	0.6329	0.6291	0.6480

Note: Levels of significance: *** p< 1 percent, ** p< 5 percent, * p< 10 percent. Time dummies are not reported. (1) refers to the model where the debt indicator is the gross public debt to GDP ratio; (2) refers to the model with external public debt to GDP ratio as the debt indicator; (3) refers to the model with the domestic public debt to GDP ratio.

The impact of gross public debt, external public debt and domestic public debt on per capita income growth of different income groups in ASEAN are summarized in Table 5.5. Non-linear inverse U-shape impact of gross public debt is found in the sample of upper-middle-income countries including Thailand and Malaysia with a threshold is 31.6 % GDP which is calculated by the formula (7). Most of the previous studies suggest the non-linear relationship between debt and economic growth. For example, Clements et al (2003), Dreger and Reimers (2013), Pattillo, Poirson and Ricci (2011), Reinhart and Rogoff (2010), Kumar and Woo (2010), Mencinger, Aristovnik and Verbic (2014) indicate the turning points of public debt which over these levels, public debt will change the direction of impact on growth from positive to negative. The threshold of 31.6% is close to the threshold of 35-40% GDP for developing countries obtained by Pattillo, Poirson and Ricci (2011). The findings show a U-shape correlation between external public debt and per capita GDP growth in the sample of two countries: the Philippines and Indonesia with the bottom threshold is 82.39% GDP. When external public debt is less than 82.39%, a decrease in external public debt leads to an increase in economic growth in these countries. This threshold is close to the one obtained for the sample of whole ASEAN and the sample of eight ASEAN countries excluding Singapore and Brunei.

Interestingly, the inverse U-shape impact of external public debt on per capita income growth is found in the sub-group including Vietnam, Laos, Cambodia, and Myanmar with the threshold of 60.65% GDP which is calculated by the equation (7). When we exclude the time effect out of the model for the group of these four countries, the inverse U-shape effect of gross public debt on economic growth becomes significant with the threshold of 122.6% GDP which is considered as a high ratio in comparing the results for the sample of Malaysia and the Philippines. This result is consistent because gross public debt consists of external public debt and domestic public debt.

Table 5.5 Non-linear Effect off public debt on Growth varies in the different groups over 1980-2016 (Fixed effects estimator)

Group/ Countries	Model with gross public debt and squared term of the gross public debt		Model with external public debt and squared term of the external public debt		Model with domestic public debt and squared term of the domestic public debt	
	Gross public debt	Gross public debt squared	External public debt	External public debt squared	Domestic Public debt	Domestic public debt squared
ASEAN (10 countries)	.00169	-.00053	-.1241**	.0007*	.0723	-.0013**
Group 8 Countries (Not including Singapore and Brunei)	-.1353	.0007	-.1342**	.0008*	-.1286	.0018
Group 6 lower-Middle-income countries	-.3195	.0024	-.0209	.0002	.0584	-.0029
V-L-C-M	.0949*	-.00039**	.1965**	-.00162**	-.0409	.00005
Singapore, Brunei	-1.328	.0055	-	_	-1.3284	.0055
Thailand, Malaysia	1.005*	-.0159**	.0403	-.0016	-.7849	.0119
The Philippines and Indonesia	_ 0.5166	.00367	-.644***	.00391**	-.1282	.00113

Note: Levels of significance: *** p< 1 percent, ** p< 5 percent, * p< 10 percent. For sub-group V-L-C-M, the time-period is 1990-2016 due to the availability of public debt data.

Source: Author's calculations

Furthermore, the control variables such as initial per capita income, population growth, investment, trade openness, current account have significantly affected economic growth (detailed results are described in the Appendix). In particular, an increase in population will reduce economic growth of ASEAN. Most of ASEAN members are developing countries with a high speed of population growth. As seen in results, the issue of an increasing population will bring difficulties to these countries, high unemployment rate, and then prevent economic growth. Investment positively influences economic growth at 1% significance. That is a motivation of ASEAN governments to increase public investment and attract greater private

investment. Investment creates more jobs, increases GDP per capita then promotes growth. In these models, initial per capita income has had an adverse significant economic effect on per capita GDP growth. In the period of the Asian financial crisis 1997-1998, the ASEAN nations had a high level of inflation and average per GDP growth was at the lowest level which was -3.4 in recession. High inflation increased the risk of returns of investment; therefore, over the financial crisis, a lot of capital flight happened.

Moreover, in both the linear model and non-linear models, the year 1998 statistically influenced economic growth. It means that in 1998-1999, the growth of ASEAN countries was influenced by big financial shocks from the Asia financial crisis 1997-1998. Over period 1997-1998, there was a financial crisis which started in Thailand, then going onto other countries such as the Philippines, Indonesia, Malaysia, etc. The significant negative coefficient on the dummy of 1998, 1999 represented for the Asian financial crisis 1997-1998 which had negatively influenced economic growth in ASEAN. Similarly, the study used the dummy variable for the year 2007, 2008 and 2009. The results from examining the effects of the global financial crisis 2007-2008 on ASEAN economic growth was statistically significant. The global financial crisis decreased the export demand of ASEAN countries and then lowered the economic growth.

5.3 Robustness Tests

The dissertation conducted a variety of robustness checks. First, the robustness of the fixed effects model's results can be assessed by conducting the other econometric methods such as differenced GMM and system GMM. The GMM specifications are using to correct for endogeneity of some explanatory variables (the human capital, total investment, current account balance, the openness, and debt variables) are instrumented to account for a potential simultaneity bias and the bias introduced by the dynamic growth model in the presence of fixed effects (Blundell and Bond, 1998). In this dissertation, we conducted differenced GMM and

the system-GMM to estimate the dynamic panel-data model where the variable of initial income is correlated with unobserved panel-level effects (As for the results, see Table A.1 – A.38). However, the GMM models are preferred for the panel-data with large individuals and small time-dimension (Roodman, 2009). Differenced GMM and system GMM confirm the negative correlation of external public debt and economic growth in the sample of the Philippines and Indonesia, the inverse U-shape relationship between gross public debt, external public debt and per capita income growth in the group of Malaysia and V-L-C-M. The results of the fixed effects model on the impact of external and domestic public debt on economic growth of different income groups are also consolidated by the differenced GMM and the system-GMM models. GMM models also examine the relationships between some important growth determinants (such as initial income, investment and population growth, human capital, and inflation) and economic growth and the sign of coefficients are the same with the fixed effect models.

Second, to deal with the existence of structural changes over the sample period, including changes in global risk factors or global trend growth, time-fixed effects were included. The two financial crises: Asian financial crisis 1997-1998 and global financial crisis 2008-2009 are statistically significant in the pooled OLS, fixed effect and GMM models with negative coefficients.

Since the economic patterns of Singapore and Brunei are sharply different, the dissertation conducted the robustness test to confirm the result of the high-income group by running the regression models for Singapore and Brunei separately. The coefficients of debt variables in these regression models are not statistically significant. This confirms the results of the fixed effects model for the high-income group that means the public debt has no significant effect on the economic growth of Singapore and Brunei.

5.4 Interpreting the results of the economic analysis for different income groups of ASEAN

5.4.1 Summary of the results of econometric analysis

In general, the impact of public debt on economic growth in ASEAN differs among income-groups. First, gross public debt and external public debt to GDP ratios have negatively correlated with per capita GDP growth while domestic public debt has no evident effects on economic growth in the whole ASEAN sample. Second, public debt is not a problem to economic growth in two high-income countries since the economic development in these countries strongly depends on the other main variables: initial income, population growth rate, current account, trade openness and human capital (Detailed results was shown in the Appendix). Third, the non-linear inverse U-shape correlation of gross public debt is found in the sample of upper-middle-income countries including Thailand and Malaysia with the threshold of 31.6% GDP. Finally, the adverse impact of external public debt on per capita GDP growth is found in the sample of the Philippines and Indonesia (Table 5.5). When external public debt is less than 82.39% GDP, a decrease in external public debt leads to an increase in the economic growth of this lower-middle-income sub-group. Gross public debt and external public debt have non-linear inverse U-shape impacts on economic growth of the other lower-middle-income sub-group including Vietnam, Laos, Cambodia, and Myanmar with the thresholds of 122.6% GDP and 60.65% GDP, respectively.

5.4.2 High-income countries (Singapore and Brunei): Not depending on public debt

Singapore and Brunei are high-income nations, and their whole public debt is the residential loan. However, their public debt management policies are different. Singapore has used its debt to develop the domestic debt market and invest abroad. On the other hand, Brunei has used its debt to fund the budget deficit created due to lower oil and gas prices. These situations may create various debt impacts in two high-income countries. As the econometric

results shown in Table 5.3 and Table 5.5, the debt impact on economic growth in the high-income group is not statistically significant in both linear and non-linear models.

Singapore has the highest level of public debt in ASEAN about more than 110% of GDP in 2016, but all government debt of Singapore is domestic public debt. However, the Singapore government does not borrow to finance its budget deficit. It has a conservative fiscal rule of running a balanced budget over its term. Most of the borrowing proceeds have been invested abroad, and the returns from investment exceed the debt servicing costs. Under the Protection of Reserves Framework in the Constitution and Government Securities Act, the government cannot use the funds raised from its debt securities issued for budget spending. There are two main types of government debt securities: Singapore Government Securities (SGS) and Special Singapore Government Securities (SSGS). SGS is used to promote the domestic debt market in Singapore, that debt is marketable. SSGS is held by Central Provident Fund for about 71% of GDP and Singapore's national pension.

Brunei is an oil and gas exporting economy which heavily depends on oil prices. A fall in oil prices created the lower revenue of the Brunei government. Brunei started borrowing to fund fiscal deficit from 2006. The total public debt to GDP was at a low level of 3% GDP in 2016. Since Brunei has a long-term positive current account, the country only borrows from the domestic market. Brunei has reformed fiscal policy that focuses on diversifying revenue sources. The authorities are encouraged to formalize the budgetary framework and public financial management in medium-term to better monitor public expenditure.

The results of the fixed effects regression model shown in the Appendix suggest that there are main variables which strongly affect economic growth in high-income countries. They are population growth rate, trade openness, human capital, and initial income. In conclusion, Singapore and Brunei do not depend on public debt to promote economic growth, and the impact of public debt on the per capita income growth is not statistically significant.

5.4.3 Upper-middle-income countries (Malaysia and Thailand): Promoting economic development on the basis of public debt

Malaysia and Thailand are the two upper-middle-income countries of ASEAN. Two countries have undergone a long process of transformation from high-poverty states to countries producing export products with a positive current account level. The development requires high investment in stable infrastructure and macroeconomic policies. Public debt has played an essential role in economic development. At the early stage, government borrowings helped the economy have enough capital resource to build up infrastructure and conduct expansionary policies to attract more foreign investment into the countries. However, public debt at a high level was one of the reasons that lowered economic growth since it involved high risk for investors. The econometric results indicate the non-linear correlation between gross government debt and per capita income growth of Malaysia and Thailand. This finding is reasonable in the context of the continuous economic development process of these countries. The public debt level of the Malaysian government has increased significantly over the past 30 years (IMF, 2018). In the mid-1980s, the Malaysian government focused on the development policies to stimulate its economic growth by the First Industrial Master Plan in ten years from 1985 to 1995 which was subjected to developing heavy industries mainly. However, these projects require high costs; the debt to GDP ratio had risen from 43% in 1980 to 101.7% in 1987. Another reason that Malaysian debt to GDP ratio peaked was due to the significant appreciation of Yen and the denomination of a large proportion of external debt in Yen. From 1987, the Malaysia government operated a fiscal surplus for the period of 1993-1997; the ratio of debt to GDP reduced to 32% in 1997; the Malaysian economy enjoyed high economic growth. During the Asian financial crisis 1997-1998, the Malaysia currency depreciated, but the impact on the debt level is relatively tiny. That is due to the small portion of external public debt in comparison with domestic debt. After the Asian financial crisis, the total public debt

amount has risen fivefold, from RM 112,119 billion in 1993 to RM 539,858 billion in 2013. Malaysia is currently the upper-middle-income country owning a high level of public debt which government debt to GDP was 56.6% in 2016, the third position in ASEAN. External public debt was accounted for more than 22% of GDP, while domestic public debt was about 34.05% GDP in 2016 (World Bank, 2018). Malaysia's economy is driven by some main production of electronics, oil, gas and palm oil. Malaysia started transforming from a raw material producer to a multi-sector emerging economy, and on the way to reach high-income position by 2020. The government borrowings have been increasing due to substantial public investment into infrastructure such as railways, highways, bridges, schools which is processing to the pavement to a high-income economy.

In the 1980s, Thailand government shifted investment with an export-oriented industrial policy. The mid-1980s, the appreciation of Japanese Yen led to an investment boom of Japanese multinational companies in Thailand. First, the first half of the 1980s, the economy experienced significant deficits. From the late 1980s to 1996, the Thailand economy enjoyed high economic growth with the average annual growth around 7%. In this period, the level of government debt was improved due to a strong budget surplus. In 1996 and 1997, because of the expansionary fiscal policy to compensate for the decline in export demand, the level of debt to GDP ratio rose significantly, revenue fell sharply leading to an increase in the fiscal deficit. After the crisis, the economy gradually returned to stable status; the Thailand government attempted to maintain a fiscal balance policy. In Thailand, the Public Debt Management Office has been established for effectively managing its debt issue. By law, public debt should not exceed 50% GDP, and the government should only borrow for public investment.

The threshold for gross government debt to GDP ratio found in the fixed effects regression model is 31.6% GDP for both countries. In history, the level of public debt to GDP ratio in these countries was moving around this threshold most of the time in the studied period.

The impact of gross public debt on economic growth in these countries was sometimes negative and sometimes positive when public debt to GDP fluctuated around the threshold level, this created the basis for the economic strategy in promoting exports. These countries have succeeded in utilizing public debt in economic development, particularly in conducting the master plans to increase current account, gross savings. However, the level of gross debt to GDP ratio has been currently higher than the threshold; the government should pay more attention to reducing government debt to a safer level.

5.4.4 Lower-middle-income countries (Indonesia, the Philippines, Vietnam, Laos, Cambodia, and Myanmar): The effect of external public debt depends on the economic situation in sub-groups

The econometric results show the different impact of public debt on economic growth in the lower-middle-income countries. The findings suggest dividing this group into two main sub-groups: one includes the Philippines and Indonesia; and the other one consists of Vietnam, Laos, Myanmar, and Cambodia. This diversity of public debt impact on economic growth also reflects the difference in economic structure in the lower-middle-income group.

5.4.4.1 Indonesia and the Philippines: Reducing external public debt to GDP ratio may help to promote per capita income growth

The findings suggest the U-shape relationship between external public debt and economic growth in the sub-group of the Philippines and Indonesia. The threshold of the non-linear U-shape relationship between external public debt and growth is 82.39% GDP; this means, below this threshold, a decrease in external public debt leads to an increase in per capita income growth. However, this means the government in these countries have to control external public debt strictly or shift the source of public debt to the domestic market. The Philippines and Indonesia had relatively low levels of public debt, only about 36% and 27% of GDP in 2016, respectively. The level of external public debt to GDP in this sub-group has been

decreasing over time along with the growth of per capita income. That is indicated in the results of adverse correlation between external public debt and economic growth obtained from the fixed effects regression model. The Philippines and Indonesia were affected by the Asian financial crisis 1997-1998; therefore, a fall in external public debt to GDP level would lead to a decrease in the external risk for the investors. As a result, lowering external public debt to GDP ratio may higher foreign direct investment into these economies, increase per capita income growth.

5.4.4.2 Vietnam, Laos, Cambodia, and Myanmar: the effect of external public debt on economic growth is non-linear inverse U-shape

The inverse U-shape correlations between gross public debt, external public debt, and per capita income growth are found in the sub-group of other countries: Vietnam, Laos, Myanmar, and Cambodia (V-L-C-M). In details, the impact of gross public debt on economic growth changes the sign from positive to negative when the debt to GDP ratio reaches the threshold of 122.6% GDP. Similarly, the sign of the external public debt effect starts to change at the threshold level of 60.7% GDP. In the past, the public debt level of this sub-group was high in the 1980s, 1990s, and the first half of the 2000s and had gradually decreased to an average level in the late of 2000s. Recently, the level of public debt to GDP ratio started to increased again, especially Vietnam and Laos reached nearly 60% of GDP in 2016. Though the level of public debt has been considerably high, these economies have still enjoyed very high economic growth since 2010. That is the main reason to explain the high debt threshold level in comparing with the group of Thailand and Malaysia. This sub-group has the lowest per capita income in ASEAN, regular negative current account, the highest rate of poverty in the region. In these countries, the infrastructure is not well developed; the economy has low per capita income, low gross savings rate. Therefore, to promote economic development, these countries must borrow from foreign countries and international organizations especially, in

recent years the rate of debt from China has risen. This is one of the reasons for making up high foreign debts in these countries. Before 2010, four countries: Vietnam, Laos, Myanmar, and Cambodia were low-income countries. To invest in the infrastructures such as high-way roads, bridges, railways, power plants to implement five-year and ten-year economic development plans, the government had to find external funds to finance their public investment. Foreign loans were one of the critical choices in capital accumulation while the private sector has not had the opportunity to access international capital. From the late 2000s, these low-middle-income countries have had the highest growth rates in Southeast Asia, with an average annual growth rate of over 5%.

In a short summary, the effects of public debt on economic growth and the socio-economic conditions of different groups in ASEAN are indicated in the following table. The effect of public debt on per capita GDP growth of different groups in ASEAN is diverse due to the differences in economic growth patterns and other socio-economic conditions which was previously shown in Chapter 3.

Table 5.6 Summary of the impact of public debt on economic growth and socio-economic conditions of different groups in ASEAN

Variables	High-income countries	Upper-middle-income	Lower-middle-income	
	Singapore and Brunei	**Thailand and Malaysia**	**The Philippines and Indonesia**	**Vietnam, Laos, Cambodia, and Myanmar**
Gross public debt	Singapore has the highest level of public debt to GDP ratio (above 100% GDP). Brunei has neglect level of public debt (about 3% GDP)	Gross public debt has inverse U-shape effect on the economic growth of Thailand and Malaysia. The threshold is about 31.6% of GDP.	Gross public debt has reduced from more than 100% GDP in the early 1980s to an average level of around 30% of GDP recently.	Gross public debt has an inverse U-shape effect on economic growth

Variables	High-income countries	Upper-middle-income	Lower-middle-income	
	Singapore and Brunei	**Thailand and Malaysia**	**The Philippines and Indonesia**	**Vietnam, Laos, Cambodia, and Myanmar**
External public debt	There is no external public debt.	The external public debt of Thailand and Malaysia fluctuated over time and recently tends to be stable.	External public debt to GDP has been reduced from a very high level to low and reasonable level. External public debt has a negative effect on economic growth. The threshold is about 82.9% of GDP.	External public debt has a non-linear effect on per capita economic growth of VLCM. The threshold is 60.7% of GDP.
Domestic public debt	All public debt is domestic debt. Public debt does not have a statistically significant effect on economic growth	Domestic public debt does not have a statistically significant effect on the economic growth	Domestic public debt does not have a statistically significant effect on economic growth.	Domestic public debt has recently increased due to the development of the domestic capital market.
Current Account	These countries have high current account surplus.	The current account started being surplus after the Asian crisis 1997-1998.	The current account is positively related to economic growth.	Current account has been often deficit.
Trade openness (Export + Import)	Economic growth depends positively on trade openness	Trade openness increases overtime in term of the amount.	Trade openness statistically has a positive correlation with economic growth	Trade openness of VLCM gradually increases and is positively correlated with economic growth.
Total investment	These countries have a high level of investment.	Malaysia and Thailand have a high level of public investment to GDP ratio, private investment increases over time.	Public investment to GDP ratio of this group was relatively low in ASEAN.	These countries have a high ratio of public investment to GDP ratio in ASEAN.
Human Capital	Human capital is one of the key drivers of economic growth.	The human capital index is in the middle in comparing		They have low human capital index except for Vietnam.

Variables	High-income countries	Upper-middle-income	Lower-middle-income	
	Singapore and Brunei	**Thailand and Malaysia**	**The Philippines and Indonesia**	**Vietnam, Laos, Cambodia, and Myanmar**
		with other countries in ASEAN.		
Population	Population growth is negatively correlated with economic growth.	Population growth is negatively correlated with economic growth.	Population growth is negatively correlated with per capita GDP growth.	Population grows fast recently. Population growth is negatively correlated with economic growth.
Initial per capita income	Initial income level is basic for economic growth.	Initial income level is basic for economic growth.	The income per capita is closed to the level of the upper-middle-income group	Per capita income is lowest in ASEAN, just in range of USD 1,000 – 2,000 per year.
Financial crises	The Asian financial crisis 1997-1998 and the global financial crisis 2008-2009 didn't statistically affect economic growth.	The Asian financial crisis negatively affected the economic growth of Thailand and Malaysia.	The Asian financial crisis negatively affected the economic growth of the Philippines and Indonesia.	The Asian financial crisis did not affect the economic growth of VLCM much.
Foreign direct investment	Singapore has the highest FDI inflow amount. Brunei has less amount of FDI inflow.	Foreign direct investment gradually increases over time.	FDI inflow of these countries was high in ASEAN, especially into Indonesia.	FDI inflow mostly goes to Vietnam in this sub-group due to lack of sufficient infrastructure.
Other socio-economic conditions	Singapore has balanced budget principle; all the borrowings was invested into infrastructure project and for the pension fund. Brunei is an oil-producing economy; the economy growth strongly depends on oil exports.	The economies transformed from agricultural economies to multi-sector emerging economies. They are export-oriented economies.	Governments have strict public debt management policies to control budget deficit and public debt level.	This sub-lower-middle-income group has the highest poverty rate in ASEAN. Most of the population live in a rural area.

APPENDIX OF CHAPTER V

Table A.1 ASEAN – Linear equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.482	-10.36***	-10.04***	-2.856**
	(0.506)	(3.469)	(3.250)	(1.206)
Total Investment/GDP	0.0242	0.114***	0.101***	0.0350
	(0.0245)	(0.0385)	(0.0322)	(0.0284)
Inflation Rate	0.0177	0.0379	0.0275	-0.00656
	(0.0348)	(0.0424)	(0.0381)	(0.0403)
Current Account Balance	-0.0627	0.0363	0.0364	0.00734
	(0.0391)	(0.0544)	(0.0511)	(0.0500)
Total dependency ratio	0.0467	-0.0631	-0.0720	0.0216
	(0.0318)	(0.0735)	(0.0681)	(0.0582)
Trade Openness	0.0208***	0.0135	0.0131	0.0293***
	(0.00398)	(0.0121)	(0.0116)	(0.00803)
Population Growth rate	-0.879**	-1.063***	-1.105***	-1.143***
	(0.384)	(0.361)	(0.338)	(0.351)
Human Capital Index	-1.398	3.953	4.899*	2.270
	(1.060)	(3.475)	(2.602)	(2.555)
Gross Public Debt/GDP	-0.0170	-0.0571**	-0.0545**	-0.0427*
	(0.0170)	(0.0240)	(0.0214)	(0.0232)
Year1998	-9.888***	-9.466***	-8.324***	-10.16***
	(1.661)	(2.290)	(1.372)	(1.997)
Year2009	-5.652***	-4.329***	-3.866***	-6.872***
	(1.687)	(1.191)	(1.023)	(2.421)
Constant	9.273**	84.81***	79.70***	21.55**
	(4.159)	(28.28)	(25.30)	(9.328)
Observations	152	152	152	152
R-squared	0.663	0.631		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.2 ASEAN – Linear equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-1.093**	-2.722**	-7.350***	-2.354***
	(0.500)	(1.179)	(1.656)	(0.892)
Total Investment/GDP	0.0308	0.0543	0.0459	0.0127
	(0.0190)	(0.0329)	(0.0285)	(0.0234)
Inflation Rate	-0.0998***	-0.0798***	-0.100***	-0.135***
	(0.0352)	(0.0242)	(0.0239)	(0.0242)
Current Account Balance	-0.0244	0.00508	0.00977	0.000253
	(0.0310)	(0.0506)	(0.0450)	(0.0411)
Total dependency ratio	-0.0153	0.0554	-0.0621	-0.0156
	(0.0302)	(0.0491)	(0.0391)	(0.0490)
Trade Openness	0.0133***	-0.00561	-0.00205	0.0124**
	(0.00321)	(0.00884)	(0.00829)	(0.00542)
Population growth rate	-0.729**	-0.623**	-0.714***	-0.817***
	(0.305)	(0.303)	(0.270)	(0.279)
Human Capital Index	-2.175**	-2.060	3.887**	0.596
	(0.961)	(2.209)	(1.555)	(1.727)
External Public Debt/GDP	-0.0151	-0.0401**	-0.0263	-0.0234
	(0.0161)	(0.0178)	(0.0161)	(0.0167)
Year1998	-7.520***	-8.291***	-6.156***	-5.500***
	(1.904)	(1.864)	(1.036)	(1.362)
Year2009	-5.106***	-4.579***	-4.094***	-3.915***
	(1.432)	(1.239)	(1.063)	(0.969)
Constant	18.66***	30.54***	59.24***	21.15***
	(3.564)	(9.689)	(12.66)	(6.803)
Observations	229	229	223	223
R-squared	0.653	0.622		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.3 ASEAN – Linear equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.322	-6.849	-6.481*	-2.465*
	(0.572)	(4.208)	(3.876)	(1.267)
Total Investment/GDP	0.0269	0.109**	0.0966**	0.0500
	(0.0271)	(0.0435)	(0.0393)	(0.0342)
Inflation Rate	0.0178	0.0219	0.00826	-0.00933
	(0.0412)	(0.0457)	(0.0437)	(0.0442)
Current Account Balance	-0.0697	0.0494	0.0411	0.00437
	(0.0432)	(0.0633)	(0.0582)	(0.0576)
Total dependency ratio	0.0209	0.0293	-0.0311	-0.0440
	(0.0339)	(0.107)	(0.0933)	(0.0835)
Trade Openness	0.0153***	0.00380	0.00486	0.0189**
	(0.00402)	(0.0128)	(0.0127)	(0.00868)
Population Growth rate	-0.832**	-0.965**	-1.023***	-1.042***
	(0.412)	(0.383)	(0.374)	(0.371)
Human Capital Index	-0.605	-0.898	0.764	0.525
	(1.045)	(3.427)	(3.191)	(2.846)
Domestic public debt/GDP	-0.00370	-0.0152	-0.0114	-0.00419
	(0.0176)	(0.0313)	(0.0310)	(0.0282)
Year1998	-9.872***	-11.94***	-9.693***	-9.942***
	(1.799)	(2.699)	(1.490)	(1.386)
Year2009	-5.014***	-4.827***	-3.935***	-5.952***
	(1.710)	(1.300)	(1.012)	(1.524)
Constant	6.539	63.28*	57.59*	24.19**
	(4.525)	(34.46)	(30.74)	(10.78)
Observations	139	139	139	139
R-squared	0.669	0.631		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4 ASEAN – Quadratic equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	0.163	-9.248	-8.919**	-1.547
	(0.541)	(7.006)	(3.556)	(1.360)
Total Investment/GDP	0.0630*	0.110	0.0987***	0.0569*
	(0.0364)	(0.0788)	(0.0325)	(0.0302)
Inflation Rate	0.0365	0.0379	0.0282	0.0107
	(0.0379)	(0.0669)	(0.0383)	(0.0409)
Current Account Balance	-0.0157	0.0303	0.0307	0.0212
	(0.0470)	(0.0858)	(0.0518)	(0.0500)
Total dependency ratio	0.0907**	-0.0273	-0.0343	0.104
	(0.0376)	(0.0914)	(0.0833)	(0.0708)
Trade Openness	0.0207***	0.0137	0.0132	0.0270***
	(0.00394)	(0.0161)	(0.0116)	(0.00805)
Population Growth rate	-1.136***	-1.162***	-1.204***	-1.329***
	(0.368)	(0.247)	(0.362)	(0.360)
Human Capital Index	-2.967**	4.002	4.850*	1.093
	(1.220)	(3.630)	(2.610)	(2.600)
Gross debt/GDP	0.117*	0.00169	0.00665	0.0935
	(0.0649)	(0.0793)	(0.0803)	(0.0711)
Gross debt/GDP squared	-0.00116**	-0.000527	-0.000544	-0.00120**
	(0.000553)	(0.000706)	(0.000689)	(0.000593)
Year1998	-8.382***	-9.462	-8.404***	-9.849***
	(1.813)	(5.766)	(1.380)	(1.986)
Year2009	-2.959	-4.240*	-3.800***	-5.317**
	(1.815)	(1.877)	(1.030)	(2.521)
Constant	-0.932	72.31	67.25**	4.882
	(5.866)	(67.49)	(29.87)	(12.39)
Observations	152	152	152	152
R-squared	0.677	0.633		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.5 ASEAN – Quadratic equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-1.207**	-3.378***	-8.524***	-3.820***
	(0.524)	(1.221)	(1.695)	(1.043)
Total Investment/GDP	0.0300	0.0522	0.0510*	0.0156
	(0.0190)	(0.0327)	(0.0282)	(0.0232)
Inflation Rate	-0.0986***	-0.0789***	-0.0995***	-0.138***
	(0.0354)	(0.0241)	(0.0236)	(0.0240)
Current Account Balance	-0.0266	0.0206	0.0322	0.0249
	(0.0313)	(0.0509)	(0.0453)	(0.0417)
Total dependency ratio	-0.0101	0.0402	-0.0747*	-0.0443
	(0.0316)	(0.0494)	(0.0388)	(0.0496)
Trade Openness	0.0130***	-0.00514	-0.000529	0.0136**
	(0.00320)	(0.00878)	(0.00820)	(0.00538)
Population Growth rate	-0.697**	-0.563*	-0.630**	-0.755***
	(0.313)	(0.302)	(0.269)	(0.276)
Human Capital Index	-1.990**	-0.986	4.643***	2.300
	(0.990)	(2.266)	(1.562)	(1.825)
External Debt/GDP	-0.0383	-0.124**	-0.131***	-0.131***
	(0.0353)	(0.0480)	(0.0431)	(0.0443)
External Debt/GDP squared	0.000199	0.000696*	0.000862***	0.000906***
	(0.000231)	(0.000370)	(0.000330)	(0.000345)
Year1998	-4.022*	-7.351***	-5.582***	-4.315***
	(2.071)	(1.917)	(1.046)	(1.419)
Year2009	-1.670	-4.462***	-4.189***	-3.812***
	(1.770)	(1.232)	(1.049)	(0.958)
Constant	15.78***	34.82***	68.74***	31.45***
	(4.027)	(9.887)	(13.01)	(7.781)
Observations	229	229	223	223
R-squared	0.653	0.629		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.6 ASEAN – Quadratic equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.118	-5.395	-4.724	-1.453
	(0.595)	(4.185)	(3.896)	(1.338)
Total Investment/GDP	0.0507	0.0929**	0.0781**	0.0507
	(0.0333)	(0.0434)	(0.0396)	(0.0336)
Inflation Rate	0.0389	0.0243	0.00837	0.00138
	(0.0443)	(0.0449)	(0.0428)	(0.0438)
Current Account Balance	-0.0464	0.0313	0.0185	-0.000297
	(0.0457)	(0.0627)	(0.0581)	(0.0567)
Total dependency ratio	0.0628	0.196	0.111	0.0504
	(0.0398)	(0.130)	(0.115)	(0.0939)
Trade Openness	0.0201***	0.00528	0.00607	0.0240***
	(0.00505)	(0.0126)	(0.0124)	(0.00888)
Population Growth rate	-0.972**	-1.234***	-1.279***	-1.233***
	(0.393)	(0.396)	(0.388)	(0.376)
Human Capital Index	-1.679	0.899	2.604	0.681
	(1.185)	(3.464)	(3.256)	(2.797)
Domestic Debt/GDP	0.0748*	0.0723	0.0680	0.0775
	(0.0430)	(0.0506)	(0.0496)	(0.0483)
Domestic Debt/GDP squared	-0.000822*	-0.00129**	-0.00118**	-0.00105**
	(0.000440)	(0.000594)	(0.000582)	(0.000507)
Year1998	-9.018***	-12.36***	-9.635***	-9.688***
	(1.773)	(2.657)	(1.460)	(1.367)
Year2009	-3.288*	-4.677***	-3.646***	-5.019***
	(1.792)	(1.278)	(1.002)	(1.563)
Constant	1.677	38.31	30.99	8.605
	(5.096)	(35.71)	(32.86)	(13.01)
Observations	139	139	139	139
R-squared	0.680	0.648		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.7 ASEAN-8 excluding Singapore and Brunei – Linear equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	0.730	-35.44***	-32.96***	-0.594
	(0.699)	(5.866)	(5.400)	(1.721)
Total Investment/GDP	0.165**	0.181**	0.183**	0.292***
	(0.0789)	(0.0890)	(0.0907)	(0.0887)
Inflation Rate	0.0704	0.144**	0.127**	0.136*
	(0.0512)	(0.0635)	(0.0587)	(0.0714)
Current Account Balance	0.0432	-0.00349	0.00121	0.108
	(0.0700)	(0.0722)	(0.0680)	(0.0752)
Total dependency ratio	0.175*	-0.415***	-0.395***	0.168*
	(0.0910)	(0.121)	(0.113)	(0.0875)
Trade Openness	0.0157***	0.0503***	0.0371**	0.00203
	(0.00577)	(0.0180)	(0.0153)	(0.0128)
Population Growth rate	-1.862	-0.750	-2.577*	-0.709
	(1.367)	(1.837)	(1.427)	(1.466)
Human Capital Index	-4.023***	0.619	9.287**	-0.596
	(1.297)	(6.173)	(3.619)	(3.397)
Gross public debt/GDP	-0.00234	-0.0606**	-0.0877***	-0.00254
	(0.0256)	(0.0295)	(0.0240)	(0.0307)
Year1998		-20.31***	-8.498***	-9.551***
		(3.667)	(1.302)	(1.828)
Year2009	7.379***	-7.170***	0.0191	-0.999
	(2.742)	(1.127)	(1.143)	(1.247)
Constant	-15.67*	300.4***	256.3***	-8.796
	(8.836)	(52.33)	(44.39)	(11.18)
Observations	109	109	109	109
R-squared	0.709	0.796		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.8 ASEAN-8 excluding Singapore and Brunei – Linear equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.747	-3.983**	-9.926***	-2.961**
	(0.621)	(1.807)	(1.942)	(1.193)
Total Investment/GDP	0.129***	0.115*	0.0886	0.0341
	(0.0393)	(0.0662)	(0.0567)	(0.0543)
Inflation Rate	-0.113**	-0.0721**	-0.116***	-0.177***
	(0.0445)	(0.0299)	(0.0268)	(0.0283)
Current Account Balance	0.0192	-0.00888	-0.0396	-0.0589
	(0.0551)	(0.0686)	(0.0551)	(0.0573)
Total dependency ratio	-0.0314	0.0584	-0.0857	-0.0679
	(0.0741)	(0.0776)	(0.0660)	(0.0659)
Trade Openness	0.00858	-0.00616	-0.000909	0.00682
	(0.00571)	(0.0127)	(0.0105)	(0.0100)
Population Growth rate	0.0848	-1.082	-1.665	-0.200
	(1.156)	(1.487)	(1.167)	(1.144)
Human Capital Index	-3.890***	-2.026	6.210***	3.133
	(1.108)	(3.985)	(2.275)	(2.380)
External public debt/GDP	-0.00663	-0.0326	-0.0139	-0.00205
	(0.0182)	(0.0227)	(0.0190)	(0.0191)
Year1998	-7.350***	-9.167***	-5.683***	-3.768**
	(2.775)	(2.331)	(1.196)	(1.733)
Year2009	-4.116***	-4.676***	-4.152***	-3.483***
	(1.526)	(1.392)	(1.091)	(1.111)
Constant	17.27***	38.34**	72.03***	20.12**
	(6.566)	(15.79)	(15.17)	(8.164)
Observations	176	176	171	171
R-squared	0.663	0.652		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.9 ASEAN-8 excluding Singapore and Brunei – Linear equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	0.387	-39.17***	-21.48***	0.158
	(0.733)	(7.754)	(7.429)	(1.531)
Total Investment/GDP	0.212***	0.283**	0.473***	0.355***
	(0.0682)	(0.113)	(0.127)	(0.0935)
Inflation Rate	0.0902	0.191***	0.117	0.159**
	(0.0687)	(0.0654)	(0.0730)	(0.0724)
Current Account Balance	0.0779	0.0991	0.193**	0.155*
	(0.0636)	(0.0842)	(0.0949)	(0.0851)
Total dependency ratio	0.145	-0.352**	-0.409**	0.150
	(0.0930)	(0.160)	(0.185)	(0.0929)
Trade Openness	0.0140**	0.0568***	0.0260	0.00566
	(0.00575)	(0.0183)	(0.0193)	(0.0125)
Population Growth rate	-0.923	1.919	-4.289*	0.0503
	(1.362)	(2.425)	(2.199)	(1.472)
Human Capital Index	-3.946***	-0.938	7.604	-4.369
	(1.462)	(6.476)	(7.100)	(3.355)
Domestic public debt/GDP	0.0574	-0.0474	-0.0339	-0.0696
	(0.0345)	(0.0372)	(0.0430)	(0.0346)
Year1998	-9.051***	-27.98***	-11.94***	-12.85***
	(2.981)	(4.301)	(1.979)	(1.629)
Year2009	0.513	-8.010***	-4.651***	-1.609
	(2.698)	(1.184)	(0.997)	(1.925)
Constant	-8.277	328.7***	170.1***	-8.287
	(8.597)	(62.17)	(56.00)	(9.896)
Observations	96	96	96	96
R-squared	0.773	0.848		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.10 ASEAN-8 excluding Singapore and Brunei– Quadratic equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	1.401*	-37.42***	-34.19***	0.194
	(0.811)	(6.751)	(6.097)	(1.766)
Total Investment/GDP	0.212***	0.162*	0.168*	0.362***
	(0.0787)	(0.0950)	(0.0976)	(0.0948)
Inflation Rate	0.113**	0.130*	0.117*	0.189**
	(0.0564)	(0.0680)	(0.0632)	(0.0758)
Current Account Balance	0.0715	-0.0186	-0.00956	0.146*
	(0.0716)	(0.0768)	(0.0724)	(0.0775)
Total dependency ratio	0.218**	-0.455***	-0.422***	0.217**
	(0.0984)	(0.138)	(0.128)	(0.0907)
Trade Openness	0.0122*	0.0540***	0.0393**	-0.00279
	(0.00632)	(0.0191)	(0.0162)	(0.0130)
Population Growth rate	-2.253	-0.639	-2.539*	-0.957
	(1.459)	(1.854)	(1.433)	(1.475)
Human Capital Index	-5.695***	1.520	10.07**	-2.689
	(1.582)	(6.380)	(4.039)	(3.546)
Gross debt/GDP	0.248*	-0.135	-0.139	0.266**
	(0.132)	(0.128)	(0.120)	(0.129)
Gross debt/GDP squared	-0.00245**	0.000687	0.000478	-0.00262**
	(0.00121)	(0.00116)	(0.00109)	(0.00122)
Year1998		-20.19***	-8.273***	-10.86***
		(3.689)	(1.402)	(1.933)
Year2009	8.472***	-7.225***	0.00179	-0.676
	(2.881)	(1.136)	(1.146)	(1.260)
Constant	-26.51**	317.8***	266.8***	-19.94
	(11.25)	(59.96)	(50.59)	(12.37)
Observations	109	109	109	109
R-squared	0.723	0.797		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A. 11 ASEAN-8 excluding Singapore and Brunei– Quadratic equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-1.081	-4.790**	-11.53***	-3.919***
	(0.654)	(1.848)	(1.942)	(1.250)
Total Investment/GDP	0.147***	0.0982	0.0943*	0.0376
	(0.0393)	(0.0664)	(0.0546)	(0.0535)
Inflation Rate	-0.107**	-0.0656**	-0.108***	-0.177***
	(0.0448)	(0.0298)	(0.0259)	(0.0278)
Current Account Balance	0.0451	0.00687	-0.00668	-0.0380
	(0.0566)	(0.0686)	(0.0541)	(0.0571)
Total dependency ratio	-0.0254	0.0481	-0.101	-0.0767
	(0.0735)	(0.0771)	(0.0638)	(0.0650)
Trade Openness	0.00779	-0.00952	-0.00302	0.00720
	(0.00570)	(0.0127)	(0.0101)	(0.00988)
Population Growth rate	0.515	-1.722	-2.353**	-0.289
	(1.200)	(1.517)	(1.146)	(1.126)
Human Capital Index	-3.828***	-0.385	6.591***	4.078*
	(1.089)	(4.056)	(2.194)	(2.380)
External Debt/GDP	-0.0832*	-0.134**	-0.149***	-0.0985**
	(0.0464)	(0.0611)	(0.0482)	(0.0470)
External Debt/GDP squared	0.000652**	0.000759*	0.00102***	0.000756**
	(0.000323)	(0.000424)	(0.000337)	(0.000338)
Year1998	-7.222**	-7.441***	-4.644***	-2.686
	(2.802)	(2.505)	(1.201)	(1.774)
Year2009	-4.099***	-4.608***	-4.495***	-3.313***
	(1.459)	(1.381)	(1.056)	(1.096)
Constant	19.70***	44.33***	88.19***	27.30***
	(6.707)	(16.01)	(15.54)	(8.654)
Observations	176	176	171	171
R-squared	0.671	0.660		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.12 ASEAN-8 excluding Singapore and Brunei– Quadratic equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	0.226	-39.97***	-32.29***	-0.178
	(0.774)	(7.860)	(7.629)	(1.637)
Total Investment/GDP	0.209***	0.275**	0.424***	0.352***
	(0.0681)	(0.114)	(0.111)	(0.0946)
Inflation Rate	0.0846	0.180***	0.142**	0.148**
	(0.0684)	(0.0673)	(0.0684)	(0.0750)
Current Account Balance	0.0778	0.0977	0.169**	0.157*
	(0.0657)	(0.0846)	(0.0843)	(0.0859)
Total dependency ratio	0.130	-0.395**	-0.482***	0.124
	(0.0940)	(0.171)	(0.174)	(0.103)
Trade Openness	0.0129**	0.0608***	0.0475**	0.00688
	(0.00611)	(0.0191)	(0.0192)	(0.0128)
Population Growth rate	-0.623	2.671	-3.160*	0.428
	(1.564)	(2.637)	(1.709)	(1.605)
Human Capital Index	-3.537**	-0.795	6.988	-3.702
	(1.374)	(6.504)	(6.096)	(3.551)
Domestic Debt/GDP	0.00321	-0.129	-0.0629	-0.00600
	(0.108)	(0.115)	(0.117)	(0.126)
Domestic Debt/GDP squared	0.00124	0.00177	-0.000257	0.00168
	(0.00274)	(0.00238)	(0.00235)	(0.00269)
Year1998	-8.226*	-28.12***	-11.30***	-12.41***
	(4.153)	(4.322)	(1.600)	(1.828)
Year2009	1.242	-7.926***	0.173	-1.379
	(3.805)	(1.194)	(1.228)	(1.252)
Constant	-7.742	336.5***	256.2***	-6.007
	(8.463)	(63.28)	(58.97)	(10.73)
Observations	96	96	96	96
R-squared	0.774	0.850		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.13 ASEAN-6 Lower Middle-Income Group – Linear Equation of Gross Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.370	-32.16***	-17.53***	-4.738*
	(1.866)	(6.896)	(5.719)	(2.693)
Total Investment/GDP	0.247**	0.100	0.208*	0.195*
	(0.0945)	(0.102)	(0.114)	(0.102)
Inflation Rate	-0.0544	-0.0679	-0.0563	-0.0380
	(0.0677)	(0.0592)	(0.0656)	(0.0749)
Current Account Balance	0.195**	0.144*	0.0426	0.0786
	(0.0868)	(0.0844)	(0.0903)	(0.0937)
Total dependency ratio	0.172*	-0.518*	0.0654	0.159
	(0.0872)	(0.266)	(0.206)	(0.137)
Trade Openness	0.00812	0.120***	0.0266	-0.00963
	(0.0191)	(0.0389)	(0.0282)	(0.0186)
Population Growth rate	-2.215	4.743	-9.167**	-4.474*
	(1.819)	(5.581)	(3.680)	(2.646)
Human Capital Index	-4.360**	-23.27	18.13**	3.021
	(1.803)	(14.86)	(7.208)	(3.883)
Gross public debt/GDP	0.0392	-0.0371	-0.0327	0.0516
	(0.0320)	(0.0317)	(0.0357)	(0.0349)
Year1998	1.198	-20.38***	-3.592*	-6.840***
	(2.322)	(5.719)	(2.091)	(2.622)
Year2009	4.347*	-6.576***	-5.060***	-5.408***
	(2.455)	(1.064)	(1.060)	(1.160)
Constant	-4.634	307.7***	95.96*	24.43
	(12.62)	(82.15)	(51.14)	(17.21)
Observations	67	67	67	67
R-squared	0.782	0.820		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.14 ASEAN-6 Lower Middle-Income Group – Linear Equation of External Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.623	2.225	-5.849*	-4.351*
	(1.849)	(3.295)	(3.030)	(2.264)
Total Investment/GDP	0.194***	0.130	0.103	0.0496
	(0.0677)	(0.0883)	(0.0694)	(0.0567)
Inflation Rate	-0.135**	-0.161***	-0.208***	-0.233***
	(0.0656)	(0.0357)	(0.0301)	(0.0258)
Current Account Balance	0.148*	0.139	0.0457	0.0429
	(0.0834)	(0.109)	(0.0747)	(0.0665)
Total dependency ratio	0.0361	-0.0148	-0.197	-0.181*
	(0.0988)	(0.212)	(0.150)	(0.0980)
Trade Openness	0.000622	0.0146	-0.0113	-0.0177
	(0.0178)	(0.0197)	(0.0164)	(0.0145)
Population Growth rate	-0.701	2.806	0.436	-0.517
	(1.921)	(3.911)	(2.167)	(1.742)
Human Capital Index	-4.110**	-13.82*	0.179	2.480
	(1.603)	(7.960)	(3.158)	(2.833)
External public debt/GDP	0.0228	0.00530	0.0282	0.0261
	(0.0264)	(0.0274)	(0.0209)	(0.0187)
Year1998	-6.120**	-7.279***	-2.469*	-0.568
	(2.551)	(2.491)	(1.493)	(1.771)
Year2009	-3.809**	-3.393**	-3.683***	-4.080***
	(1.834)	(1.590)	(1.188)	(1.088)
Constant	13.48	13.62	55.91**	41.34**
	(14.65)	(36.51)	(28.16)	(16.22)
Observations	108	108	105	105
R-squared	0.783	0.726		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.15 ASEAN-6 Lower-Middle-Income Group – Linear Equation of Domestic Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-3.846*	-34.57***	-16.03	-4.751
	(1.966)	(11.45)	(10.81)	(3.757)
Total Investment/GDP	0.224**	0.197	0.421***	0.237**
	(0.0899)	(0.119)	(0.134)	(0.120)
Inflation Rate	0.0224	-0.0547	-0.0176	0.0487
	(0.0737)	(0.0649)	(0.0786)	(0.0872)
Current Account Balance	0.206*	0.306**	0.343**	0.209*
	(0.108)	(0.117)	(0.155)	(0.123)
Total dependency ratio	0.0270	-0.557*	-0.463	0.0582
	(0.101)	(0.308)	(0.378)	(0.140)
Trade Openness	-0.0215	0.0985**	0.0649**	-0.0234
	(0.0193)	(0.0369)	(0.0417)	(0.0249)
Population Growth rate	0.780	8.195	-6.366	0.0783
	(2.026)	(7.536)	(6.291)	(3.218)
Human Capital Index	-0.500	-23.60	3.562	0.638
	(1.956)	(18.74)	(18.65)	(3.928)
Domestic public debt/GDP	-0.00919	-0.0804	-0.062	-0.00686
	(0.0373)	(0.0546)	(0.0603)	(0.0435)
Year1998		-25.41***	-7.688***	-10.81***
		(7.561)	(2.501)	(3.214)
Year2009	5.457**	-7.135***	-4.525***	-5.297***
	(2.406)	(1.683)	(1.569)	(1.153)
Constant	19.20	331.2***	138.7**	32.53
	(14.29)	(94.26)	(66.31)	(23.80)
Observations	54	54	54	54
R-squared	0.854	0.875		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.16 ASEAN-6 Lower-Middle-Income Group – Quadratic Equation of Gross Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	0.276	-37.54***	-28.20***	-4.545
	(1.922)	(7.746)	(7.270)	(3.113)
Total Investment/GDP	0.311***	0.0383	0.0748	0.204
	(0.102)	(0.109)	(0.124)	(0.125)
Inflation Rate	-0.00835	-0.118*	-0.132*	-0.0334
	(0.0694)	(0.0678)	(0.0708)	(0.0842)
Current Account Balance	0.212**	0.117	0.0102	0.0827
	(0.0854)	(0.0852)	(0.0861)	(0.100)
Total dependency ratio	0.266**	-0.721**	-0.364	0.171
	(0.119)	(0.297)	(0.277)	(0.169)
Trade Openness	0.00448	0.127***	0.0526*	-0.00973
	(0.0193)	(0.0386)	(0.0291)	(0.0189)
Population Growth rate	-3.393	5.883	-4.488	-4.563
	(2.180)	(5.550)	(4.069)	(2.777)
Human Capital Index	-6.005***	-18.76	16.70**	2.627
	(2.053)	(14.96)	(6.799)	(4.978)
Gross debt/GDP	0.254	-0.320	-0.466	0.0792
	(0.158)	(0.198)	(0.202)	(0.215)
Gross debt/GDP squared	-0.00190	0.00238	0.00367	-0.000245
	(0.00133)	(0.00165)	(0.00168)	(0.00188)
Year1998	0.511	-17.59***	-2.454	-7.147**
	(2.403)	(5.953)	(2.032)	(3.562)
Year2009	5.424**	-6.241***	-4.762***	-5.463***
	(2.380)	(1.073)	(1.005)	(1.253)
Constant	-17.00	354.4***	206.5***	22.53
	(16.05)	(87.10)	(69.90)	(22.76)
Observations	67	67	67	67
R-squared	0.790	0.830		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.17 ASEAN-6 Lower-Middle-Income Group – Quadratic Equation of External Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-0.609	2.361	-5.498*	-4.072*
	(1.862)	(3.345)	(3.064)	(2.258)
Total Investment/GDP	0.185**	0.127	0.103	0.0453
	(0.0720)	(0.0896)	(0.0694)	(0.0564)
Inflation Rate	-0.133**	-0.160***	-0.208***	-0.231***
	(0.0661)	(0.0361)	(0.0301)	(0.0256)
Current Account Balance	0.153*	0.141	0.0560	0.0564
	(0.0832)	(0.110)	(0.0759)	(0.0669)
Total dependency ratio	0.0400	-0.00271	-0.181	-0.164*
	(0.0986)	(0.216)	(0.152)	(0.0982)
Trade Openness	0.00399	0.0163	-0.00728	-0.0109
	(0.0189)	(0.0205)	(0.0172)	(0.0154)
Population Growth rate	-0.725	2.598	0.265	-0.613
	(1.940)	(3.991)	(2.179)	(1.731)
Human Capital Index	-4.191**	-13.41	0.0747	2.119
	(1.634)	(8.112)	(3.161)	(2.827)
External Debt/GDP	-0.0234	-0.0209	-0.0162	-0.0440
	(0.0837)	(0.0845)	(0.0616)	(0.0598)
External Debt/GDP squared	0.000318	0.000187	0.000323	0.000491
	(0.000576)	(0.000572)	(0.000422)	(0.000398)
Year1998	-5.515*	-6.813**	-1.855	0.319
	(2.859)	(2.884)	(1.694)	(1.900)
Year2009	-3.686*	-3.315**	-3.576***	-3.863***
	(1.879)	(1.619)	(1.196)	(1.094)
Constant	14.09	11.65	53.37*	40.09**
	(14.74)	(37.26)	(28.36)	(16.14)
Observations	108	108	105	105
R-squared	0.784	0.727		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.18 ASEAN-6 Lower-Middle-Income Group – Quadratic Equation of Domestic Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-3.918*	-41.01***	-17.04	-4.975
	(1.963)	(13.37)	(11.89)	(3.839)
Total Investment/GDP	0.231**	0.207*	0.441***	0.270**
	(0.0924)	(0.120)	(0.161)	(0.134)
Inflation Rate	0.0296	-0.0332	-0.00827	0.0667
	(0.0798)	(0.0690)	(0.0897)	(0.0939)
Current Account Balance	0.213*	0.279**	0.340**	0.240*
	(0.108)	(0.120)	(0.159)	(0.136)
Total dependency ratio	0.0434	-0.367	-0.397	0.113
	(0.132)	(0.369)	(0.478)	(0.171)
Trade Openness	-0.0223	0.0989**	0.0635	-0.0239
	(0.0191)	(0.0370)	(0.0433)	(0.0253)
Population Growth rate	0.481	6.387	-7.822	-0.969
	(2.637)	(7.797)	(8.893)	(3.735)
Human Capital Index	-0.729	-19.45	6.400	0.0487
	(2.218)	(19.30)	(22.57)	(4.120)
Domestic Debt/GDP	0.0266	0.0584	-0.123	0.0872
	(0.139)	(0.157)	(0.175)	(0.168)
Domestic Debt/GDP squared	-0.000843	-0.00285	-0.000919	-0.00227
	(0.00267)	(0.00303)	(0.00385)	(0.00391)
Year1998		-28.52***	-7.716***	-11.61***
		(8.272)	(2.573)	(3.549)
Year2009	5.576**	-8.502***	-4.830**	-5.712***
	(2.519)	(2.227)	(2.057)	(1.373)
Constant	19.19	360.9***	137.4**	32.95
	(14.46)	(99.66)	(68.37)	(24.21)
Observations	54	54	54	54
R-squared	0.854	0.880		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.19 Singapore and Brunei – Linear equation of Domestic Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-59.28**	-36.11**	15.42	-25.49
	(25.81)	(15.48)	(55.39)	(51.90)
Total Investment/GDP	-0.126	0.105	-0.0407	-0.0491
	(0.102)	(0.0695)	(0.167)	(0.173)
Inflation Rate	-0.0426	0.103*	-0.182	-0.140
	(0.128)	(0.0604)	(0.164)	(0.154)
Current Account Balance	0.0668	0.223*	0.152	0.190
	(0.192)	(0.124)	(0.241)	(0.240)
Total dependency ratio	1.998**	0.00845	0.836	0.895
	(0.769)	(0.251)	(0.840)	(1.741)
Trade Openness	0.130***	0.107***	0.0294	0.0996
	(0.0403)	(0.0325)	(0.104)	(0.0671)
Population Growth rate	-0.736	-1.640***	-1.207	-0.554
	(1.068)	(0.582)	(1.213)	(1.240)
Human Capital Index	31.52**	21.28**	-6.069	14.08
	(10.05)	(8.492)	(32.87)	(24.99)
Domestic public debt/GDP	-0.254	-0.240	-0.346	-0.176
	(0.143)	(0.108)	(0.261)	(0.190)
Year1998	-2.964		-17.04**	-12.21
	(4.412)		(8.681)	(12.28)
Year2009	9.305		-12.82**	-9.383*
	(7.587)		(6.322)	(5.544)
Constant	431.7*	300.5**	-158.8	181.8
	(216.0)	(127.0)	(457.9)	(416.3)
Observations	43	43	43	43
R-squared	0.913	0.502		
Time Effect	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.20 Singapore and Brunei – Quadratic equation of Domestic Public Debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-41.77	-36.18**	9.821	-11.48
	(57.96)	(15.24)	(52.76)	(72.84)
Total Investment/GDP	-0.153	0.101	0.00785	-0.0673
	(0.125)	(0.0685)	(0.204)	(0.194)
Inflation Rate	-0.0651	0.0963	-0.212	-0.156
	(0.142)	(0.0596)	(0.171)	(0.171)
Current Account Balance	0.0292	0.205	0.233	0.161
	(0.235)	(0.123)	(0.272)	(0.273)
Total dependency ratio	2.087**	-0.104	1.405	0.927
	(0.835)	(0.259)	(1.117)	(1.843)
Trade Openness	0.103	0.116***	0.0104	0.0787
	(0.0832)	(0.0327)	(0.108)	(0.101)
Population Growth rate	-1.087	-1.731***	-0.739	-0.843
	(1.519)	(0.576)	(1.248)	(1.642)
Human Capital Index	25.04	20.31**	-15.31	9.025
	(18.62)	(8.388)	(37.75)	(31.56)
Domestic Debt/GDP	0.0393	-1.277	-1.294	0.0451
	(0.697)	(0.739)	(1.396)	(0.784)
Domestic Debt/GDP squared	-0.00220	0.00610	0.00561	-0.00168
	(0.00526)	(0.00430)	(0.00834)	(0.00574)
Year1998	-15.14		-12.42	-2.848
	(12.20)		(7.672)	(15.30)
Year2009	-2.379			
	(4.996)			
Constant	278.5	331.3**	-86.15	41.53
	(530.4)	(126.9)	(417.4)	(630.4)
Observations	43	43	43	43
R-squared	0.915	0.533		
Time Effect	Yes	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.21 Thailand and Malaysia – Linear equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-127.4***	-129.4***	-150.9***	-145.0***
	(21.52)	(28.95)	(41.31)	(40.76)
Total Investment/GDP	0.0496	-0.0172	-0.433	-0.381
	(0.385)	(0.556)	(0.786)	(0.819)
Inflation Rate	0.139	0.133	0.123	0.119
	(0.137)	(0.152)	(0.174)	(0.179)
Current Account Balance	-0.165	-0.208	-0.557	-0.517
	(0.347)	(0.415)	(0.617)	(0.645)
Total dependency ratio	-0.0787	-0.191	-0.0652	-0.128
	(0.411)	(0.659)	(0.531)	(0.539)
Trade Openness	-0.0137	-0.0140	0.00220	-0.000280
	(0.0362)	(0.0448)	(0.0546)	(0.0527)
Population Growth rate	19.93	25.55	14.27	17.92
	(13.79)	(23.93)	(19.63)	(12.88)
Human Capital Index	168.1*	240.5	177.2***	215.1**
	(87.65)	(281.8)	(45.98)	(102.6)
Gross public debt/GDP	-0.274**	-0.274**	-0.320**	-0.300**
	(0.105)	(0.111)	(0.136)	(0.135)
Year1998	-7.716	23.89	-0.469	-13.84
	(23.07)	(107.7)	(9.045)	(21.41)
Year2009	-5.636	5.524	-1.415	-26.63
	(58.78)	(26.28)	(2.034)	(56.21)
Constant	661.5***	469.4	860.3***	725.5***
	(113.9)	(726.7)	(306.0)	(199.8)
Observations	42	42	42	42
R-squared	0.985	0.985		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.22 Thailand and Malaysia – Linear equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-4.413*	-0.394	-12.22	-14.10***
	(2.402)	(3.862)	(9.497)	(4.043)
Total Investment/GDP	0.584	0.771**	0.476	0.972***
	(0.359)	(0.288)	(0.311)	(0.264)
Inflation Rate	0.137	0.160	0.180	0.137
	(0.141)	(0.138)	(0.134)	(0.134)
Current Account Balance	0.428	0.520*	0.208	0.601**
	(0.268)	(0.260)	(0.289)	(0.243)
Total dependency ratio	-0.418	-0.539	-0.424	-0.265
	(0.568)	(0.391)	(0.359)	(0.342)
Trade Openness	0.00530	0.0191	0.0237	-0.00261
	(0.0696)	(0.0462)	(0.0405)	(0.0419)
Population Growth rate	7.741*	13.47**	4.673	10.06***
	(4.191)	(5.857)	(7.866)	(3.857)
Human Capital Index	-10.84	-11.48	4.978	-13.85
	(11.02)	(12.57)	(10.15)	(11.60)
External public debt/GDP	-0.156**	-0.0652	-0.0503	-0.0341
	(0.0752)	(0.0857)	(0.0863)	(0.0867)
Year1998	-17.77***	-25.44**	-16.09**	0.774
	(5.896)	(9.396)	(6.853)	(10.08)
Year2009	-1.737	-5.061*	-4.063*	26.30*
	(2.678)	(2.915)	(2.311)	(15.64)
Constant	62.53	23.07	95.02	108.1***
	(41.31)	(56.01)	(82.31)	(41.41)
Observations	68	68	66	66
R-squared	0.933	0.937		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.23 Thailand and Malaysia – Linear equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-81.31**	-83.79**	-84.55**	-84.67**
	(26.71)	(29.01)	(40.14)	(39.94)
Total Investment/GDP	0.702	0.609	0.583	0.617
	(0.430)	(0.684)	(0.964)	(0.981)
Inflation Rate	0.345**	0.340*	0.354*	0.338
	(0.144)	(0.173)	(0.200)	(0.215)
Current Account Balance	0.204	0.146	0.118	0.145
	(0.385)	(0.526)	(0.778)	(0.809)
Total dependency ratio	-0.218	-0.338	-0.184	-0.196
	(0.579)	(0.882)	(0.712)	(0.821)
Trade Openness	0.00112	0.000766	0.00443	0.00481
	(0.0471)	(0.0584)	(0.0737)	(0.0713)
Population Growth rate	9.374	17.88	13.44	12.99
	(25.30)	(44.79)	(49.03)	(32.02)
Human Capital Index	115.8	198.3	111.5	106.5
	(148.5)	(371.7)	(76.75)	(172.7)
Domestic public debt/GDP	-0.0692	-0.0827	-0.104	-0.108
	(0.181)	(0.222)	(0.261)	(0.264)
Year1998	-3.651	26.56	-8.701	-7.300
	(66.49)	(147.6)	(15.42)	(51.46)
Year2009		8.636	0.331	2.822
		(34.91)	(4.178)	(131.3)
Constant	382.5	167.3	419.8	432.3
	(270.5)	(944.3)	(351.7)	(294.3)
Observations	42	42	42	42
R-squared	0.974	0.974		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.24 Thailand and Malaysia – Quadratic equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-159.6***	-169.5***	-176.0***	-187.3***
	(30.01)	(27.69)	(41.41)	(40.32)
Total Investment/GDP	1.275**	1.221	0.497	0.752
	(0.540)	(0.658)	(0.946)	(0.897)
Inflation Rate	0.0589	0.0317	0.0701	0.0251
	(0.123)	(0.125)	(0.163)	(0.157)
Current Account Balance	0.488	0.436	-0.0623	0.0717
	(0.354)	(0.414)	(0.653)	(0.617)
Total dependency ratio	-1.736*	-2.281*	-1.019	-1.880*
	(0.833)	(0.982)	(0.793)	(1.006)
Trade Openness	-0.0358	-0.0394	-0.0115	-0.0178
	(0.0277)	(0.0363)	(0.0510)	(0.0448)
Population Growth rate	4.813	20.09	-8.907	3.420
	(13.26)	(18.74)	(23.59)	(13.06)
Human Capital Index	340.1**	581.6*	137.2***	408.0***
	(117.4)	(258.4)	(49.74)	(130.9)
Gross debt/GDP	0.868*	1.005*	0.526	0.851*
	(0.464)	(0.520)	(0.568)	(0.602)
Gross debt/GDP squared	-0.0142**	-0.0159**	-0.0108	-0.0147*
	(0.00584)	(0.00638)	(0.00706)	(0.00755)
Year1998	-78.38*	174.4	-2.866	-88.19**
	(38.48)	(103.2)	(8.469)	(42.16)
Year2009	-143.8	38.43	-4.873*	-173.4*
	(83.23)	(24.33)	(2.939)	(88.75)
Constant	655.4***	-95.77	1,229***	766.1***
	(115.4)	(608.9)	(370.9)	(167.8)
Observations	42	42	42	42
R-squared	0.991	0.992		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.25 Thailand and Malaysia – Quadratic equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-3.461	0.971	-13.04	-13.15***
	(2.728)	(4.258)	(13.99)	(4.509)
Total Investment/GDP	0.562	0.753**	0.466	0.959***
	(0.366)	(0.291)	(0.338)	(0.270)
Inflation Rate	0.133	0.156	0.183	0.128
	(0.146)	(0.139)	(0.139)	(0.138)
Current Account Balance	0.384	0.471*	0.202	0.577**
	(0.280)	(0.269)	(0.303)	(0.251)
Total dependency ratio	-0.259	-0.352	-0.438	-0.140
	(0.590)	(0.459)	(0.409)	(0.425)
Trade Openness	-0.00389	0.00865	0.0249	-0.0110
	(0.0695)	(0.0484)	(0.0441)	(0.0456)
Population Growth rate	6.129	11.81*	4.511	8.750*
	(4.759)	(6.264)	(8.292)	(4.680)
Human Capital Index	-11.25	-12.01	5.215	-14.00
	(11.66)	(12.68)	(10.79)	(11.80)
External Debt/GDP	-0.0730	0.0403	-0.0619	0.0205
	(0.138)	(0.159)	(0.167)	(0.139)
External Debt/GDP squared	-0.00131	-0.00159	-0.000199	-0.000975
	(0.00190)	(0.00201)	(0.00243)	(0.00191)
Year1998	-18.06***	-25.85**	-15.93**	3.053
	(5.983)	(9.485)	(7.267)	(11.17)
Year2009	-1.709	-4.861	-4.082*	28.58*
	(2.897)	(2.949)	(2.376)	(16.51)
Constant	51.46	7.226	102.6	95.00*
	(44.62)	(59.90)	(125.6)	(49.25)
Observations	68	68	66	66
R-squared	0.934	0.939		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.26 Thailand and Malaysia – Quadratic equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-103.0**	-104.3**	-103.0**	-102.5**
	(34.39)	(34.42)	(44.58)	(46.77)
Total Investment/GDP	-0.413	-0.457	-0.410	-0.393
	(1.266)	(1.196)	(1.436)	(1.592)
Inflation Rate	0.240	0.239	0.231	0.233
	(0.285)	(0.195)	(0.239)	(0.258)
Current Account Balance	-0.476	-0.505	-0.465	-0.441
	(0.786)	(0.796)	(0.997)	(1.100)
Total dependency ratio	0.637	0.553	0.441	0.649
	(1.079)	(1.201)	(0.977)	(1.332)
Trade Openness	-2.01e-06	-0.000208	-0.00298	0.00184
	(0.0427)	(0.0578)	(0.0737)	(0.0742)
Population Growth rate	25.81	30.87	33.46	29.59
	(28.26)	(45.92)	(53.32)	(38.89)
Human Capital Index	70.24	121.8	176.9*	51.92
	(134.0)	(374.6)	(103.9)	(191.3)
Domestic Debt/GDP	-0.785	-0.785	-0.757	-0.803
	(0.767)	(0.685)	(0.750)	(0.885)
Domestic Debt/GDP squared	0.0120	0.0119	0.0117	0.0118
	(0.0128)	(0.0110)	(0.0126)	(0.0143)
Year1998	-10.25*	-28.89	-6.022	31.38
	(5.372)	(154.8)	(15.60)	(71.10)
Year2009	28.24	-4.147	1.232	78.72
	(69.58)	(36.52)	(4.266)	(164.6)
Constant	651.6	552.7	384.8	640.5
	(354.5)	(1,000)	(351.8)	(396.4)
Observations	42	42	42	42
R-squared	0.978	0.978		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.27 Indonesia and The Philippines – Linear equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	5.438	-170.9**	-25.85	21.59
	(26.74)	(49.50)	(31.98)	(48.65)
Total Investment/GDP	0.0732	0.113	0.0732	0.100
	(0.213)	(0.142)	(0.282)	(0.405)
Inflation Rate	-0.184	-0.236*	-0.207	-0.174
	(0.188)	(0.100)	(0.200)	(0.282)
Current Account Balance	0.282	0.105	0.0213	0.178
	(0.571)	(0.221)	(0.440)	(0.657)
Total dependency ratio	-0.709	2.828**	0.471	-0.544
	(0.388)	(0.982)	(0.958)	(0.684)
Trade Openness	0.130	-0.0296	0.0947	0.113
	(0.118)	(0.0751)	(0.113)	(0.175)
Population Growth rate	4.640	-8.282	-9.996	-2.844
	(23.79)	(10.31)	(20.67)	(28.92)
Human Capital Index	17.28	21.29	64.80	48.94
	(73.03)	(27.63)	(52.61)	(93.92)
Gross public debt/GDP	-0.0120	-0.0187	0.0188	0.00602
	(0.113)	(0.0587)	(0.121)	(0.170)
Year1998	-9.179	-91.59**	-4.091	-11.48
	(13.46)	(28.66)	(7.530)	(17.49)
Year2009	-14.61	-34.80**	-8.298	-28.95
	(38.53)	(9.339)	(5.182)	(48.57)
Constant	-44.42	1,155**	28.09	-232.3
	(309.3)	(363.0)	(197.3)	(526.6)
Observations	35	35	35	35
R-squared	0.949	0.986		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.28 Indonesia and The Philippines – Linear equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	6.130**	7.646***	9.271**	2.732
	(2.255)	(2.398)	(4.442)	(4.163)
Total Investment/GDP	-0.0390	0.0599	0.104	-0.0354
	(0.0796)	(0.0961)	(0.0829)	(0.0829)
Inflation Rate	-0.248***	-0.245***	-0.244***	-0.260***
	(0.0227)	(0.0356)	(0.0377)	(0.0348)
Current Account Balance	0.391***	0.347**	0.453**	0.365**
	(0.0765)	(0.130)	(0.176)	(0.182)
Total dependency ratio	-0.583***	-1.416***	-1.354**	-0.757***
	(0.202)	(0.489)	(0.532)	(0.248)
Trade Openness	0.204***	0.209***	0.172***	0.174***
	(0.0553)	(0.0535)	(0.0579)	(0.0545)
Population Growth rate	4.603*	12.70**	14.86***	6.468**
	(2.659)	(5.033)	(5.016)	(3.025)
Human Capital Index	-1.003	-36.66*	-43.56***	2.219
	(4.377)	(19.24)	(16.49)	(6.520)
External public debt/GDP	-0.251***	-0.256***	-0.193**	-0.167**
	(0.0582)	(0.0658)	(0.0844)	(0.0728)
Year1998	4.453	4.032	0.913	4.295
	(3.355)	(3.189)	(2.635)	(3.861)
Year2009	-0.537	2.506	2.123	-0.565
	(1.426)	(2.076)	(2.385)	(1.500)
Constant	-21.71	85.99	82.96	2.611
	(24.56)	(60.97)	(59.51)	(32.53)
Observations	68	68	66	66
R-squared	0.951	0.953		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.29 Indonesia and The Philippines – Linear equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	8.096	-185.3**	-27.85	18.56
	(27.18)	(48.79)	(29.53)	(43.54)
Total Investment/GDP	0.0546	0.171	0.0829	0.122
	(0.236)	(0.148)	(0.312)	(0.449)
Inflation Rate	-0.203	-0.204*	-0.191	-0.156
	(0.222)	(0.0939)	(0.204)	(0.289)
Current Account Balance	0.257	0.167	0.0341	0.211
	(0.567)	(0.217)	(0.458)	(0.692)
Total dependency ratio	-0.727	3.105**	0.457	-0.526
	(0.412)	(0.961)	(0.955)	(0.727)
Trade Openness	0.127	-0.0590	0.105	0.112
	(0.108)	(0.0706)	(0.0950)	(0.167)
Population Growth rate	5.562	-10.12	-10.78	-3.369
	(24.04)	(9.588)	(21.00)	(29.37)
Human Capital Index	18.89	18.61	63.09	46.41
	(70.37)	(25.54)	(51.21)	(89.84)
Domestic public debt/GDP	0.00946	-0.0649	0.00244	-0.0168
	(0.153)	(0.0716)	(0.146)	(0.206)
Year1998	-8.620	-100.8**	-4.985	-11.75
	(13.17)	(28.63)	(5.898)	(17.06)
Year2009	-15.13	-37.94**	-8.495	-27.71
	(38.34)	(9.391)	(5.311)	(48.66)
Constant	-68.70	1,264**	49.70	-204.2
	(296.2)	(358.3)	(143.8)	(463.9)
Observations	35	35	35	35
R-squared	0.949	0.988		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.30 Indonesia and The Philippines – Quadratic equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-32.43*	-127.6	-47.29	-35.30
	(11.69)	(65.60)	(32.65)	(63.85)
Total Investment/GDP	-0.189	-0.0211	-0.157	-0.206
	(0.211)	(0.195)	(0.304)	(0.441)
Inflation Rate	-0.337**	-0.288*	-0.322	-0.330
	(0.0764)	(0.113)	(0.197)	(0.283)
Current Account Balance	0.212	0.134	0.139	0.200
	(0.251)	(0.223)	(0.401)	(0.588)
Total dependency ratio	-1.314**	1.332	-0.794	-1.347
	(0.330)	(1.783)	(1.274)	(0.900)
Trade Openness	0.165*	0.0417	0.154	0.171
	(0.0674)	(0.103)	(0.110)	(0.163)
Population Growth rate	3.986	-4.133	-0.518	4.203
	(9.927)	(11.10)	(19.69)	(26.53)
Human Capital Index	2.126	12.94	14.65	-0.592
	(34.85)	(28.83)	(60.00)	(93.39)
Gross debt/GDP	-1.100**	-0.517	-0.974	-1.141
	(0.265)	(0.499)	(0.752)	(0.954)
Gross debt/GDP squared	0.00798**	0.00367	0.00706	0.00826
	(0.00215)	(0.00365)	(0.00530)	(0.00678)
Year1998	-7.280	-59.32	-5.075	-7.293
	(5.944)	(43.04)	(6.729)	(16.03)
Year2009	-13.82	-24.47	-7.222	-12.86
	(19.49)	(13.89)	(4.674)	(45.44)
Constant	356.5*	923.3	406.6	387.2
	(139.1)	(429.8)	(333.7)	(693.4)
Observations	35	35	35	35
R-squared	0.985	0.990		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.31 Indonesia and The Philippines – Quadratic equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	6.310**	8.495***	9.463**	2.402
	(2.345)	(2.332)	(4.525)	(4.326)
Total Investment/GDP	-0.0183	0.132	0.148	-0.0263
	(0.0865)	(0.0995)	(0.0971)	(0.0874)
Inflation Rate	-0.242***	-0.233***	-0.235***	-0.256***
	(0.0223)	(0.0346)	(0.0398)	(0.0368)
Current Account Balance	0.433***	0.410***	0.462**	0.364*
	(0.0835)	(0.129)	(0.180)	(0.186)
Total dependency ratio	-0.470*	-1.488***	-1.447***	-0.709**
	(0.236)	(0.468)	(0.551)	(0.277)
Trade Openness	0.202***	0.206***	0.178***	0.174***
	(0.0532)	(0.0510)	(0.0592)	(0.0557)
Population Growth rate	2.608	11.74**	13.95***	5.161
	(3.267)	(4.826)	(5.199)	(4.372)
Human Capital Index	0.618	-45.73**	-49.93***	3.700
	(4.326)	(18.99)	(18.17)	(7.529)
External debt/GDP	-0.458**	-0.643***	-0.473	-0.279
	(0.185)	(0.219)	(0.318)	(0.276)
External debt/GDP squared	0.00210	0.00391*	0.00264	0.00110
	(0.00183)	(0.00212)	(0.00289)	(0.00260)
Year1998	6.588*	7.154*	3.709	5.570
	(3.577)	(3.478)	(4.067)	(4.968)
Year2009	0.436	4.642*	3.766	-0.131
	(1.260)	(2.292)	(3.020)	(1.846)
Constant	-28.75	110.1*	105.9	2.015
	(25.64)	(59.56)	(65.57)	(33.28)
Observations	68	68	66	66
R-squared	0.953	0.959		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.32 Indonesia and The Philippines – Quadratic equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-7.841	-178.6	-18.44	-6.703
	(22.18)	(77.84)	(36.03)	(63.34)
Total Investment/GDP	-0.244	0.146	-0.139	-0.208
	(0.275)	(0.264)	(0.479)	(0.716)
Inflation Rate	-0.265	-0.209	-0.239	-0.241
	(0.141)	(0.113)	(0.240)	(0.365)
Current Account Balance	0.494	0.187	0.274	0.491
	(0.509)	(0.296)	(0.625)	(0.917)
Total dependency ratio	-0.994**	2.932	-0.329	-0.933
	(0.287)	(1.775)	(1.579)	(1.046)
Trade Openness	0.0817	-0.0546	0.0929	0.0734
	(0.102)	(0.0887)	(0.108)	(0.206)
Population Growth rate	17.35	-8.682	4.112	15.66
	(20.77)	(16.00)	(32.24)	(44.45)
Human Capital Index	-11.03	16.58	25.73	-7.029
	(58.14)	(33.67)	(79.69)	(131.8)
Domestic debt/GDP	-0.960*	-0.128	-0.648	-0.920
	(0.447)	(0.516)	(0.971)	(1.330)
Domestic debt/GDP squared	0.0165	0.00113	0.0112	0.0157
	(0.00800)	(0.0091)	(0.0165)	(0.0227)
Year1998		-97.60	-8.070	-9.132
		(41.76)	(8.047)	(20.62)
Year2009	4.967	-36.76*	-7.329	-5.263
	(22.05)	(14.38)	(6.224)	(66.32)
Constant	127.1	1,225*	104.7	116.7
	(258.7)	(519.0)	(181.2)	(720.7)
Observations	35	35	35	35
R-squared	0.974	0.988		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.33 VCLM- Linear Equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-17.48***	-31.55***	-17.24***	-17.74***
	(5.474)	(7.359)	(4.614)	(4.502)
Total Investment/GDP	0.217	0.187	0.00628	0.0736
	(0.148)	(0.117)	(0.119)	(0.113)
Inflation Rate	0.00485	0.0226	0.00411	0.0112
	(0.0310)	(0.0408)	(0.0415)	(0.0418)
Current Account Balance	0.241**	0.118	0.0619	0.115
	(0.103)	(0.0944)	(0.105)	(0.0912)
Total dependency ratio	0.0751	0.406*	-0.160	-0.0616
	(0.159)	(0.228)	(0.126)	(0.137)
Trade Openness	0.0192	0.0399*	0.0619***	0.0334**
	(0.0192)	(0.0225)	(0.0234)	(0.0159)
Population Growth rate	-8.468*	-9.343***	-8.248**	-8.557***
	(4.511)	(3.238)	(3.299)	(3.086)
Gross Public debt/GDP	0.000411	-0.0285	-0.0434	-0.0305
	(0.0213)	(0.0233)	(0.0259)	(0.0227)
Year1998	-12.40***	-36.54***	-2.070	-1.029
	(3.249)	(12.39)	(2.105)	(1.854)
Year2009	-7.683**	-13.71***	-5.566***	-1.205
	(3.510)	(3.665)	(1.759)	(4.074)
Constant	130.1***	214.7***	138.8***	133.1***
	(40.52)	(48.44)	(37.02)	(35.36)
Observations	55	55	55	55
R-squared	0.898	0.873		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.34 VCLM- Linear Equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-13.12**	-3.381**	-14.86***	-15.01***
	(5.660)	(1.416)	(5.065)	(4.654)
Total Investment/GDP	0.0266	0.0359	0.0321	0.0752
	(0.139)	(0.102)	(0.111)	(0.107)
Inflation Rate	0.0840*	0.050*	0.00873	0.0188
	(0.0442)	(0.0255)	(0.0514)	(0.0494)
Current Account Balance	0.0779	0.0685	0.0314	0.0688
	(0.107)	(0.080)	(0.0938)	(0.0823)
Total dependency ratio	0.0520	0.0233	0.0351	0.0359
	(0.0978)	(0.0198)	(0.0909)	(0.0926)
Trade Openness	0.0246	0.0446**	0.0518**	0.0312*
	(0.0200)	(0.0198)	(0.0223)	(0.0170)
Population Growth rate	-7.728**	-2.971**	-7.566**	-7.697***
	(3.426)	(1.4155)	(2.966)	(2.750)
External Public debt/GDP	0.0357	0.043**	0.0433*	0.0335
	(0.0471)	(0.020)	(0.0411)	(0.0389)
Year1998	-7.463**	-5.776*	-6.594**	-5.468*
	(3.460)	(9.357)	(2.762)	(2.964)
Year2009	-5.201	-4.395*	-5.490**	-4.000
	(5.123)	(3.607)	(2.207)	(4.484)
Constant	102.4**	24.62*	111.2***	110.9***
	(41.43)	(46.39)	(36.70)	(33.52)
Observations	63	63	62	62
R-squared	0.805	0.707		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.35 VCLM- Linear Equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-30.23***	-22.02**	-21.44***	-26.97***
	(9.213)	(13.95)	(4.823)	(6.412)
Total Investment/GDP	0.298**	0.224	0.159	0.240
	(0.104)	(0.135)	(0.159)	(0.149)
Inflation Rate	-0.0304	-0.0742	-0.0845	-0.0352
	(0.0376)	(0.0561)	(0.0546)	(0.0527)
Current Account Balance	0.182**	0.186*	0.136	0.140
	(0.0692)	(0.0957)	(0.118)	(0.122)
Total dependency ratio	0.115	-0.753	-0.818***	0.0493
	(0.202)	(0.873)	(0.246)	(0.211)
Trade Openness	0.0626*	0.122**	0.129***	0.0539**
	(0.0313)	(0.0483)	(0.0427)	(0.0235)
Population Growth rate	-19.04**	-31.93*	-31.08***	-16.57***
	(7.547)	(15.46)	(7.996)	(5.297)
Domestic Public debt/GDP	0.00527	-0.00793	-0.0131	-0.00276
	(0.0414)	(0.0730)	(0.0652)	(0.0457)
Year1998	-11.80***	-5.534*	-5.168***	-10.94***
	(4.024)	(7.562)	(1.577)	(2.327)
Year2009	224.3***	217.4***	216.0***	203.2***
	(73.04)	(62.62)	(48.05)	(51.02)
Observations	42	42	42	42
R-squared	0.942	0.899		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.36 VCLM- Quadratic Equation of Gross public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-15.11***	-5.739**	-13.85**	-16.31***
	(5.119)	(10.11)	(5.636)	(4.721)
Total Investment/GDP	0.277*	0.1395	0.0921	0.132
	(0.158)	(0.127)	(0.145)	(0.123)
Inflation Rate	0.0262	0.003	0.0180	0.0235
	(0.0278)	(0.0422)	(0.0448)	(0.0436)
Current Account Balance	0.161*	0.1245	0.0524	0.0716
	(0.0842)	(0.0970)	(0.110)	(0.0986)
Total dependency ratio	0.319	0.00236	0.00440	0.127
	(0.199)	(0.232)	(0.194)	(0.198)
Trade Openness	0.0263	0.0474**	0.0605**	0.0355**
	(0.0183)	(0.0231)	(0.0243)	(0.0163)
Population Growth rate	-10.96**	-3.295*	-9.917***	-10.36***
	(4.432)	(3.504)	(3.726)	(3.427)
Gross debt/GDP	0.106**	0.0949*	0.0426	0.0469
	(0.0505)	(0.0820)	(0.0797)	(0.0621)
Gross debt/GDP squared	-0.000373**	-0.000387**	-0.000269	-0.000259
	(0.000144)	(0.000250)	(0.000234)	(0.000193)
Year1998	-14.68***	-32.36*	-1.856	-1.052
	(3.749)	(15.17)	(2.196)	(1.895)
Year2009	-8.114**	-12.55***	-5.251***	0.815
	(3.397)	(4.396)	(1.850)	(4.426)
Constant	97.73**	188.7**	103.6**	108.9***
	(38.83)	(72.03)	(49.23)	(40.37)
Observations	55	55	55	55
R-squared	0.911	0.875		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.37 VCLM- Quadratic Equation of External public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-13.40**	-14.36**	-14.32***	-15.46***
	(5.756)	(6.356)	(5.202)	(4.835)
Total Investment/GDP	0.0713	0.0571	0.0352	0.0790
	(0.135)	(0.126)	(0.114)	(0.109)
Inflation Rate	0.0549	0.0361	0.00893	0.0154
	(0.0360)	(0.0532)	(0.0524)	(0.0509)
Current Account Balance	0.0774	-0.0495	-0.00679	0.0832
	(0.100)	(0.110)	(0.104)	(0.0893)
Total dependency ratio	0.0971	0.381	0.138	0.0124
	(0.103)	(0.234)	(0.143)	(0.107)
Trade Openness	0.0208	0.0606**	0.0573**	0.0319*
	(0.0194)	(0.0257)	(0.0235)	(0.0173)
Population Growth rate	-8.935***	-10.37**	-8.524***	-7.301**
	(3.242)	(3.768)	(3.194)	(2.925)
External debt/GDP	0.0744	0.197**	0.0526**	0.0701*
	(0.0876)	(0.0932)	(0.110)	(0.0881)
External debt/GDP squared	-0.000851*	-0.00162**	-0.000711*	-0.000310**
	(0.000449)	(0.000613)	(0.000755)	(0.000667)
Year1998	-10.87***	-18.00*	-9.448**	-3.760
	(3.464)	(9.710)	(4.140)	(4.751)
Year2009	-7.307	-7.385**	-5.891**	-2.668
	(5.080)	(3.481)	(2.293)	(5.387)
Constant	102.5**	89.54**	101.3***	114.0***
	(44.02)	(42.38)	(38.93)	(34.77)
Observations	63	63	62	62
R-squared	0.820	0.764		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.38 VCLM- Quadratic Equation of Domestic public debt

VARIABLES	(1) OLS	(2) Fixed Effects	(3) Differenced GMM	(4) System GMM
Ln (initial income)	-31.64***	-8.01**	-23.98***	-28.34***
	(9.129)	(5.130)	(5.996)	(6.896)
Total Investment/GDP	0.326***	0.1187	0.214	0.266*
	(0.111)	(0.043)	(0.178)	(0.158)
Inflation Rate	0.00297	-0.048	-0.0423	-0.00215
	(0.0544)	(0.0728)	(0.0796)	(0.0736)
Current Account Balance	0.159**	0.2299**	0.121	0.118
	(0.0672)	(0.0971)	(0.122)	(0.130)
Total dependency ratio	0.179	-0.427**	-0.640*	0.107
	(0.221)	(0.243)	(0.347)	(0.233)
Trade Openness	0.0680**	0.0776***	0.126***	0.0586**
	(0.0320)	(0.0509)	(0.0438)	(0.0251)
Population Growth rate	-18.94**	-8.01**	-30.14***	-16.30***
	(7.963)	(7.63)	(8.260)	(5.449)
Domestic debt/GDP	0.139	-0.04	0.134	0.133
	(0.133)	(0.272)	(0.208)	(0.211)
Domestic debt/GDP squared	-0.00192	0.000053	-0.00201	-0.00197
	(0.00158)	(0.00315)	(0.00271)	(0.00297)
Year1998	-12.30***	-2.038*	-6.614***	-11.43***
	(4.073)	(8.215)	(2.526)	(2.502)
Constant	227.9***	192.1**	221.3***	206.7***
	(74.04)	(66.69)	(49.56)	(52.59)
Observations	42	42	42	42
R-squared	0.944	0.907		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note:

Levels of significance: *** p< 1 percent, ** p< 5 percent, * p< 10 percent.

(1) refers to the model where the debt indicator is the gross public debt to GDP ratio;

(2) refers to the model with external public debt to GDP ratio as the debt indicator;

(3) refers to the model with the domestic public debt to GDP ratio.

Time dummies are not reported.

The period of most of the regressions covers 1980 – 2016. For the sample of sub-group including Vietnam, Laos, Cambodia, and Myanmar, the period is 1990-2016.

Singapore and Brunei have only domestic public debt, no external public debt.

CHAPTER VI CONCLUSION

In conclusion, the impact of public debt on economic growth is an important topic which attracts the attention of many researchers and policymakers. The answer to the question, "Is public debt good for the economic growth or not?", is still controversial. Nevertheless, the dissertation suggests some findings as follows.

First, theoretical literature suggests that the impact of public debt on economic growth depends on the level of public debt. Specifically, at the low and reasonable level, public debt may have a positive impact on economic growth through productive public investment and expansionary fiscal policy. However, most of the theoretical literature supports the negative link of high public debt level with economic growth through lowering investment, lowering capital accumulation, lowering total factor productivity and causing capital flight because of the high risk of default. In the inverted-U shape explanation, the positive effect and negative effect of public debt on economic growth are integrated. The non-linear impact of public debt is examined by many empirical studies using the data sample from advanced countries and developing countries. Most of the existing empirical studies focus on total public debt and external debt impact while neglecting the impact of domestic public debt on economic growth. The existing empirical literature on this topic using data from ASEAN countries indicates that public debt may hurt growth but not showing how its impact on economic growth differs among different income groups of ASEAN countries.

Second, over the last three decades from the 1980s, the total amount of public debt in ASEAN countries has increased significantly. However, the overall ratio of public debt to GDP has decreased to a moderate level. Public debt may be an important factor leading to the economic growth of ASEAN members over the period 1980s-2010s. Since low levels of public debt to GDP ratio attract more investment into the country, GDP growth increases as a

consequence. There are three main country groups in ASEAN: high-income, upper-middle-income, and lower-middle-income. These groups have different conditions in terms of per capita income level, current account balance surplus, budget deficit, gross savings, net public investment, poverty level, and industrial structures. High-income countries have only domestic public debt; the main reason may be the fact that they have a high current account surplus and a large amount of gross savings. Singapore has the highest domestic public debt to GDP ratio in ASEAN, but the risk from its debt almost equals to zero. Lower-middle-income countries and upper-middle-income countries have different public debt structures and public debt management policies.

Third, the dissertation summaries detailed procedures of how to apply the Solow growth model to the analysis of the impact of public debt on per capita income growth in ASEAN countries. The standard Solow growth model was augmented by adding human capital as a part of resource of economic development in the long term, and then it was developed as a regression model which can be applied to the panel data analysis (Mankiw, Romer and Weil, 1992). Later on, Islam (1995) modified the M-R-W model to apply it to an empirical analysis with technology, climate and institutional factors included in the country specifics and correlated with population growth and savings rate. We included debt variables such as total public debt, external public debt and domestic debt as a share of GDP into Islam's regression growth model to test the relationship between public debt and economic growth. The econometric model based on the Islam model using ASEAN data, the impact of external public debt and domestic public debt on economic growth are examined.

Finally, this study has provided empirical evidence about the relationship between public debt and economic growth for a panel of 10 ASEAN countries referring to their economic structures. Methodologically, the dissertation used the fixed effects model to estimate the impacts of public debt on the economic growth of ASEAN countries. Initially, the

dissertation divided ASEAN countries into three groups based on per capita income as suggested by the World Bank, which is high-income, upper-middle-income and lower-middle-income countries. The results, based on the fixed effects model, have shown that this is the right direction and suggest that the impact of public debt on economic growth in ASEAN is diverse among different groups of ASEAN countries.

Specifically, the group of high-income countries including Singapore and Brunei has high gross savings and current account surplus; these governments do not depend on the public debt to promote economic growth. Other variables such as human capital, trade openness, initial income, population growth rate determine the economic growth patterns of these two high-income countries.

In the upper-middle-income group including Thailand and Malaysia, gross public debt has non-linear inverse U-shape impact on per capita income growth with the threshold of 31.6% GDP. In the past, the government promoted economic growth on the basis of public debt while the debt level was moving around the threshold level. The public debt level of these countries currently exceeds this threshold level; the government should pay more attention to controlling its debt level.

The results of the study suggest that the lower-middle-income group should be divided into two sub-groups: one includes the Philippines and Indonesia, and the other consists of Vietnam, Laos, Cambodia, and Myanmar. The U-shape relationship between external public debt to GDP ratio and economic growth is found in the sub-group of the Philippines and Indonesia, with the threshold of 82.4% GDP. However, this negative impact is strongly confirmed by the linear model since the external public debt level of these countries was lower than 80% GDP most of the studied period. Therefore, a decrease in external public debt to GDP ratio leads to an increase in per capita GDP growth in Indonesia and the Philippines.

The finding of sub-group including Vietnam, Laos, Cambodia, and Myanmar indicates that external public debt has inverse U-shape impact on economic growth with the threshold of 60.7 % GDP. When external public debt is lower than this threshold, an increase in external borrowing leads to a rise in per capita income growth. Besides, gross public debt also has an inverse U-shape effect on economic growth with the threshold of 122.6 % GDP which is much higher than those obtained by the previous empirical studies. Developing countries depend on external borrowing to promote economic growth while the domestic capital market is limited. External public debt plays a crucial role in creating financial sources for development and promoting economic growth, but careful controlling external public debt to GDP ratio is also necessary.

The results also suggest a positive relationship between trade openness and economic growth in most ASEAN countries. The findings show a negative relationship between population and growth in all groups in ASEAN. ASEAN members need to control the speed of population growth because it harms per capita income growth in general. Population growth creates an abundant labor force supplying for the labor market. Moreover, in low-income and lower-middle-income countries such as Cambodia, Myanmar, Vietnam, Laos PDR, the Philippines, and Indonesia, abundant labor may mean more unemployment and social problems, which can negatively influence economic growth.

Given that the ASEAN Economic Community has been established since 2015, debt issue should be an essential aspect that needs to be considered carefully and specified in a particular policy. Data on public debt should be given full attention among international organizations such as the IMF and World Bank. It is necessary to have a close link between the governments of ASEAN and international organizations providing information on public debt.

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