THE RELATIVE EFFECTIVENESS OF FISCAL AND MONETARY POLICIES ON ECONOMIC GROWTH IN FIVE ASEAN COUNTRIES

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ABSTRACT

The issues of fiscal policy dependency, vulnerabilities of domestic economy, frail financial uphold, and small fiscal multiplier motivated this study to examine the relationship between fiscal and monetary policies and economic growth in ASEAN-5 for the period of 1970-2015 by using the autoregressive distributed lag (ARDL) and Toda Yamamoto method. Expenditure is significant in ASEAN-5 economies except for Indonesia. Implementation of non-tax in the long run results in expenditure being significant in ASEAN-5 except in Indonesia; tax and non-tax are significant in the Philippines, Thailand, and Singapore; and debt is significant in Indonesia and Thailand. The policy contributes to the Philippines and Thailand to increase the rate of non-tax in support of the growing expenditure. Singapore highly recommends increasing the rate of tax and non-tax to decrease its accrued debt. The interest rate is significant in Indonesia and the Philippines, inflation is significant in Indonesia and Thailand, and the exchange rate is significant in Indonesia and Malaysia. The result provides useful information about the existence of cost channel in Indonesia. Singapore recommends reducing its control in the exchange rate as the exchange market may not be well developed because of lesser integration with international financial markets. The results support the views of the St. Louis Model that asserts monetary policy is relatively more effective than fiscal policy in Indonesia, and vice versa in Malaysia. Monetary dominance exists in the Philippines, and there is cooperation between fiscal and monetary policies in Singapore and Thailand. Interaction policies exist in ASEAN-5 except Indonesia. Causality in the interaction term is found in Indonesia supporting the Post Keynesian theory of endogenous money, and in Thailand it supports the Non-Ricardian theory. Monetary authorities should be transparent in monetary tools and fiscal authorities to ensure growth stability through accountability in contractionary or expansionary policies in aggregate demand using the fiscal instrument.

Keywords: fiscal policy, monetary policy, growth, cross-sectional, ASEAN-5

ABSTRACK

Isu-isu kebergantungan dasar fiskal, kelemahan ekonomi domestik, pendirian kewangan yang lemah, dan pengganda fiskal kecil menyumbang kepada keperluan kajian ini. Kajian ini mengkaji hubungan antara dasar fiskal dan kewangan dengan pertumbuhan ekonomi di ASEAN-5 dalam tempoh 1970 hingga 2015. Kaedah lag edaran autoregresif (ARDL) dan Toda Yamamoto digunakan dalam kajian ini. Perbelanjaan signifikan berlaku dalam ekonomi ASEAN-5 kecuali di Indonesia. Pelaksanaan cukai bukan hasil dalam jangka panjang dalam perbelanjaan adalah signifikan di ASEAN-5 kecuali di Indonesia. Sementara itu, cukai dan cukai bukan hasil adalah signifikan di Filipina, Thailand, dan Singapura, manakala hutang pula adalah signifikan di Indonesia serta Thailand. Dasar ini memberi sumbangan terhadap Filipina dan Thailand untuk meningkatkan kadar cukai bukan hasil dalam menyokong perbelanjaan yang semakin meningkat. Singapura direkomendasikan meningkatkan kadar cukai dan bukan cukai untuk mengurangkan hutang terakru. Sementara itu, kadar faedah adalah signifikan di Indonesia dan Filipina. Selain itu inflasi adalah signifikan di Indonesia, dan kadar pertukaran signifikan di Indonesia dan Malaysia. Oleh itu, hasilnya memberikan informasi yang berguna dimana keberadaan saluran kos di Indonesia. Singapura diperakukan untuk mengurangkan kawalan dalam kadar pertukaran kerana pasaran pertukaran mungkin tidak berkembang dengan baik. Ini disebabkan oleh integrasi yang lebih rendah dengan pasaran kewangan antarabangsa. Hasil ini menyokong pandangan Model St Louis yang menegaskan dasar kewangan yang relatif lebih efektif daripada dasar fiskal di Indonesia, dan sebaliknya di Malaysia. Dominasi kewangan berlaku di Filipina, dan kerjasama antara dasar fiskal dan kewangan berlaku di Singapura dan Thailand. Dasar interaksi wujud di ASEAN-5 kecuali di Indonesia. Penyebab dalam istilah interaksi ditemui di Indonesia yang menyokong teori wang endogen Post Keynesian, dan Thailand menyokong teori Non-Ricardian. Oleh itu, pihak berkuasa kewangan harus telus dalam alat kewangan dan pihak berkuasa fiskal untuk memastikan kestabilan pertumbuhan melalui akauntabiliti dalam penguncupan atau dasar pengembangan dalam permintaan agregat menggunakan instrumen fiskal.

Kata Kunci: dasar fiskal, dasar kewangan, pertumbuhan, keratan rentas, ASEAN-5

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LIST OF ABBREVIATIONS

Abbreviation	Full Meaning
ADF	Augmented Dickey Fuller
AFC	Asian Financial Crisis
ASEAN-5	Indonesia, Malaysia, Philippines, Singapore, Thailand
BI	Bank of Indonesia
BOT	Bank of Thailand
BSP	Bangko Sentral ng Pilipinas
CPI	Consumer Price Index
GDPC	Gross Domestic Product Per Capita
GFC	Global Financial Crisis
LM	Lagrange Multiplier
LS	Lee and Strazicich
MAS	Monetary Authority of Singapore
USD	United States Dollar

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter presents the general introduction of the thesis. The background and issues of ASEAN-5 countries are highlights in the following section. Section 1.3 discusses the problem statement, Section 1.4 contains the research questions, and Section 1.5 presented the objectives of the study. The significance of the study is given in Section 1.6, while Section 1.7 and Section 1.8 offer the scope of the study and the organization of the thesis.

1.2 Background of the Study

Economic growth is known for its cruciality not only for a country but also individual wellbeing. Bringing up economic growth in a country requires appropriate policy prescription in macroeconomic policies. In achieving higher growth per capita, both convergent and divergent of fiscal and monetary policies stances are crucial. The robustness of fiscal and monetary policies are essential tools that could save a country from economic circumstances and political influences. The influences of these two devices depicted on three worldwide phenomena which are during the Great Depression, Asian Financial Crisis (AFC), and Global Financial Crisis (GFC).

During the Great Depression in 1930, the nationwide accentuate on Keynesian theory in restoring the economy. Though the fiscal policy has been used successfully during the Great Depression, Keynesian theory was into doubtfulness situation in the 1980s and turn out to be true when AFC hit the economy in 1997 (Ketema, 2006). Both

increases in unemployment and inflation in the 1960s implied that the Keynesian fiscal policy might be flawed, leading the gradual shift to monetary policy. According to, Mishkin (1996), fiscal policy has lost its appropriateness in stabilising the aggregate economy. Hence, the world shifts to monetary policy after the AFC where monetary policy is held relatively more superior than the fiscal policy with its rapid and timely adjustment in policy implication.

However, the trends of dismissing the fiscal policy tools to improve the economy from recession come to an end with the appearing of GFC in 2007. The worsening of economic activities during the GFC was different from the AFC as the economy worsened due to the pre-existing state of low-interest rate. Thus, the GFC has returned fiscal policy to the centre stage once again for two compelling reasons. First, from the start, the recession was anticipated to be a lengthy process thus contributing the conditioned stimulus having a sufficient time of positive impact on the economy. Second, the monetary policy has reached its limits in credit and quantitative easing (Blanchard, Dell'Ariccia, & Mauro, 2010). As a result, monetary policy is abandoned in the 2009 and replaced with fiscal policy just like during the Great Depression in 1930 as the essential tool for influencing economic activity.

In brief, utilisation of these policy setting, and reforms are indispensable in reviving growth during the economic recession and when the crisis hit the country economy. Hence, the concerns in this study, are not whether preference of fiscal or monetary policies but instead identifying the factors that might contribute to the economic breakdown not only in theory but also practically. Also, with the present factors, how far or what is the impact that the country received in response to these policies setting

despite the economic downturn and the pass-through effect from the globalised markets and countries nowadays.

1.2.1 Issues of Fiscal Policy

In further recognising the constraint of the policy-making and the policy limitation, this study thus reviews the crucial tools in the fiscal policies.

Table 1.1
Fiscal Policy (ASEAN-5)

Year/ Country	**Fiscal Policy**			
2015 (Recent)	**TE**	**T**	**NT**	**TD**
Indonesia	149,623.30	108,945.82	32,333.78	332,117.54
Malaysia	74,785.81	47,555.62	18,813.62	117,177.16
Philippines	56,529.59	51,608.76	6,011.79	64,888.13
Singapore	59,824.34	43,668.31	13,416.98	2,748,295.92
Thailand	87,543.30	80,599.79	11,346.13	177,562.43
1970-2015 (Average)	**TE**	**T**	**NT**	**TD**
Indonesia	44,145.06	31,558.93	9,797.10	99,629.07
Malaysia	27,507.22	15,513.05	5,615.30	36,703.99
Philippines	18,205.88	11,046.91	1,395.17	37,710.62
Singapore	16,210.28	12,316.34	5,716.05	305,555.26
Thailand	30,711.78	20,762.25	2,557.79	52,876.93

Note: TE total expenditure, T tax, NT non-tax, and TD total debt. All the variables figures are in USD (United States Dollar).
Sources: Balance of Payments databases, Government Finance Statistics Yearbook and data files, International Debt, International Monetary Fund, International Financial Statistics, National Accounts and data files, OECD GDP estimates, UNESCO Institute of Statistics, World Bank national accounts data and World Development Indicators.

Referring to the Table 1.1, in comparison with other ASEAN-5, Indonesia averagely from 1970 to 2015, and in 2015 ranked as the first country with the most significant expenditure of 44,145.06 USD (United States Dollar) and 149,623.30 USD. Thailand expenditure of 30,711.78 USD ranked as the second country compared to other ASEAN-5 with the most massive expenditure on average and in 2015 with 87,543.30 USD. According to Sussangkarn (2012), the effectiveness of fiscal stimulant in Indonesia was lesser than Thailand during the GFC as their law compels them by their deficit and public debt ratio. Moreover, the effectiveness of ASEAN-5 fiscal stimulus packages was predominantly expenditure-based except for Indonesia. In Malaysia,

expenditure amounted to 100% of the total stimulus, 80% in Singapore and the Philippines, and 70% in Thailand (Budina & Tuladhar, 2010).

Malaysia ranked as the third country with the most massive expenditure, an average of 27,507.22 USD from 1970 to 2015, and of 74,785.81 USD in 2015. Emerging economies that are potentially more susceptible to financing pressures will withdraw their fiscal stimulus earlier. For instance, the effectiveness of fiscal stimulus was significantly shorter in length and to some degree slighter in Thailand and Malaysia than in Indonesia and the Philippines (Isnawangsih, Klyuev, & Zhang, 2013). The Philippines expenditure of 56,529.59 USD in 2015 and of 18,205.88 USD average ranked as the fourth country with the lowest expenditure in ASEAN-5. On the other hand, Singapore expenditure of 16,210.28 USD in average and of 59,824.34USD in 2015 ranked as the lowest in ASEAN-5.

Singapore debt of 305,555.26 USD in average and of 2,748,295.92 USD in 2015 ranked as the highest in comparison to ASEAN-5. In 2015 Indonesia also has a spectacular debt as it ranked as second largest debt country of 332,117.54 USD and an average of 99,629.07 USD compared to other ASEAN-5. Thailand ranked as the country with the third highest debt of 52,876.93 USD in average and of 177,562.43 USD in 2015. Philippines ranked as the country with the fourth lowest debt of 37,710.62 USD in average and lowest debt of 64,888.13 USD in 2015. Moreover, Malaysia also ranked as the lowest country in debt accumulation of 36,703.99 USD in average and ranked as the fourth lowest in debt collection in 2015 with 117,177.16 USD compared to other ASEAN-5.

Indonesia ranked as the highest country in tax and non-tax revenue in 2015 of 108,945.82 USD and 32,333.78 USD an average of 31,558.93 USD and 9,797.10 USD compared to other ASEAN-5. This high revenue is predictable as according to Budina and Tuladhar (2010), the effectiveness of Indonesia fiscal stimulus packages was predominantly revenue-based. Thailand tax revenue of 20,762.25 USD and 80,599.79 USD is ranked as the second highest in average and in 2015 compared to other ASEAN-5, respectively. On the contrary, Thailand non-tax of 2,557.79 USD and 11,346.13 USD in average and in 2015 ranked as the fourth-lowest country in relative to other ASEAN-5.

Singapore tax of 12,316.34 USD in average is ranked as the fourth lowest in ASEAN-5 and of 43,668.31 USD in 2015 ranked as the lowest in 2015 compared to other ASEAN-5. Singapore non-tax of 13,416.98 USD is ranked as the third largest in 2015 and of 5,716.05 USD on average is ranked as the second highest in ASEAN-5. In ensuring the effectiveness of fiscal policy, Singapore government even attempted training programs for unskilled workers and targeting particular group when conducting expansionary fiscal policy to eliminate the structural problem in the country.

Malaysia ranked as the fourth-lowest country in tax collection of 47,555.62 USD in 2015 and ranked third of 15,513.05 USD in average compared to other ASEAN-5. On the contrary, Malaysia ranked as the second highest country in non-tax collection of 18,813.62 USD in 2015 and ranked as the third country of 5,615.30 USD in average compared to other ASEAN-5. Philippines was the ranked as the third country tax of 51,608.76 USD in 2015 but the lowest tax of 11,046.91USD in average relative to

other ASEAN-5. According to Abitona (2014), taxing capacity complication in the Philippines may lead the country having a low tax collection. The Philippines ranked as the lowest non-tax of 6,011.79 USD in 2015 of and of 1,395.17 USD on average.

1.2.2 Issues of Monetary Policy

The review of fiscal policy will be incomplete without the tools of monetary policy in every country. In the past two decades, the effectiveness of monetary policy frameworks in the ASEAN-5 economies has evolved substantially mainly in response to economic crisis. Thus, this study also choices some crucial tools of the central bank. Similarly, according to Jeasakul, Lim, and Lundback (2014) during the period of significant domestic turbulence and external vulnerabilities like during the GFC, ASEAN-5 monetary policy frameworks have performed well in delivering both price and output stability that lead to the economies resiliency.

Table 1.2
Monetary Policy (ASEAN-5)

Year/ Country	**Monetary Policy**			
2015 (Recent)	**MS**	**IR**	**ER**	**CPI**
Indonesia	339,185,301,031.92	5.83	13,389.41	131.49
Malaysia	519,374,085.47	3.21	3.91	113.63
Philippines	211,453,243,939.77	2.53	45.50	117.43
Singapore	402,603,301,154.98	0.50	1.37	113.21
Thailand	823,640,512,150.75	1.59	34.25	110.35
1970-2015 (Average)	**MS**	**IR**	**ER**	**CPI**
Indonesia	95,196,320,538.01	14.62	4,514.46	36.95
Malaysia	124,028,569.68	4.49	2.94	65.47
Philippines	46,461,887,145.05	10.60	27.83	45.31
Singapore	99,894,341,373.29	4.13	1.89	74.47
Thailand	146,197,179,959.01	8.95	28.59	59.22

Note: MS represents money supply, IR interest rate, ER nominal exchange rate, and CPI consumer price index. All the variables figures are in percentage annual rate except MS figures in USD.
Sources: Balance of Payments databases, Government Finance Statistics Yearbook and data files, International Debt, International Monetary Fund, International Financial Statistics, National Accounts and data files, OECD GDP estimates, UNESCO Institute of Statistics, World Bank national accounts data and World Development Indicators.

Table 1.2 shows that averagely, double digits of interest rate were seen in Indonesia and the Philippines. Indonesia interest rate of 14.62% was the highest, followed by

The Philippines of 10.60%. Then, Thailand interest rate of 8.95% was third highest averagely, followed by Malaysia and Singapore interest rate of 4.49% and 4.13%, respectively. In 2015, Indonesia interest rate was the highest with 5.83%, followed by Malaysia, the Philippines, Thailand, and Singapore of 3.21%, 2.53%, 1.59%, and 0.50% interest rate, respectively. Indonesia interest rate was ranked the highest in average and in 2015, suggesting that interest rate response may have its limitations due to price control and lengthy high inflation episode in Indonesia. Singapore interest rates are the lowest in average and in 2015, this might imply that the government is stimulating economic activity through other channels. Furthermore, according to Hwa (2015), central banks in Malaysia, the Philippines and Thailand tend to lower their policy interest rates when financial stress increases for quicker economic recovery.

Averagely, Thailand money supply of 146,197,179,959.01 USD was ranked as the highest, follow by Singapore, Indonesia, Philippines, and Malaysia with money supply of 99,894,341,373.29 USD, 95,196,320,538.01 USD, 46,461,887,145.05 USD, and 124,028,569.68 USD, respectively. In 2015, Thailand money supply of 823,640,512,150.75 USD was ranked as the highest, follow by Singapore, Indonesia, the Philippines, and Malaysia with money supply of 402,603,301,154.98 USD, 339,185,301,031.92 USD, 211,453,243,939.77 USD and 519,374,085.47 USD, respectively. Malaysia money supply was the lowest compared to other ASEAN-5 in 2015 and in average. Malaysia money supply was the lowest was expected as BNM indeed moved from the selection of monetary aggregates towards interest rate targeting in the mid-1990s.

Averagely, Consumer Price Index (CPI) of 74.47 was the highest in Indonesia, followed by Malaysia, Thailand, the Philippines, and Indonesia with CPI of 65.47, 59.22, 45.31, and 36.95, respectively. In 2015, CPI of 131.49 was the highest in Indonesia, followed by the Philippines, Malaysia, Singapore, and in Thailand with CPI of 117.43, 113.63, 113.21, and 110.35, respectively. Although Indonesia and the Philippines monetary policy are practising inflation targeting due to their historic high inflation episode, still CPI was rank the highest in Indonesia, followed by the Philippines in 2015.

Before the AFC, the ASEAN-5 economies had tightly pegged their exchange rates, which became a source of vulnerabilities such as excessive borrowing and currency mismatch by corporates and banks. After the AFC, the ASEAN-5 countries adjusted their monetary policy frameworks to allow more exchange rate flexibility to gain more independence in capital flow (International Monetary Fund, 2016). In 2015, Indonesia exchange rate of 13,389.41 rupiah/USD was the lowest, followed by the Philippines exchange rate of 45.50 (Peso/USD) and Thailand exchange rate of 34.25 (baht/USD). The sharp depreciation of the currency in Indonesia and Thailand suggest that these countries might be at risk. According to Mishkin (1996 & 1999), these fluctuations in the exchange rate can cause a financial crisis.

Furthermore, according to Klyuev & Dao (2016), Malaysia and Singapore tend to supervise the value of their currencies against undisclosed baskets while Indonesia, Thailand, and the Philippines profess floating exchange rates. Singapore exchange rate of 1.37 (Dollar/USD) in 2015 was ranked the highest in ASEAN-5, and follow by Malaysia of 3.91 (RM/USD) in 2015. The ASEAN-5 countries are not among those

with the highest degree of foreign exchange intervention, except for Singapore that equal to China due to their financial openness and sensitivity of capital flows to interest rate differentials. While, Indonesia exchange rate management is the lowest in ASEAN-5 and is comparable to some advanced economies, from Japan. On the other hand, the Philippines and Thailand are with a slightly higher degree of exchange rate management and Malaysia around the median sample between Russia and Argentina (International Monetary Fund, 2016).

1.2.3 Relative Effectiveness of Fiscal and Monetary Policies

Discussion on the effectiveness of fiscal and monetary policies focus on the magnitude of the policy to economic growth. On the other hand, the debate on the relative effectiveness of fiscal and monetary policies concentrate on the degree of which policies capable of producing the desired result at the given time. For instance, in the wake of the first AFC in 1998, many governments across the world enacted aggressive fiscal policy. However, in the aftermath of the second GFC in 2008-2009, the world enacted an aggressive monetary policy.

Table 1.3
Relative Effectiveness of Fiscal and Monetary Policies (ASEAN-5)

Recession Year	GDPC	TE	T	NT	TD	MS	IR	ER	CPI
Indonesia		**Fiscal Policy**				**Monetary Policy**			
1982	-1.20	13.61	-3.62	23.29	10.42	8.96	-0.02	4.70	9.48
1998	-14.35	-56.26	-58.06	-62.04	11.11	-52.71	1.26	244.18	58.39
1999	-0.61	47.28	40.56	116.02	-0.00	43.07	-0.62	-21.56	20.49
Malaysia									
1985	-3.80	2.88	-4.32	-3.78	8.20	3.65	-0.10	5.95	0.35
1986	-1.71	4.84	-15.44	5.36	7.95	8.68	0.19	3.96	0.74
1998	-9.61	-25.47	-39.4	-32.67	-10.20	-28.15	0.11	39.50	5.27
2001	-1.55	8.93	30.35	23.03	7.66	11.64	0.05	0.00	1.42
2009	-3.17	0.55	-10.71	5.22	3.12	1.97	-0.39	5.66	0.58
Philippines									
1983	-0.87	-15.31	-9.40	0.88	-0.83	17.57	0.35	30.13	10.03
1984	-9.81	-26.66	-16.30	-22.42	0.60	-21.51	0.71	50.27	50.34
1985	-9.78	-1.09	9.69	1.39	9.36	0.92	-0.40	11.43	23.10
1991	-3.02	-1.66	6.30	22.01	6.12	4.15	0.05	13.03	19.26
1992	-2.08	19.14	23.33	4.30	1.71	21.83	0.06	-7.16	8.65
1993	-0.30	-1.96	3.75	-16.38	8.88	20.55	-0.17	6.30	6.72
1998	-2.73	-20.65	-27.16	-34.91	5.65	-21.76	-0.14	38.76	9.23
2009	-0.34	4.07	-13.03	6.41	-4.29	0.99	-0.17	7.57	4.22
Singapore									
1985	-0.82	2.39	-15.82	3.80	7.10	0.63	-0.30	3.14	0.48
1998	-5.49	-8.91	-21.54	7.38	93.59	15.56	0.14	12.72	-0.27
2001	-3.59	4.72	-8.24	-19.06	0.79	1.85	-0.25	3.93	1.00
2008	-3.49	51.74	14.8	10.84	26.04	19.35	-0.64	-6.12	6.52
2009	-3.56	8.62	-5.55	-38.28	26.04	8.30	-0.66	2.80	0.60
Thailand									
1997	-3.82	1.42	-21.71	2.10	-2.78	-3.40	0.70	23.76	5.63
1998	-8.70	-16.74	-37.29	-23.22	-4.36	-16.53	-0.17	31.87	7.99
2009	-0.88	6.33	-12.1	-8.84	21.33	3.74	-0.63	2.92	-0.85

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, ER nominal exchange rate, and CPI consumer price index. All the variables figures are in percentage annual rate. (-) represent negative values.
Sources: Balance of Payments databases, Government Finance Statistics Yearbook and data files, International Debt, International Monetary Fund, International Financial Statistics, National Accounts and data files, OECD GDP estimates, UNESCO Institute of Statistics, World Bank national accounts data and World Development Indicators.

1.2.3.1 Indonesia

Table 1.3 shows that Indonesia has two periods of recession wherein 1982 and during 1998-1999. The GDPC (gross domestic product per capita) declined by 1% in 1982 and by 14% in 1998 (the worst recession historically). Subsequently, Indonesia reduced their spending by 56% in 1998 (the most prominent cut historically). In 1999 Indonesia increased expenditure by 47%. Indonesia tax collection decreased the most in 1998 by 58%, yet also increased the greatest by 41% in 1999. Non-tax collection fell the most in the year 1998 by 62%. The largest non-tax collected by the government was in 1999 by 116%. According to Sussangkarn (2012), the effectiveness of

Indonesia fiscal stimulant relied more on tax reductions in stimulating growth in the economy.

During the first recession in 1982, Bank of Indonesia (BI) decreased massive money supply by 9% in 1982. Consequently, in 1982, CPI fell to 9%, interest rate lessens by 0.02%, and currency depreciated by 5%. During the second recession in 1998, BI decreased massive money supply by 53% in 1998, the highest throughout the history. In fact, Indonesian economy was distressed after suffering a severe monetary crisis in 1998 that leads to the socio-economic turmoil in the country (Setiawan, 2017). Forthwith, the inflation also increased by 58% in 1998. The interest rates only increased by 1% in 1998. Indonesia currency depreciates by 244% in 1998, the highest depreciation throughout the history. In 1999, BI increased the money supply by 43%, and subsequently, CPI rose by 20%. Equally, the interest rates decreased by 0.6%, and the currency also shrank by 22% in 1999.

1.2.3.2 Malaysia

Malaysia has negative GDPC or recession that divided into four periods in 1985-1986, 1998, 2001, and in 200. GDPC decreased by 4% and 2%, in 1985 and 1986 respectively. Malaysia economy was in the worst recession in 1998 as GDPC dramatically lessened by 10%. Meanwhile, GDPC only declined by 2% in 2001 and by 3% in 2009. In 1998, Malaysia government decreased its expenditure by 25%. Thus, leading debt accumulation to decline by 10% in 1998. On the other hand, the government increased its expenditure by 3%, 5%, 9%, and 0.5% in 1985, 1986, 2001, and in 2009, respectively.

Malaysia tax collection decreased consecutively in 1985, 1986 when the economy hit by the first recession by 4% and 15%. Malaysia tax collection decreased the most in the year 1998 by 39% during the second recession period. Meanwhile, tax increased by 30% during the third recession in 2001. Then, tax decreased by 11% in 2009. Malaysia non-tax collection decreased the most in the year 1998 by 32%.

During the first recession, the development of the Malaysia economy was at a critical crossroad in 1985, as the economic growth slumped into the first recession with GDPC by 4% and 2% in 1985 and 1986, respectively. Money supply increased by 4% and interest rate decreased by 0.1 in 1985. The CPI growth recorded at the lowest in history with 0.3% in 1985. Exchange rate depreciated by 6% in 1985. In 1986, Bank of Malaysia (BNM) increased the money supply by 9%, and interest rate increased only by 4%. Thus, CPI also rose 0.7 %. However, the exchange rate appreciated by 4%.

The outburst of the financial crisis in Asia led the depreciation of the Ringgit Malaysia (RM) by 39%, the most substantial depreciation throughout the history and placed a powerful CPI pressure by 5% on Malaysia during the second recession in 1998. The episode of the financial crisis has brought severe turmoil to Malaysia, BNM decreased massive of the money supply by 28% in 1998. With the withdrawn of the money supply from the economy, the interest rate increased by 0.11%. The excessive volatility of the Ringgit made it impossible for BNM to influence interest rates. Thus, instead of heavily relying on one policy tool, BNM used a combination of several instruments such as monetary aggregates and various interest rates (Cheong, 2004).

The third recession in 2001, money supply increased by 12%. However, interest rate rose by 0.05%, CPI decreased by 1.4%, and the exchange rate was fixed at 3.80 (Ringgit/USD). During the fourth recession, money supply increased by 2% and CPI also rose 0.6 % in 2009. The interest rate only decreased by 0.4% and the currency depreciated by 6%. The interest condition during the GFC was unlike the AFC. According to Elekdag, Lall, and Alp (2012), BNM has been utilising discretionary interest rate cuts to soften the crisis.

1.2.3.3 The Philippines

The Philippines have four periods of recessions during 1983-1985, 1991-1993, 1998, and in 2009. In the event of the first oil price shock in 1974, Philippines survived from the severely fall in world commodity prices took the hit in the economy as the GDPC still constructive. However, the economy was not in fluke when the second oil price shock hit the economy in 1980. Subsequently, during the first recession, the GDPC lessened by 0.9% in 1983 and decreased by 9.8% in 1984 and 1985. During the second recession, the GDPC declined by 3%, 2%, and 0.3%, in 1991, 1992, and 1993, respectively. The third recession in 1998, GDPC decreased by 3%, and fourth recession in 2009 reduced GDPC the slightest by 0.3%.

In the event of the first recession, Philippines decreased its expenditure by 15%, 27%, and 1% in 1983, 1984, and 1985, respectively. Likewise, the government again lessened its spending both by 2% in 1991 and 1993 in the event of the second recession. Identically, Philippines again reduced its expenditure by 21% in 1998, the third recession. Expenditure was increased by 4% in 2009 in the fourth recession.

The Philippines tax decreased the most in the year 1998 by 27% in the third recession. Tax fell in 2 digits were in the year 1984 by 16% in the first recession and year 2009 by 13% in the fourth recession. The Philippines non-tax collection decreased the most by 35% in 1998 in the third recession. Double-digit of lessened in non-tax were seen in 1984 by 22% in the first recession and lessened by 16% in 1993 in the second recession.

During the first recession (1983-1985), Bangko Sentral ng Pilipinas (BSP) increased the money supply by 18% in 1983. However, interest rate rose by 0.4%, CPI grew by 10%, and currency depreciated by 30% in 1983. Subsequently, a year after the currency depreciated by 50% and CPI increased by 50%, the depreciation of the currency and the highest inflation in history in 1984. Under IMF pressure in 1983, Philippines depreciated their currency in 1984 with reduced export taxes and abandoned the exchange surrender requirement. The substantial devaluation of currency was through the issuance of swap and forward contracts in the economy due to the oil shock. The IMF also demanded a reduction in the level of the money supply due to the high CPI in 1984. Thus, money supply was decreased by 22% and interest rate increased by 0.7%. In fact, BSP also increased the interest rate due to the stringent monetary growth restrictions from the IMF.

During the second recession (1991-1993), BSP increased the money supply by 22%, and CPI grew by 9% in 1992. The currency appreciated by 7% while the interest rate increased by 0.06% in that year as well. The third recession in 1998, BSP decreased the money supply by 22%. Thus, the interest rate also dropped by 0.14%. However, the CPI increased by 9% and the Peso currency depreciated by 39%. The fourth

recession in 2009, only increased the money supply by 1% and the CPI by 4%. The Peso currency depreciated by 8% while the interest rate decreased by 0.2%.

1.2.3.4 Singapore

Singapore has four periods of recessions in 1985, 1998, 2001, and during 2008-2009. The previous increment of GDPC by 7% was seen to decrease by 0.8% in 1985 after the first recession. The second recession in 1998 was the worst recession as the GDPC shrank by 5%. The third recession decreased GDPC by 4%. During the fourth recession, GDPC fell by 3% and 4% in 2008 and 2009. Singapore allocation of expenditure was the peak during the fourth recession as spending increased by 52% in 2008. On the contrary, expenditure increased only by 8.62% in 2009.

Singapore debt increment was at the peak in 1998 during the second recession where debt increased four digits by 1836%. In fact, Singapore has a tendency trend to increased debt a year before the recession hit apparently as in 1997 and 2007 where the debt was increased by 41% and 38%, respectively. According to Budina and Tuladhar (2010), high debt in Singapore might due to the accumulated foreign exchange assets in its sovereign wealth funds and age-related spending. Singapore tax decreased the most in the year 1998 by 22% in the second recession. Tax increased the most in 1988 by 32%. Singapore has the most decrement in non-tax by 38% in 2009 during the fourth crisis.

The first recession in Singapore only leads the Monetary Authority of Singapore (MAS) to rose the money supply by 0.6% and drop of interest rates by 0.3% in 1985. Consequently, CPI only increased by 0.5% and the dollar currency to depreciate by

3.1%. MAS increased the money supply and devalued the currency by double-digit during the second recession, which by 16% and 13%. The CPI was found to decrease by 0.3%, and the interest rate was rise by 0.14% in 1998.

MAS only increased the money supply by 2% and decreased the interest rate by 0.3% during the third recession in 2001. Thus, CPI rises by 1% and the currency depreciated by 3.9%. However, MAS again increased the money supply by double-digit again in the fourth recession. MAS increased the money supply by 19% that then lead the CPI rose by 7%. Interest rate decreased by 0.6% and yet the currency appreciated by 6% in 2009.

1.2.3.5 Thailand

Thailand only has two periods of recession during 1997-1998 and in 2009. GDPC declined by 4% in 1997 and by 9% in 1998. On the other hand, GDPC also dropped by 0.9% in 2009. The government only jolted to reduce its debt in 8 years consecutively straight after the first recession in 1997 until 2004. Government decreased expenditure by 17% in 1998. According to Sussangkarn (2012), the effectiveness of Thailand economy relied more on expenditure increases in stimulating growth in the economy. Thailand peak tax decrement was in 1998 by 38% when the first recession struck.

During the first recession (1997-1998), Bank of Thailand (BOT) decreased the money supply by 3.4% and increased the interest rate by 0.7% in 1997. The CPI rose by 5.6% and the baht currency depreciated by 24% in 1997. In 1998, BOT decreased the money supply double digit by 17%. However, the CPI rose by 8%, the interest rate fell by

0.2%, and 32% further depreciated the baht currency in 1998. During the second recession in 2009, BOT took another approach where increased money supply by 3.7% and interest rate decreased by 0.6%. The CPI shrank by 0.8% and the currency depreciated by 2.9% in 2009.

1.2.4 Interaction of Fiscal and Monetary Policies

In general, for developing countries, higher rates of economic growth remain difficult for developing countries because these countries are often mire in the vicious cycle of low incomes and small capital stock. For this reason, these countries tend to resort to borrowings to expand their capital base and to achieve a more robust growth (Duran, 2017).

Moreover, according to Moreno (2003), the maturity of government debt and its composition, are usually indexed to short-term interest rates, exchange rate, and inflation. Debt that indexed to short-term interest rates will thus contribute to an increase in debt cost and notably the rise in the sustainability uncertainty that then result in depreciation of the currency. Higher domestic interest rates will then counter this depreciation in the currency. On the other hand, debt that indexed to exchange rate also leads to currency depreciation and subsequently amplify the debt burden later. For instance, in the event of oil price hikes and a steep rise in the world interest rates that coupled with a debt-driven growth strategy that anchored on investment expansion in the Philippines, triggered a recession in the economy in the 1980s.

In the cases of developing countries, losses of the central bank capital are usually triggered by two of the quasi-fiscal actions by the government. First, the central bank

intervention in foreign currency markets. For example, Bank Negara intervention in the market with 40 billion ringgit of foreign exchange reserves as of late October 2015, to shore up the ringgit. However, after a while, the intervention turned out to be ineffectual (Chander & Welsh, 2015). Second, in the wake of crises, central bank usually plunges into the restoration of financial systems.

Besides, central banks also prone to obligate with the government fiscal where rather than borrow in capital markets, the government usually call on the central bank in financing their budget deficits. Although, the need to reduce debts in emerging economies are widely realised, but few have self-addressed this issue expansively due to their constraint and small-scale policy making. Going forward, issues of high debt levels in domestic economies with unstable external settings of volatile interest rates and exchange rates might demands further borrowing from the government are the motivation of this study.

1.3 Problem Statement

The growth of the economy is the primary concern of every policymaker, yet the systems constraints by the government might influence the growing diversity of each country. Thus, the fiscal tools like government expenditure, tax and debt continue to be a source of much debate. Moreover, weak financial positions and limited fiscal expansion in developing countries trigger this study to inquire the impact of fiscal policy on growth.

Indonesia government strengthened its spending by double digits in masses in 35 years from the total duration of 46 years. Consequently, leading the country to be the country

with the most massive expenditure compared to other ASEAN-5 in 2015 and in average. Henceforth, this might conclude additional spending or fiscal profligacy does not lead to growth in Indonesia as the economic growth still behindhand.

The Philippines was the only country in ASEAN-5 that decreased its expenditure mostly and by double-digit when the country in recession. These enormous expenditures make it challenging for developing countries to fund them from tax revenues, and thus mostly leads to budget deficits. Budget deficits caused by such expenditure must be financed, and but developing nations like ASEAN-5 prone to face with weak tax regimes and low incomes, choose debt as the best option for financing government budget.

Singapore debt was the highest in comparison to ASEAN-5 in average and in 2015. Debt increment was in the percentage of four-digit increment, at the peak during the second recession in 1998. Apparently, Singapore also tends to increase their debt by double-digit a year before the recession hit in 1997 and 2007. Outwardly, throughout the history, the government only decreased its debt in five occasions in the year of 1986, 1988, 1990, 1999, and in 2000. Indonesia ranked as the second top debt country after Singapore in ASEAN-5. Thailand only decreased its debt in eight occasions in the total of 47 years. The government only jolted to reduce its debt after the struck of the first recession in 1997 and reduced its debt in eight consecutive years from 1997 until 2004. However, reliance on the debt alone in steering a country's economy away from a low growth trap is not advocated irrespective of developed or developing countries.

Thus, occasionally, the government also has a strong preference for reducing the size of the fiscal deficit by cutting the public spending. Spending cuts can be intended for unpopular programs to levy minimal severity on the electors, in theory, but practically, these cuts enactment are unmanageable. Besides, emerging economies expenditure stabilisers also tend to be low due to the large proportion of fixed expenses. Thus, lead to tax as the fiscal adjustment approach.

Philippines was the third country in ASEAN-5 with the highest tax collection in 2015, but the lowest in average. On the other hand, non-tax was the lowest in 2015 and on average. It is apprehensible as the non-tax in the Philippines alters quickly due to the reliance on taxes on an international trade like export taxes and the transitory effect in the indirect revenue. Meanwhile. Indonesia economy was hit hardest in 1998, tax and non-tax trend were much alike where tax decreased upmost in 1998, and yet subsequently in 1999, it also increased the greatest. Likewise, the non-tax fell upmost in 1998 but increased the greatest in three digits in 1999.

However, tax as the fiscal adjustment measurements are to a lesser extent acceptable by the central banks. First, the argument is from the view of tax efficiency, and second is the narrowness of the tax burden in emerging economies. The third is due to tax impact on inflation, as it is unacceptable to increase enough tax and regulate price to cut down the fiscal deficits in developing countries. Consequently, the extent that ASEAN-5 economy to provides a more efficient overall independent fiscal environment in protecting and increasing the growth in the country has become more imperative.

Furthermore, the over-reliance in fiscal policy would only lead to exhaustion of the stimulus and abbreviate the fiscal policy conservation in the future crisis. As such, the underlying causes of economic weakness and the stance of fiscal policy lead to the role of monetary tools and the nexus of monetary policy and growth in the study.

In 2015, Indonesia monetary policy tool was seemingly exhausted as its interest rate, and CPI was ranked the highest in ASEAN-5, while its exchange rate was ranked the lowest in relative to other ASEAN-5. Meanwhile, averagely throughout 46 years, the exchange rate is the lowest in Indonesia, followed by Thailand. A country that has fluctuations in the exchange rate or sharp depreciations during the economic crisis are at risk mainly as it may quickly put the country in jeopardy with the financial crisis. Similarly, the Philippines CPI was the second highest, and its exchange rate was the second lowest in relative to other ASEAN-5.

Although Indonesia and the Philippines monetary policy are in inflation targeting framework, still Indonesia and the Philippines CPI still ranked as the highest and second highest in comparison with other ASEAN-5 in 2015. Bearing in mind, that interest rate in Indonesia also the highest in Indonesia in 2015. On the other hand, Malaysia interest rate was the second highest in 2015. Interest rate response may have its limitations due to price control in Malaysia and lengthy high inflation episodes in Indonesia. On the other hand, Thailand money supply was the highest in 2015, followed by Singapore. Averagely throughout 46 years, money supply is the highest in Thailand, followed by Singapore, CPI is the highest in Singapore, followed by Malaysia, and the interest rate is the highest Indonesia, followed by the Philippines.

Fiscal and monetary policies are two powerful tools in steering the economy in the right direction when used appropriately. The economic literature has yet to agree on the relative effectiveness of fiscal and monetary policies, particularly in developing countries. Furthermore, there is also an absence of debate and studies conducted in ASEAN-5 countries. Also, the uniqueness of each country that leads to the individualistic issues and strength will determine not only the role of fiscal and monetary policies but also the relative effectiveness of these policies during economic stagnation and crisis.

This study will also examine the joint interaction between monetary and fiscal policies in absorbing the debt pressure which is ignored in ASEAN-5. The fact that deficits are growing due the expansionary fiscal policy after the economic crisis, also implies the inevitable vulnerability of fiscal policy has also increased. Furthermore, interest rates play an imperative role particularly in the emerging economies due to its effect in servicing costs and its property in debt. Furthermore, higher real interest rates could take place globally if the high debt remains in unison in the largest economies.

On average throughout 47 years, Indonesia has the highest interest rate, followed by the Philippines, Thailand, Malaysia, and Singapore. On the other hand, the debt highest in Singapore, followed by Indonesia, Thailand, the Philippines, and Malaysia. While, the expenditure highest in Indonesia, followed by Thailand, Malaysia, the Philippines, and Singapore in average. In 2015, Indonesia had the highest interest rate, followed by Malaysia, the Philippines, Thailand, and the Singapore. Debt ranked the highest in Singapore, followed by Indonesia, Thailand, Malaysia, and the Philippines

in 2015. While, expenditure is the highest in Indonesia, followed by Thailand, Malaysia, Singapore, and the Philippines.

Also, although the need of reducing debts in ASEAN-5 are widely realised, few have self-addressed this issue expansively due to their constraint policy making, leading monetary policy to obligate with the government fiscal in financing the budget deficits. Bearing in mind, that massive spending with an accumulation of debt and fluctuations in interest rate and exchange rate are custom made in developing countries as they are in the process of development in infrastructure, lead to this study urgency.

Markedly, this study proposes that credibility of fiscal policy might be a prerequisite for monetary policy effectiveness. Otherwise, the dominance of fiscal policy would have adverse economic consequences with the perceptiveness to count on monetary policy to fine-tune on the fiscal refinancing.

1.4 Research Questions

With the theme of the impact, relative effectiveness, and the interaction of fiscal and monetary policies, the fiscal and monetary framework in ASEAN-5 countries is designed to answer the below research questions:

1. What is the impact of the relationship between fiscal and monetary policies and economic growth?
2. What is the impact of the relative effectiveness of fiscal and monetary policies on economic growth?

3. What is the effect of monetary interaction with debt and government spending on economic growth?
4. Does causal relationship exist among the fiscal and monetary policies on economic growth?

1.5 The General and Specific Objectives of the Study

Based on the endogenous growth theory, the overall purpose of this study is to find out the relationship of fiscal or monetary policies in increasing the economic growth measured by growth in Indonesia, Malaysia, Philippines, Singapore and, Thailand.

The specific objectives are:

1. To determine the long and short run relationship between the fiscal and monetary policies and economic growth.
2. To examine the influence of relative effectiveness of fiscal and monetary policies on economic growth.
3. To examine the effect of monetary policy interaction with debt and government expenditure on economic growth.
4. To investigate the causal relationship between the fiscal and monetary policies on economic growth.

1.6 Significance of the Study

The present progress of GDPC in ASEAN-5 countries is not as robust as before the crisis. These days, policymakers attending not just exclusively on economic growth but instead growth per capita to describe and compare the standard living of the people in and between the nations. Hence, higher growth per capita despite uncertainties in

economic and worldwide crisis is very crucial and lies to the policymakers. The findings of this study, theoretically and empirically will contribute to the literature and provide better future research understanding and prediction.

This study arises due to the discrepancy studies of fiscal and monetary policies on GDPC conducted in ASEAN-5. The resurgence of monetary policy after AFC and the popularity of fiscal policy in the aftermath of GFC has proved the inadequacy of fiscal and monetary policy to solely influence economic growth. Also, the government popularity in managing the financial crisis in ASEAN-5 countries lead to this study. Developing countries like ASEAN-5 mainly need to make use of their fiscal policy more efficiently as they are more vulnerable to external shock. Not to mention that during the AFC and GFC, the government in ASEAN-5 countries had mostly used up their fiscal stimulus drastically to stave off the economic recession and consequently the global economic recovery momentum in the future is becoming more delicate and slow. Hence timing and sequencing of an exit strategy from fiscal policy stimulation are particularly crucial.

There are also limited studies on the impact of monetary policy on growth with Endogenous theory conducted in ASEAN-5 countries is the primary motivation that triggers this study. Bearing in mind, that the findings may also rely on econometric approach and on the economic state which may change after sometimes. This study will lead to the precise factors of monetary thus ensuring the effectiveness of monetary policy in avoiding the possibility of government manipulation in its financial. In line with the contemporary world and government policies that in support of the development of labour and strategies in attracting more capital investment in the

economic growth process, this study also mooted on the inclusion of capital and labour (foreign direct investment and secondary school enrolment) in the analysis.

Furthermore, reckoning the economic crisis and the uniqueness of fiscal and monetary policies in ASEAN-5 countries, it is crucial to probe into the relative effectiveness theme. This study will be able to determine the dominance of fiscal or monetary policies, or both policies are complementary to each other in the economic growth process. As grasping a fruitful policy mix from another country of opposite extremes could prompt to the failure of a nation (Atchariyachanvanich, 2007). Thus, this study has made a revisit to the relative effectiveness of monetary and fiscal policies in ASEAN-5 with updated data and some independent features in the empirical approach.

This study is also lead by the insufficient and inconclusiveness reviews of the interactions of monetary policy on fiscal policy. To the best of the knowledge, the analysis of the interaction of monetary with debt and government spending have not yet been embedded in the ASEAN-5. Moreover, given the fluctuations of interest rate and exchange rate that are custom made in ASEAN-5 as they are in the process of development in infrastructure, its interaction and relationship with debt accumulation in the process of economic growth is very crucial for the policy-making and thus lead to this study contribution. Proper policy formulation will lead to an executable strategy that suitable and appropriates to the state demographic uniqueness in each of the countries in ASEAN-5.

1.7 Scope of the Study

This study will evaluate the fiscal and monetary policies implemented in ASEAN-5 countries economic growth utilising data from the year 1970 to 2015, on the theme of the impact, the relative effectiveness, and the interaction of fiscal and monetary policies. This study uses government expenditure, tax, non-tax, and public debt for fiscal policy variables and money supply, interest rate, exchange rate and inflation for monetary policy variables with the economy growth value by GDPC.

When comparing economic activity across different geographic regions that have different population sizes, GDPC is particularly crucial. Economist tends to cancel out the effects of different population sizes, and the consequences of inflation over time to measure the progress of growth. Using GDPC will signal the development standard of the society through time and hence the country economy. Selected cross-country variables are the foreign direct investment, inflow and gross school enrolment at the secondary level will be proxy to denote capital and labour in each implementation of policies towards the growth of the economy.

The practical issues in macroeconomic policy analysis in this study directed to the impact of policies towards economy, the relative effectiveness of policies in influencing the economy and finally, the interaction of monetary policy with debt and government expenditure on growth. This study also considering the practicality and importance of labour and capital in the contemporary economy nowadays.

This study will cover only Indonesia, Malaysia, the Philippines, Singapore, and Thailand, out of ten ASEAN countries. Because initially ASEAN-5 is start off with

these five countries on the declaration and the primary purpose to increase the economic growth. A cross-country analysis will be conducted in ASEAN-5 countries due to the uniqueness of their fiscal and monetary position and the differences among the countries in their standard of living. This study also contributes to theoretical knowledge and policy implication of fiscal and monetary policies on growth.

1.8 Organization of the Thesis

Chapter one gives the background and issues of this study, problem statement, research questions and objectives, significance and scope of the study. Chapter two lay out the theoretical review and empirical study on ASEAN-5 countries and research gap. Chapter three bring out the details concerning estimation methodology along with data sources. Chapter four presents the evaluation results and discusses the results. Chapter five manages the conclusions and policy implication.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter starts with Section 2.1 and Section 2.2 with the introduction, concept and theoretical framework. Section 2.3, Section 2.4, Section 2.5, and Section 2.6 are crucial as it is the reason of this study set in motion, as it will outline the general review on the impact, the relative effectiveness and the interaction of fiscal and monetary policies in increasing economic growth. Next, moving on is the empirical studies of labour and capital in Section 2.7. Section 2.8 put up the highlights the research gap and lastly, Section 2.9 is the chapter summary.

2.2 Concept and Theoretical Framework

Whether fiscal or monetary policies can be shown reliable to have significant effects on growth rates, and for how long these effects persist as this effect even over a small number of years when adding up in the growth rates could be substantial for the policymakers. Hence, reinstating vigorous growth is essential in addressing the challenges and crisis ahead.

2.2.1 Economic Growth

The neoclassical theories, says to achieve economic growth is the mobilise the resources. Growth is a quantitative and qualitative process along with the structural changes, which leads to supportive economy impact and rise in the standard of living (Leszek, 2001) and (Haller, 2012). In other words, economic growth is the adjustment

in the potential output and the factors or the rise in factors of productivity. In short, increases in the economy are not only complex but also subjected to constraints of limited resources and inefficient utilisation of resources.

Economic growth is classified into five sections. First, the economic growth starts with the Adam Smith views on capital accumulation. He regarded growth as an endogenous process where growth reckons on the agent's activities. Finite resources lead to diminishing returns but maybe even off by the productivity intensification in labour segmentation. Second, is David Ricardo distribution theory and capital accumulation, viewing growth as a dynamically increasing return with his argument rest on constant returns to scale where producers opt for cost-minimizing production.

Third, the linear models of economic growth that view production as a circular flow. Fourth, the neoclassical models of exogenous growth, in Robert Solow and Trevor Swan work. Fifth is the recent literature models of endogenous growth revolving in rather bright ideas that have predicted by more former economists like Adam Smith and David Ricardo. Thus, present-day growth theory is somewhat back to the classical approach. Here, this study will only further discuss the exogenous and endogenous growth model.

The revised version of the Solow model (1957) has been most successful in explaining output growth, but weakness in the identification of technological change with the residual does not allow further elaboration on technological change. Though the Solow's model accounting for technical change enlightened the stylised facts, the

fundamental problem is the unlikeliness in distinguishing between a move along the production function and a shift in the production function.

Advance theoretical developments on growth have strived to solve this issues. Through endogenizing long-run rate of growth, a theoretical groundwork is established in examining the purpose of policies in the determination of growth rate (Xu, 1994). Endogenization of technological change is the design of the endogenous theory (Santangelo, 2003). This section discusses related theories of economic growth determination. Below are some of the fiscal and monetary policies approaches that widely discoursed in the literature.

2.2.2 Fiscal Policy

The term "fiscal policy" is typically used to portray the impact on the economy by the levels of spending and tax, and more particularly, the gap between them. In whole, the impact of government expenditures, taxation, and debt on the aggregate economy is enormous significance, and consequently a considerable controversy, in economics (Kopcke, Tootell, & Triest, 2006 and Rademacher, 2011). Fiscal policy is characterised to incorporate general budget balance, tax, and expenditure policies (Tanzi & Zee, 1997).

Fiscal policy impacts may vary by time horizon, so that investigation of fiscal policy requires recognising that short-run and medium-run examination inspect the consequences of policy under the presumption of unaltered potential output. The medium-run analysis assesses the impact of changes in money related assets which makes the issue of how the spending shortfall is finance. Ultimately, the long-run

analysis examines the effects of fiscal policy on an economy's rate of growth over time consequently permits technology, capital, and labour force to change (Palley, 2013).

In fiscal policy, the Keynesian and the neoclassical theory were designated with the former as demand-side theory and the latter as a supply-side theory. The Keynesian recommends policymakers to support consumption while the neoclassical acclaims on improving the investment conditions for producers. Accordingly, a synthesis of these two ideas was built up with the endogenous growth theory, which however is concentrating on the supply side as well (Rademacher, 2011). Neoclassical theory view government intervention can just worsen the development of the business cycle and market will work itself to equilibrium.

Despite the anticipate Keynesians attempt to demonstrate that the economy is not always in equilibrium and needs government intervention to augment growth. In short, endogenous growth theory is closer to Keynesian theory, with its claims of government intervention. However, it is also closer to neoclassical theory, as it recommends government interfering to support production and not consumption.

2.2.3 Monetary Policy

The monetary transmission mechanism is a course in which monetary policy pronouncements interpenetrated to real growth with two conditions in mind: no privately released securities to replace the monetary base and nominal prices cannot counter right away the nominal changes in the monetary base (Taylor, 2000). Most

economists have reached to conclude that monetary policy has a real effect at least in the short run (Taylor, 1997).

The working of the monetary policy and the respective transmission channels relies on upon the characteristics or contemporary stance of the given economy and financial system (Klacso, 2013). According to Van Hai & Trang (2015), first monetary induce a change in prices and the quantity of money and second monetary to induce a change in the aggregate demand in the monetary transmission mechanism. This study will probe into more in-depth into the latter.

A system of money targeting is practice previously as the implicit nominal anchor. The money is targeting emphases on the growth rate of a chosen monetary aggregate. In the market computerization not only the association between monetary aggregates and the price is turning out to be weaker, but the central bank may also likewise fail to manage the selected monetary aggregate with appropriate accuracy. Nowadays, the financial innovation and globalisation, make exchange rate targeting and inflation targeting more practical. In the exchange rate targeting, the central bank attempts to safeguard the nominal exchange rate stability with interest rate and foreign currency.

2.2.4 Relative Effectiveness of Fiscal and Monetary Policies

Inflation was not the only worry for monetarists economist as indeed there are significant effects on short-run fluctuations in real growth, however not in the long run (Andersen & Carlson, 1970 and Andersen & Jordan, 1968). On the other hand, monetarists, like Brunner and Meltzer (1968), Meltzer (1976 & 2003), and Friedman and Schwartz (2008) believed that monetary policy was attributed for the worsening

the cyclical fluctuations in real output historically. Along with the rational expectations revolution, came in the policy ineffectiveness proposition of the New Classical Macroeconomics (Sargent & Wallace, 1975). The underlying interpretations were that the rational expectations hypothesis would reduce the ineffectiveness monetary policy in affecting real output, both in the short and long run. Thus, there was no monetary policy in product stabilisation.

Both Keynesians and monetarists went under examination with the ascent of the new classical school amid the mid1970s. According to Jorgenson and Eckstein (1976), fiscal policy tends to impact the economy just with a period slack. Policymakers are ineffective because individual market members can anticipate policy changes and act ahead of time to counteract them (Kydland & Prescott, 1977). Finally, the presences of 'Ricardian agents' lessens the impacts of expansionary fiscal measures by anticipating future tax hikes (Barro, 1974).

Another era of Keynesians that emerged in 1980 contended that while economy agents can anticipate correctly, aggregate markets may not perfect immediately; in this manner, in the short-run fiscal policy still effective (Jahan, Mahmud, & Papageorgiou, 2014). The monetary-fiscal mix was a feature of the macroeconomic landscape in the 1980s due to growing inflationary pressures induced by the oil shocks. Monetary conditions were tightened, and more restrictive follow on by restriction in spending positions likewise. Here, the fiscal and monetary policies stayed synchronised for restriction in the immediate result of the oil shock. Budgetary policies slowly turned out to be more expansionary, in any case, as the fiscal authorities started to accept the need to finance the oil-related external shortages through public money. Monetary

tightening likewise eased, and demand management policies became mutually accommodating. As output kept on stagnating, unemployment rose, and inflation expectations persisted, the combined fiscal and monetary expansion soon came to be viewed as not working, undoubtedly as having adverse results.

Then in the mid-1990s, economists and policy-makers in most advanced economies have endorsed the detachment of forces of policies between monetary and fiscal as a way of optimising noninflationary growth. This separation of monetary and fiscal policies was the consequence of countries suffering from fiscal deficits and interest rates that were similarly high to advance the satisfactory long-term growth of potential output. Accordingly, the relative effectiveness of fiscal and monetary policies in any economy relies on the prevailing economic and political conditions (Chowdhury & Afzal, 2015).

The debate theory over the relative impact of monetary versus fiscal policy has been time-tested in the empirical studies. It was initially introduced by Friedman and Meiselman (1963) (FM) who argued that monetary policy effects be colossal and always significant while expenditure effects are small and insignificant. Responding to FM study were De Prano and Mayer (1965), Ando and Modigliani (1965), and Hester (1964). Each suggested tax receipts, imports, and inventory investment should be cast off from expenditures on the basis that each would likely be negatively correlated with the error term of the consumption function. In short, the 1965 debates were mainly about choosing an appropriate exogenous expenditure variable.

The FM debate of 1963 failed to sustain itself, due to the failure to reach an agreement on the independent expenditure variable. Both Friedman and Meiselman (1963) and Ando and Modigliani (1965) studies suggesting that no conclusion as to the relative usefulness of the Keynesian model or the quantity theorist (Johnson, 1973). However, the question of the relative importance of monetary versus fiscal policy was renewed in 1968 with the publication of Andersen and Jordan (1968) (AJ) in the most straightforward quantitative approaches in a closed economy. AJ refuelled the debate in 1968 with presumably acceptable expenditures variable and constructed the St. Louis equation. Regressing changes in nominal GDP on changes in current and lagged measures of monetary and fiscal variables where the policy variables are money stock (or monetary base) and high-employment budget measures with quarterly data year 1952 to 1968. Conclusions, indicating monetary policy as a more significant, more predictable, and faster than the change in the fiscal variable upon GNP.

2.2.5 Interaction of Fiscal and Monetary Policies

The fundamental interaction between monetary policy and fiscal policy related to the financing of the spending deficiency and its results for monetary management. The monetary stance influences the government capacity in financing the shortage in expenditure. The funding scheme by the central bank will then place a requirement on their operational independence (Muthama, 2015). The interactions of both monetary and fiscal policies typically hinge on the government and financial institutions restructuring, and the historical structural adjustment of fiscal policies that were then influenced by the structural deficits and volatilities of the domestic economy.

Also, by complexity, monetary authorities typically have an extended time horizon, yet they additionally tend to be cautious and often sluggish. Hence, an economy may lock in a high deficit or debt equilibrium, a debt reduction strategy, which cannot depend on monetary reactions, either because inactive or ineffective, may bring about in a short-run politically deadly recession. Politicians may consider the high-debt the present state of affairs to be acceptable. This thinking may help in comprehension the circumstance in the 1980s. The critical difference is that lately, monetary policy was not slow or inactive. Instead, it appears to have limited effects on debt (Alcidi & Thirion, 2016).

The possibility of monetary-fiscal policy interaction theory goes far back to Cooper (1969), Friedman (1948), and Mundell (1962) in which they accentuated the stability of cyclical fluctuations and inflation determination. These formal empirical investigations have concentrated on every approach in isolation. In the 1970s, the open deliberation was centred on inflation due to money financed spending shortfall. Many economists contended that monetary policy ought to control by an independent authority (Kydland & Prescott, 1982 and Rogoff, 1985). Bruno and Fischer (1987) and Drazen (1985) concentrated the impact of the interaction of fiscal and monetary policies on public debt without utilising formal game-theoretic approach.

Blinder (1980) studied different means by which fiscal and monetary policies may interact, providing a reason to feel ambiguous about the presumption that their coordination can merely be sufficient. Both fiscal and monetary policies can utilise instruments in influencing aggregate demand and discover a trade-off between output and inflation (Andersen & Schneider, 1986). Policy mix concept is known as

fiscal/monetary harmonisation where there is no dominance in any policy alternative, and monetary and fiscal policy can coordinate in a way that enhances economic growth. However, the central bank should guide its monetary policy towards the short-end of the market and government should conduct fiscal policy towards the long-end of the market (Dharmadasa, 2015).

Fiscal or monetary policy mix is one of the keys and more unpredictable relationships in macroeconomic theory. Blinder (1980) and Reynolds (2001) demonstrate that policy mix technique prompts to stagflation and the policy mix effect is not extensively sufficiently extensive in leading the economy as others presumed. Additionally, Beetsma and Bovenberg (1995) and Beetsma and Bovenberg (1999) considered the conflict of interest between fiscal and monetary policies, to be specific the regulation of public debt and the rate of inflation. They reveal that it is possible to achieve effective interaction of the two authorities regardless the independence of the central bank.

In an ideal setting, liquidity management is not part of the monetary policy stance. However, presently the dominant view is that the central bank had utilised liquidity management actively mainly during the crisis periods and this is term as non-standard monetary policy measures (Gameiro, Soares, & Sousa, 2011).

2.3 Empirical Work on Fiscal Policy and Economic Growth

Restriction in the Solow and Swan model lead to endogenous growth models by Barro (1990). Barro and Sala-I-Martin (1992) established that under various circumstances, fiscal could affect the long-term economic growth, human, and capital investment.

Government expenditures, taxes, and deficits are the primary drives on economic activities (Tanzi & Zee, 1997). The endogenous theory also takes in investment in technologies and human capital in the long run growth as one of the policy measurement. Varying results accounted regarding public expenditure, tax, indirect tax, and debt with its relationship with economic development.

2.3.1 Neoclassical Theory and the Plea for Non-Intervention

Neoclassical growth theory states that a policy can only have a short effect on growth since long-term growth driven by exogenous and policy invariant factors. On the other hand, endogenous growth theory provides a theoretical account in analysing how government policy can affect long-term growth (Barro & Sala-I-Martin, 1992). In fact, the neoclassical policy strategy aspires on non-intervention of the government is the arrangement to achieve growth development. These include diminution of public expenditure as the market will work itself into equilibrium and tax ought not to be acquired. Likewise, hazardous relationship on deficit and growth as tenacious deficits crowd out investment. By the same token, Wagner (1890) hypothesized that government expenditure is an endogenous variable notably an outcome rather than a source of growth.

Studies that discovered no relationship between expenditure on growth were Dogan and Tang (2011) and Sinha (1998). Dogan and Tang (2011) found no evidence of a long-run relationship in all ASEAN-5 countries except in Indonesia during 1960-2002. Equally, Granger causality tests also indicate that Wagner law was not affirmed in all ASEAN-5 countries. Instead, a reverse causality from expenditures to growth is found

exceptionally in the Philippines. Likewise, Sinha (1998) discloses no evidence of causality between growth and expenditure in Malaysia during 1950-1992.

Hasnul (2015), findings indicate that government expenditure has a negative effect on the economic growth of Malaysia during the period 1970–2014 with OLS technique. Coupled with his result that displays a negative correlation between expenditure and growth in Malaysia for the past 45 years. Likewise, Phua (2014), reveal expenditure was found to have a significant adverse relationship with growth in the long haul from 1970-2012 in Malaysia.

On the other hand, Ali and Ahmad (2010) reveal evidence of fiscal deficit exerts a negative effect on growth over the long haul in Pakistan during the period 1972-2008 with ARDL model. In general, Poirson, Ricci, and Pattillo (2004) confirm that extravagantly debt depicts negative influence on growth in 61 developing countries over the period 1969–98. Likewise, Swamy (2015) reveal a negative relationship between government debt and growth in advanced countries during 1960–2009. Identically, he also shows evidence of a long-term effect of debt on economic growth from the variance decomposition and impulse response model.

Correspondingly, Hussain, Haque, and Igwike (2015) found evidence of an adverse impact on debt with growth with Dynamic Arellano-Bond panel data during 1995-2012 in 48 countries of Sub-Saharan Africa. Furthermore, Lee and Ng (2015) discover public debt has a negative impact on growth in Malaysia over time during 1991-2013. Both, Choong, Lau, Liew, and Puah (2010) and Mohd Dauda, Ahmad, and Azman-

Saini (2013) found external debt has a negative impact on growth in Malaysia over time and also the existence of short-run causality linkages between debt and growth.

2.3.2 Keynesian Theory and State Intervention

As opposed to neoclassical, Keynes (1936) proposed that government spending is exogenous and government spending boosts economic growth. To enumerate, Keynesians express that market can descend into disequilibrium over time. Henceforth, demand to be stimulated by expatiating government expenditure into other public-sector ventures like the infrastructure and education. In fact, the tax is the key to Keynesian economic as the government needs it for countercyclical demand policy purpose. Correspondingly, for Keynesians, direct taxes are progressive to the economy relative to indirect taxes as the higher the economy agent pay, the higher the relative pay share. Henceforth, Keynesians propose revenue collection concentration on direct taxes (Rademacher, 2011). To put it plainly, in the process of economic development Keynesians advocate direct taxes to finance the government expenditures.

Moreover, the Keynesian school views budget deficit extends growth and does not force out private investment. Notably, when resources under-employed in the economy. Bakar and Hassan (2011) found external debt has a positive effect on Malaysian growth during 1970-2005. In fact, Hadiwibowo (2010), reveals that deficits might facilitate the long-run growth in Indonesia during 1969-2008. Furthermore, Wibowo (2017) proves the relationship between public debt and growth in eight countries in Southeast Asia that are members of ASEAN from 2006-2015 with Vector Autoregression. Additionally, evidence reveals growth caused debt in Indonesia

further demonstrate accordance with the finance-led growth hypothesis where debt increase growth of a country.

There are two propositions regarding the relationship between economic growth and government spending notably the Wagner and Keynesian Law. The former posit that as growth grows the public sector is inclined to produce, while the latter postulates that government spending causes economic growth. Ismal (2011) discovered that both Wagner and Keynes lead to growth in the Indonesian.

Samudram, Nair, and Vaithilingam (2009) with ARDL together with Gregory Hansen cointegration method disclose evidence of expenditure on growth in the long haul during 1970-2004 in Malaysia. Additionally, found causality in supports of Wagner Law. Sudarsono (2015) study also poses Wagner law hypothesis in Indonesia and Malaysia as growth cause increase in government spending during 1970-2006. Ebaidalla (2013) found causality run from expenditure to growth, both in short and over time in Sudan during 1970-2008. Also, Govindaraju, Rao, and Anwar (2011) find support for the Keynesian hypothesis as their study reveals that government expenditures caused growth within the context of a bivariate and multivariate framework in Malaysia during 1970-2006. Likewise, Jiranyakul and Brahmasrene (2007) detected a unidirectional relationship and positive government spending on growth in Thailand during 1993-2006.

2.3.3 Endogenous Growth Theory and Non-Distortionary Taxes

Nevertheless, opposed to neoclassical theory, endogenous growth theory expresses that only certain expenditures can lead to growth and revenues can likewise be

expanded by tax increments. Similarly, oppose to Keynesians rate that advocates direct taxes, endogenous growth theory opts for indirect tax. Revenues shall be the source of indirectly added tax due to its regressive appeal. In fact, indirect tax affects all poor economy virtually as an economy agent, in general, spend much of their income on consumption. Altogether, endogenous growth theory likewise of neoclassical advocating policymaker ought to bolster the supply side and revenue accumulation from labour and not from a corporation. Uniquely, debt is alleged to be no sign of growth in Ricardian perspectives. In fact, the budget deficit is merely an act of tax deferment. Indeed, the Ricardian regard a lower tax rate and the debt will lead to higher taxes in future.

Kneller, Bleaney, and Gemmell (1999) determine that expenditure and taxation solitary affected growth when they were productive and distortionary for 22 OECD economy during 1970–1995. In detail, positively impact growth is the productive government spending whereas harmful to growth is the distortionary taxation. Ismal (2011) also discovered in detail; growth influenced by employment expenditure, non-tax income, and goods expenditure with ARDL and VAR model. Besides, government expenditures were influenced by imports, payment of debts and oil exports in Indonesia.

Furthermore, Puapan (2011) prove tax was exhibiting negative consequences on growth and following the endogenous theory in Thailand during 1979-2008, while government expenditure was showing a positive impact on growth. In Venkadasalam (2014) study, an indirect tax depicts a negative relationship with growth in the Philippines and Thailand while vice versa in Singapore.

Kofi Ocran (2011) found deficit has no significant impact on growth in the South African economy during 1990-2008 and in unity with the Ricardian hypothesis, while government expenditure and tax has a positive effect on growth. Likewise, Van and Sudhipongpracha (2015) discover deficits not significant in Vietnam economic growth during 1989-2011, but foreign direct investment brought a considerable use of growth. Similarly, a study by Stylianou (2014) displays no causality between debt and growth with structural breaks method in Greece 1980-2010. Correspondingly, Rahman (2012) study accord with Ricardian equivalence hypothesis as there is no long-run relationship between debt and growth in Malaysia from 2000-2011.

Above all, studies of both Reinhart, Reinhart, and Rogoff (2012) and Reinhart and Rogoff (2010) and argue that there is no link between debt and growth when debt is below 90% of GDP, though higher levels debt might negatively correlate with growth. Other studies in agreement of Reinhart and Rogoff (2010) includes studies of Cecchetti, Mohanty, and Zampolli (2011), Checherita-Westphal and Rother (2012), Baum, Checherita-Westphal and Rother (2013), Mencinger, Aristovnik, and Verbic (2014), Woo and Kumar (2015), and Baharumshah, Soon, and Lau (2017).

Regardless, according to Peacock and Wiseman (1961) in spend-and-tax hypothesis express, that spending causes revenue with attention to increases in expenditures transmit by crisis will bring permanent changes to spending. Equally, Hong (2009) result line with a spend-tax theory where evidence of cointegration between government revenue and expenditure in Malaysia during 1970-2007. Conversely, Narayan (2005) reported mixed evidence with the bound approach and VECM

method. He finds proof of the tax-spend theory in Singapore and Indonesia in the short-run but spend-and-tax in the long-run in Indonesia.

On the contrary, Chang, Liu, and Caudill (2002) result reveals from Granger causality test suggest none of the Tax-Spend hypothesis nor Spend-Tax hypothesis in Thailand during 1951-1996, thus supporting institutional separation theory. Similarly, affirming fiscal synchronisation hypothesis was Abdul Aziz, Habibullah, Ngah, Saini, and Mohamed (2000) that disclose bidirectional causality between expenditure and tax in Malaysia during 1960-1997 with Toda-Yamamoto method.

2.4 Empirical Work of Monetary Policy and Economic Growth

There are various yet distinctive channels through which changes in the monetary policy stance may affect the real economies. Thereupon, selecting the proper operating target of monetary policy is pivotal in stimulating the economy activity efficiently while maintaining price stability in unison (Abdul Karim, 2011). Furthermore, it is believed the decisiveness of the central bank in policy making will able to cover the time lag of fiscal policy. From time to time, monetary authority involvement is essential especially in devising short-term strategies like managing the periodic volatility in interest rate and exchange rate, money supply, and inflation.

Moreover, according to Kakar (2011), by dominating the interest rate and government expenditures, the short-run economic activity can be stimulated. Whereas, Mishra and Montiel (2013) reveal evidence of weak monetary transmission in developing countries. Likewise, Mishra, Montiel, Pedroni, and Spilimbergo (2014) disclose worries on the transmission strength are not exceptional in Asia.

2.4.1 Neo-Classical -Monetary Policy

The Neo-Classical examined the use of money in economic with Solow model. Solow model demonstrates that money is not relevant or neutral to growth because the output does not rely on monetary growth but existing capital per worker. Precious and Makhetha-Kosi (2014) found money supply and exchange rate are insignificant while inflation significant in driving the South Africa economy during 2000-2010. Likewise, Udude (2014) findings indicate broad money supply, interest rates, and liquidity ratio did not have a bearing on growth in Nigeria during 1981-2012 while only exchange rate exerted a substantial impact on economic growth in Nigeria.

2.4.2 Keynesians-Monetary Policy

In contrast to the Neo-Classical, the Keynesians suggested that an adjustment in money supply could alter the output via a change in interest rate (Chingarande, 2012). Similarly, Ramey (1993) agreed that interest rate is the key to the mechanical transmission in the conventional Keynesian model. Abdoh, Yusuf, Zulkifli, Bulot, and Ibrahim (2016) indicate that positive change in nominal interest domestically will also cause the currency to be appreciated and vice versa.

Ali, Irum, and Ali (2008) during 1990-2007 found evidence of significant positive money supply and resolve monetary policy of more considerable influence in South Asian. Likewise, the study conducted by Chuku (2009) during 1986:1-2008:4 disclose that changed in broad money supply determine growth in Nigeria with structural vector autoregression. Similarly, Muhammad, Wasti, Hussain, and Lal (2009) found money supply exerting a substantial positive impact on growth in 1977-2007 in Pakistan.

AbuDalu, Ahmed, Almasaied, and Elgazoli (2014) results affirmed that the money supply and exchange rates had a significant positive impact on ASEAN-5 growth during 1991-2006 with ARDL method. Van Hai and Trang (2015) finding show interest rates and money demand were a significant part of variations in growth with VAR model during 2000-2011 in Vietnam. Also, Semuel and Teddy (2014) found a significant negative relationship between interest rates on growth and a significant positive relationship between exchange rates and growth, while inflation does not major influenced on growth in Indonesia from June 2005 until December 2013.

Whereas, Kizito (2013) discovered money market negatively related to economic growth for the period 1980-2012 with vector error correction method in Nigeria. Ganev, Molnar, Rybinski, and Wozniak (2002) found no evidence of inflation in the monetary impact but evidence of exchange rate in Central and Eastern European economies. Likewise, Hossain (2005) evidently implicate no causality from inflation to growth but a bidirectional causality between money supply and inflation and also between exchange rate and inflation in Indonesia.

2.4.3 Monetarist-Monetary Policy

Different from the Keynesian, the monetarists conceive over time adjustments in the supply of money cannot affect real variables. The quantity theory states that a change of money supply will change the price level if money demand is stable and thus additionally influences real output but only in the short run (Chingarande, 2012). Inflationary pressures subsided mainly from supply-side factors. Rising inflation can threaten an economy as it increases interest rates.

Researchers like Wai (1959) and Bhatia (1960) in the IMF Staff Papers in 1960 however, unsuccessful in observing these impact in 1950 and 1960 (Li, 2006). Despite, in Latin American countries during 1970, adverse inflation on output was evidently clear. Likewise, Bruno and Easterly (1998) apparently show rising price surpass 40% could harm growth. Equally, Li (2006) discover the same in developing countries where the price can be lethal in the action of the government. Similarly, Barro (1995) evidence also provides an adverse association of inflation on growth that extended to 100 countries during 1960-90 proved the same where substantial increases in price lead to an impact on growth permanently.

In fact, Dewan and Hussein (2001) found evidence of inflation having an adverse impact on growth in 41 middle-income developing utilising the bivariate technique. Indeed, the threshold of inflation in Asian countries is 5.43%, in Malaysia, Indonesia, the Philippines, and 7.84% in Thailand during 1980-2011 (Thanh, 2015). Comparatively, Liwan and Lau (2007) evidently prove inflation has an adverse impact on growth in Thailand and Malaysia while vice versa for Indonesia.

2.5 Empirical Work of Relative Effectiveness of Fiscal and Monetary Policies

Alongside study attempting on the relative effectiveness of fiscal and monetary policies begin with St. Louis equation that pioneer by Andersen and Jordan (1968) (AJ) utilising the Keynesian and Monetarist theory. Given St. Louis equation, Ahmed and Johannes (1984), and Stein (1980) and had been criticising the validity of this equation three grounds. First the St. Louis equation is a reduced form equation, second it suffers from specification error, and third, the equation is a constrained Almon lag function. To clarify, first money and government expenditure included are not

statistically exogenous, second, some other relevant regressors like the interest rate might be neglected. Above all, St. Louis equation may be inconsistent and biased.

On balance, studies favoring monetary policy over fiscal policy include those of Younus (2012), Adeniji and Evans (2013), Ajisafe and Folorunso (2002) are Aigheyisi (2011), Sanni, Amusa, and Agbeyangi (2012), Jawaid, Arif, and Naeemullah (2010), Hussain (2014), Jawaid, Ali, and Qadri (2011), Adefeso and Mobolaji (2010), Senbet (2011), Snyder and Bruce (2011), Havi and Enu (2014), and Takyi and Twum (2015). Whereas, empirical studies that favour fiscal policy over monetary policy include those of Halcon and De Leon (2004), Atchariyachanvanich (2007), Tang, Liu, and Cheung (2013), Hussain (2014), and Hidayat, Suman, and Kaluge (2014).

In Younus (2012) study, he uses interest rate, government expenditure, real money supply, and real GDP. Subsequently, Adeniji and Evans (2013) conducted their studies by implementing the model specification of Younus (2012) in selected African countries from 1970–2012. The differences between both studies are the latter apply panel data technique compared to the former who used Cointegration and Vector Error Correction method in Bangladesh. Identically, both studies came to an understanding favouring monetary policy over fiscal policy in invigorating growth.

Comparatively, studies that try out a model specification that stated differently from the AJ study and above studies are Ajisafe and Folorunso (2002). In their model, the monetary policy variables are both the narrow money and broad money; the fiscal policy variable is government budget deficits. Also, the studies that apply the same model specification with Ajisafe and Folorunso (2002) are Aigheyisi (2011) and

Sanni, Amusa, and Agbeyangi (2012). These three studies equally conducted it in Nigeria with error correction method. Although fiscal and monetary variables differ, the primary variables like government expenditures and money supply are still similar. Aigheyisi (2011) utilised lending interest rate and investment and real GDP whereas the Sanni et al., (2012) used narrow money supply and money printing as the proxy for the monetary policies and debt-financed deficits and financed deficit as the proxy for the fiscal policies. After all, three of the studies agreed monetary policy is comparatively greater in Nigeria.

Additionally, Jawaid, Arif, and Naeemullah (2010) advocate the combination of both policies in Pakistan from 1981-2009 with money supply and fiscal balance, yet greater emphasize on monetary compared to fiscal policies in stimulating economic growth due to the coefficient measurement. Furthermore, Snyder and Bruce (2011) reveal evidence supporting monetary policy with the error correction vector autoregression (ECM) in deciding the relative explanatory power in United States economy during 1966 to 2000. Meanwhile, Hussain (2014) suggests VD and IRF method instead of the Cochrane-Orcutt to evaluate the policies effectiveness in Jawaid, Ali, and Qadri (2011) study as the Cochrane-Orcutt is not befitting in measuring the effectiveness of policies.

Coupled with the same token of analysis using cointegration and error correction method are Adefeso and Mobolaji (2010). Updating the previous studies in Nigeria from 1970 to 2007, the study found that force of monetary policy is potent relatively. Albeit, Hussain (2014) pinpoint that Adefeso and Mobolaji (2010) ought to use SVAR method compared to OLS. Then, Senbet (2011) in his studies utilise the unrestricted

VAR approach in the USA during 1959- 2010 with government expenditure, federal funds rate and real output. He reveals the superiority of monetary policy but concludes there might be endogeneity possibility, model misspecification and imperfect utilisation in nominal instead of real growth.

Similarly, the study of Havi and Enu (2014) is an improvement of Ajisafe and Folorunso (2002) who apply the growth model specification. Monetary policy measured by money supply (M2), total labour force as the labour, capital represented the gross fixed capital formation, and fiscal policy measured by general government consumption expenditure from 1980-2012 in Ghana using OLS estimation technique and pinpoint that the impact of monetary policy comparative exerting greater influence in stimulating output growth. Correspondingly, Takyi and Twum (2015) used autoregressive distributed lag in Ghana in the period during 1965-2013 also found likewise.

Different from above studies that show favouring of monetary over fiscal policy, below studies shows backing over fiscal policy. Hussain (2014) examines the impact of fiscal policy in SAARC countries in 1974-2007 with the unrestricted VAR, variance decomposition, and impulse response functions method and found fiscal policy exerting more influence in Bangladesh, India, and Nepal but monetary policy in Pakistan and Sri Lanka. Besides, Tang, Liu, and Cheung (2013) reveal the effectiveness of government spending was discovered during the AFC and GFC in Singapore and Thailand, meanwhile, in Indonesia, it is after the AFC that the impact of the effectiveness of government spending improved. Furthermore, Widiyanti and Jusoh (2011) study accord to Keynesian with the superiority fiscal policy impact on

growth in Indonesia during 1970-2006 with ARDL method. Hidayat, Suman, and Kaluge (2014) also reveal that government expenditure and inflation have a positive impact on growth, but interest rate has a negative impact on growth in Indonesia during 2005-2012.

Equally, Halcon and Leon (2004) paper, found fiscal policy stays influential in offsetting leading alteration of the aggregate necessitate in the Philippines during 1986-2003. In detail, they added shift towards an inflation targeting had enhanced the Philippines central bank effectiveness overall particularly in its pursuit of price stability. Additionally, the Philippines government able to control its rate of tax but not the revenue. Likewise, Atchariyachanvanich (2007) reveals that the Philippines are classified as monetary-policy-dominated countries because no fiscal instrument is found statistically significant during 1990-2004. In contrast, both monetary and fiscal policies are significant in Thailand through the magnitude of the latter seems to be mildly stronger.

Similarly, Khalid and Fakhzan (2013) establish both monetary and fiscal policies play a role in the growth in Thailand with ARDL method. In detail, Markov-switching method is also utilized to characterize the regime switching and prove monetary activeness will only lead to lower growth. In fact, Thailand monetary policy is active mainly while fiscal policy is predominately passive during 1971-2009. Conversely, Singapore economy is only positively determined by monetary policy, but fiscal policy stays insignificant. Indeed, Singapore was in active monetary and passive fiscal during 1971-1991. Above all, Singapore was in passive both monetary and fiscal for eight years before shifting into passive monetary and active fiscal in the year 2000-2009.

Be that as it may, the empirical research has not reached a consensus regarding the relative effectiveness of fiscal and monetary policies. Not to mention, some researchers also found a complementary role for both policies. Simorangkir and Adamanti (2010), display combination of fiscal and monetary to growth in Indonesia. Likewise, Mahmood and Sial (2011) depict monetary and fiscal policies both significant to growth in Pakistan. Furthermore, Falade and Folorunso (2015) resolves fiscal and monetary are still complementary in Nigeria during 1970-2013.

2.6 Empirical Work of Interaction of Monetary Policy

The joint interaction between monetary and fiscal policy with debt and expenditure is ignored by previous researchers. It remained neglected part of empirical literature. Also, it is acknowledged that fiscal policy influence significantly monetary policy through interest rate and exchange rate channels (Aizenman, Kletzer, & Pinto, 2007). As both policies interacted indirectly on the different channels like the inflation and deficit financing, the interaction relationship becomes more complicated to investigate (Canzoneri, Cumby, & Diba, 2011).

When in doubt of monetary policy and fiscal policies, the interest rates and inflation rates are called upon (Rakic & Radenovic, 2013). In fact, interest rates have a direct impact on fiscal with its servicing costs and debt property. Likewise, interest rates volatility brings fluctuations in the requisite of the primary surplus. Henceforth, the impact of interest rate is greater when debt level is eminent (Lane & Milesi-Ferretti, 2002).

In the same way, intensification of debt likewise increases the interest rates, consequently leading to the diminution of the growth potential. Comparatively, inefficient tax schemes and nonproductive public projects also contribute to the unfavourable impact of economic production. Hence, these fiscal distortions are debatable and again demanding the attention and sound response from the monetary authorities. Besides, interrelated of monetary and fiscal policies lay the drive to pool resources to in realising the policies shortcoming. Uniquely, the nature of policy interactions and the economic environment uncertainty also lead to the elusiveness of policy creation.

The original works of McCallum (1981 & 1983), Sargent and Wallace (1984), and Smith (1982) on monetary-fiscal policy interaction have highlighted that tight monetary policy may decrease inflation in the short run yet it will create higher inflation in the long haul. To evade these sorts of circumstance, they have proposed the interaction of both policies where monetary policy moves first then guide fiscal policy to achieve related targets. Consequently, it might prompt to stabilise price levels. Then, Alesina and Tabellini (1987), Leeper (2010), Hallett, Libich, and Stehlik (2014), and Nordhaus, Schultze, and Fischer (1994) have also made the contributions to the interaction terms. In Leeper (2010) explanation, he has brought up the indirect ways that interaction both policies to achieve price stability but by taking care of budget deficit through the nominal interest rate. Be that as it may, according to Dharmadasa (2015), above reviews focus on likelihood of the outcomes and there are no any definite conclusions drawn utilising any econometric analysis.

In a seminal paper on monetary and fiscal policy interactions, Leeper (1991) clarifies how the macroeconomic impact of monetary and fiscal policy can vary contingent upon the supposition that which policy compelled while the other policy can efficiently respond to the shocks. Assadi (2015) reviews later prove the adequacy of fiscal policy when monetary policy obliged in policy commitment, like Taylor Rule or inflation targeting. In fact, the mechanisms of these works were developed in isolation. Consequently, the interaction term is often displayed as the non-cooperative game between a central bank and its government, each having its needs over inflation and output (Alcidi & Thirion, 2016).

Markedly, Sargent and Wallace (1984) demonstrated that confined monetary policy is not capable of lessening inflation neither in the long-run nor short-run unless there is an alteration of fiscal policy (Merzlyakov, 2012). Similarly, the monetary policy of debt management must coordinate with fiscal policy in the United States to ensure growth without inflation in the report of Kennedy Council of Economic Advisers (Rasche & Williams, 2005). Likewise, Hoogduin, Ozturk, and Wierts (2011) held the potential for interaction between debt and monetary policy due to the worldwide expansion of short-term debt in the GFC. In fact, difficulty in isolating monetary policy and government debt is well known.

According to Bernanker and Gertler (1989), the real impact of the monetary-stimulated interest rates on the growth cannot be clarified just within the channel of interest rate. As according to James (1963) issuance of short-term debt by the government is like a monetary expansion, according to the portfolio choice. Debt management is postulate with the occurrence of shifting activity between the short and

long-dated paper. These shifting movement, in general, is a countercyclical policy to influence private capital and growth.

Additionally, Bernanke and Blinder (1988) depicted the connection between banking (investment) and changes in macroeconomic (growth) through the cash flow and balance sheet. According to Palley (2008), lending of the bank is essential in money supply, thus when debt increase it is the primary concern in the endogenous money theory. Debt impact on growth through nominal wage adjustment and price in the economy. At the same time, endogenous money is a necessity for economic growth.

In general, there is three models of money supply process, firstly the pure portfolio model, second pure loan demand model, and third mixed portfolio loan demand model (Palley, 1994). The first model in regard to the money supply process and mainly accentuated on the substitutability of the asset. Henceforth, coherent with interest as the transmission mechanism and is regarded as money supply exogenous (controllable).

Accordingly, second model checks into the Post Keynesian (PK) accommodationist of endogenous money and third represents the structuralist PK (Pollin, 1991). PK model stresses on the asset substitutability importance to money supply, and notably, the banking system capability in underwrites economic activity. Money is endogenous regardless financial innovations, or other institutional changes (Rochon & Rossi 2013). In detail, major linkage runs from credit to money and then economy activity and able to connect to the real sectors.

The interaction of policies is also explored accordingly with the impact of fiscal policy on interest rates. Indeed, debt has no consequences for interest rates in the Ricardian world and deficit prompt interest rate in the non-Ricardian world. According to Mohanty (2012), the former serves that the industry in general preserves the full extent of discounted tax liability and concealed by a rise in the fiscal deficit while the latter in accordance to the crowding out assumptions as the higher fiscal deficits with an invariant money supply will thus leading to higher interest rates. In fact, country reliance on foreign credit along with fiscal dominance will consequently proof the non-Ricardian theory with the default risk premium on government debt.

Likewise, Blinder (1980), a tremendous change in the policy mix would only cause a modest increase in growth, taken in the uncertainty in increase or decrease of prices. Bearing in mind, the assumption of Ricardian equivalence holds, and tax is lump sum; the results will be unaltered though expenditure is financed by fiscal deficits. Contrary, Lambertini (2006), revealed that would not be in the case of distortionary tax.

The optimal debt management theory supposes state contingent will disburse government liabilities Barro (1979), Lucas and Stokey (1983), and Missale (1999). In cutting-edge economies, expectations of proceeding with substantial spending deficits may trigger absence of trust, consequently justify the monetary policy to back up the financial system (Al-Hamidy, 2012). To enumerate, this might be the indirect impact of fiscal stance on monetary policy. Besides, Lew (2007) reveal that deficit does not cause interest rate in ASEAN-5 countries, and the deficit does not cause inflation rate either, aside from the Thailand and Singapore during 1980–2006. Correspondingly, causality between the debt, interest rate and inflation rate is asymmetric. Kuncoro and

Sebayang (2013) attempt to estimate the dynamic interaction of fiscal and monetary policies for economic stability. Their study proved that debt and fiscal imbalances are on the rise and fiscal dominance had become an issue in Indonesia.

Then again, Mohanty (2012) revealed that the Singapore Monetary Authority is a fascinating country where its entire issuance of debt is unconnected to its fiscal requirements notably. Given that, the government must have held the proceeds from the sale of securities in a particular account to meet its interest payments and repayments. Regardless, yields on Treasury bills, are often use as a reference percentage for pricing other loans in the Philippines. When the yields on Treasury bills have fallen sharply, this implies the government has rejected bids in auctions. As a result, this might led confusion about the monetary policy signal.

Conversely, Tobin-Mundell debate stressed that a proper policy mix could prompt the achievement of both external and internal balance of the economy, thus underlining appropriate institutional cooperation is necessary to formulate an optimal policy mix approach. Reynolds (2001) argued that monetary and fiscal policies are not interchangeable, and the fiscal shortage cannot finance by issuing new money. He emphasised that monetization leads to inflation and restrictive monetary policy can create deflation. According to him, inflation and deflation are monetary phenomena, and it cannot come through fiscal or real consequences.

Former empirical studies have cleared the previously mentioned contention revealing several adverse economic outcomes of the policy mix. The resistance of policy mix approach always gave imperfect results like the high fiscal deficit and high real

interest rate. In the long haul, such policy mix drives government debt to develop quickly and bring down the level of growth in the nation (Blinder 1980; Lambertini, 2006; Nordhaus, Schultze, & Fischer, 1994). Nonetheless, endless debates exist in macroeconomic literature over policy choice, and their appropriateness as economic theories are developing after some time with new thoughts and methods come into display from time to time.

2.7 Empirical Work of Labour and Capital

According to Mokyr (2005), investment in human capital brought in the conditions of faster innovation in growth as it also a constructive realisation to foreign direct investment. Moreover, in the era of unpredictable flows of global capital, the stability of FDI comes forth as an efficient channel for facilitating faster growth in the developing countries (Makki & Somwaru, 2004). In general, there are three channels which FDI can lead growth. First FDI enhances domestic savings, second FDI serves as the passage of technology spillovers that increase factor productivity, and third FDI leads to increase in exports and higher competitiveness in domestic output.

In fact, diminishing returns to capital can be postponed if labour is complement into the production function alongside with unskilled labour following the endogenous growth theory. That is to say, increase in quality of labour is a significant factor that capable of absorbing the technological spillovers ensuing from the capital. Besides, Qadri and Waheed (2013) proved that returns on labour in the low-income countries are higher than the returns on labour both in the middle and higher-income countries in a sample of 106 countries during 2002–2008. Contrary, De Oliveira, Santos, and

Kiker (2000) proved a positive relationship between overeducation and growth, while vice versa between undereducation and growth.

Additionally, Borensztein, De Gregorio, and Lee (1998) suggest that nations need to achieve a threshold labour level to the experience positive impact of capital. Likewise, Li and Liu (2005) affirm that human capital is essential for inward FDI to promote economic growth in developing nations positively. Barro (1991) refer human capital as advantageous to growth, and this result seems to support the convergence hypothesis of neoclassical growth models with the significance of secondary school enrolment rates applicable in OECD countries. Besides, education spending also exhibited a substantial impact on growth in Malaysia, increased growth in Singapore, but decrease growth in the Philippines (Maitra & Mukhopadhyay, 2012).

According to Sulaiman, Bala, Tijani, Waziri, and Maji (2015), secondary and tertiary school enrolments have a positive impact on growth in Nigeria during 1975-2010. Also, higher education found to have a positive effect on growth during 1982-2009 in Sudan (Arabi & Abdalla, 2013). Similarly, Mallick, Das, and Pradhan (2016) revealed a positive impact on education expenditure on growth in Japan, Malaysia, the Philippines, Singapore, and Thailand from 1973 to 2012. In detail, education granger causes growth, while a unidirectional causality from growth to education both in the short and long-run with panel vector error correction method. Banerjee and Roy (2014) results indicated labour is the most significant factor with ARDL method during 1950–2010 in India.

Nevertheless, the impact of capital on growth also contingent upon the labour and the financial sector development. As such, Zadeh and Madani (2012) suggest that impact of capital on growth rate as non-linear when capital has a negative impact on growth and low financial development but positive impact on growth when financial development surpasses the threshold. Then, Bende-Nabende, Ford, Slater, and Sen (2002) proved that capital positive on growth for relatively less advanced countries like Thailand and the Philippines, but harmful in the more economically advanced countries like Taiwan and Japan.

Following De Vita and Kyaw (2011), the neoclassical believes that FDI could shock growth permanently. Additionally, FDI was considered as a reliable and less volatile source for the developing countries (Blomstrom & Kokko, 1998). Unlike neoclassical, the endogenous growth theories hypothesis that over time growth reckoning on the technology transfers and knowledge spillovers Grossman and Helpman (1991), Romer (1994), and Nair-Reichert and Weinhold (2001). In fact, Borensztein et al. (1998), reveals that higher productivity of capital only holds when the nation has the least threshold stock of labour. Similarly, the stock of human capital in contributing capital impact on growth was also highlighted by Wijeweera, Villano, and Dollery (2010). Furthermore, Wu and Hsu (2008) proved that capital stage an uncertain role in contributing growth in 62 countries from 1975-2000 using threshold regression developed by Caner and Hansen (2004).

Baharumshah and Thanoon (2006) using dynamic panel proved FDI beneficial in the growth of Malaysia, the Philippines, Thailand, and Singapore economies. Hansen and Rand (2006) found that FDI advantageous in 31 developing countries with Granger

causality test and emphasis on FDI with knowledge transfers and adoption of new technology. Also, Choong, Liew, Chan, Ch'ng (2011) who also utilising the bounds test method, found likewise in Malaysia, Indonesia, the Philippines, and Thailand economics. Lindblad (2015) suggest that capital is regarded to be far more positively now than it was 50 years ago, in Indonesia and worldwide. Zakari and Mohammed (2012) establish a positive relationship between capital and growth for 30 countries both from Africa and Asia with panel data during 1990-2009. Moreover, Wogbe Agbola (2014), FDI is found to be a drive in the Philippines growth during 1965–2010.

Contrary, Hussin and Saidin (2012) found FDI is not related to growth for all ASEAN-5 except Singapore during 1981-2008 with Ordinary Least Squares and panel estimation. Also, Karimi and Yusop (2009) discovered no evidence of a bi-directional causality and long-run relationship between capital and growth in Malaysia. In addition, Sakar and Aslam (2013) disclosed capital not significant on growth in Malaysia during 1980-2010.

According to Makki and Somwaru (2004), the strength of FDI in driving growth rely on the internal conditions of the nation. Following De Mello and Sinclair (1995), capital is anticipated to increase the attainment and acquisition of the national workforce through transfers of technical expertise and new knowledge. Chowdhury and Mavrotas (2005) discovered a bidirectional causality between growth and capital in Thailand and Malaysia during 1969-2000 with Toda-Yamamoto causality method.

Roy and Mandal (2012) detected a two-way causal relationship exists between growth and capital only in the case of Thailand but no causality between capital and GDP in

Malaysia, causality from growth to capital in Indonesia, Philippines, and Singapore during 1981-2008. Samad (2009) causality results indicate the bidirectional relation between GDP and FDI for Bolivia, Columbia, Singapore, Indonesia, and India, Thailand, and Pakistan while unidirectional from GDP to FDI in Philippines and Bangladesh. According to Sami (2012), a unidirectional causality from FDI to growth and FDI exerts a positive impact on growth over time in Malaysia.

Regardless, Dowling and Hiemenz (1983) and Lee, Rana, and Iwasaki (1986) concluded that causality occurred in the reverse way where fast-paced growth could induce the capital inflow. Consequently, the nation will demand more capital by appealing offering such as preferential or advantageous terms for overseas investors. Moudatsou and Kyrkilis (2011) study proved growth driven capital in European Union countries, but FDI drives growth in the Philippines and Singapore, and a two-way causality between growth and FDI in Indonesia and Thailand during 1970-2003. Har, Teo, and Yee (2008) study reveal that capital has a positive impact on growth with the Ordinary least square regressions in Malaysia during 1970-2005. Rahman (2015) state that exuberant capital expenditure might cut down the positive impact of capital on growth.

2.8 Research Gap

In contrast to most previous studies which based on total output effect or nominal output, this study focuses on the impact of fiscal and monetary policies on real GDP per capita. This study also develops in greater detail growth model that includes separate effects of the tax on economic activity. There are two sources of revenue received by the government that comprises of tax and non-tax, but a key feature of this

study model is that these taxes often have uneven effects on the growth. The central contribution of this study is to emphasize the different distribution effect of tax and non-tax that may be a driving source of filling in the expenditure.

This study also uses updated data including observations in the 1970s and has the following distinctive features. Earlier studies when examining the impact monetary policy with economic growth, emphasise mostly on the Keynesian and Monetarist theory or Solow theory in Sturgill (2014) study. In contrast, this study lead by Barro (1991) notably the Endogenous growth theory will be the theoretical framework for this study.

Also, this study is also incorporating views on mechanism channel in empirical studies with the indirect effects and direct effects of the policies target variables. The evidence on both direct and indirect effects are expected in serving the efficiency of the economic system. The immediate consequences of the fiscal policy and monetary policy are government expenditure, tax, money supply, and interest rates. The indirect effects are debt, inflation, and exchange rate. Country-specific variables namely human capital and foreign direct investment as the proxy for labour and capital will also be included to enhance the practicality of the current economic situation.

Motivated by the literature that was initially start off by Friedman and Meiselman (1963) (FM) in deriving a test of the relative usefulness of the Keynesian versus the quantity theorists and further improved by Andersen and Jordan (1968) that employs fiscal measures to correct the feedback effects, and consequently proved the favouring of monetary policy over fiscal policy in develop countries. This study intends to test

whether monetary policy or fiscal policy domain on growth and differ from the traditional view, this study model comprise tax and interest rate. In essence, this study focusses on the transmission to real variables and revisits the relative effectiveness of monetary and fiscal policies in ASEAN-5 countries.

A somewhat surprising feature of the literature is the noticeable absence of formal economic models of the relationship between the interaction of monetary policy and public debt with government expenditure. This study represents an initial attempt to fill this gap by considering the role of public debt in an endogenous growth framework with interest rate among ASEAN-5 countries. The expansion of short-term debt during the late worldwide global crisis incite, the likelihood of the interaction term. Regardless, management of debt and monetary policy is well-known of its coherent difficulty in isolating both altogether. Thus, the interaction of interest rate with debt and government expenditure is of the essence and indeed timely nowadays.

In summary, the identified gaps in the literature includes examining the influence of indirect taxes in supporting the economy spending, the success of fiscal policy and monetary policy as a targeting anchor in the economies, investigating the relative effectiveness of the fiscal and monetary policies as strategic tool for growth stagnation in ASEAN-5 economies, and the interaction of monetary policy with fiscal policy when debt reigned. Lastly, this study also intends to examine the causality among the variables of fiscal and monetary theory on growth determination in ASEAN-5 countries.

2.9 Chapter Summary

This chapter reviews studies on both theoretical and empirical related literature and causality among the growth fundamentals. The empirical analysis reveals mixed results on the relationship between the variables. Also, the reasons for inconsistencies in the literature are not yet established. The chapter ends with summarising the gaps in the literature.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter focuses on the theoretical framework and methodology employed to answer the objectives of the study. Section 3.2 presents the theoretical framework, Section 3.3 compromises model specification, and Section 3.4 discusses operational justification of variables. Section 3.5 compromises estimation procedures, Section 3.6 contains the sources of data, and lastly, the chapter summary is offered in Section 3.7.

3.2 Theoretical Framework

This section established the fundamental connection between dependent and independent variables to develop and justifies testable hypotheses without regards to empirical evidence. It also identifies and conceptualised variables relevant to the analysis. The theoretical framework is presented in the following subsections. This section gives the underpinning theory of Endogenous Growth Theory. In fact, since 1980 the exogenous growth model was declared as inadequate in explaining the growth over time. Consequently, leads to the AK model with the non-diminishing return of production (Barro & Sala-i-Marin, 2004). Here, A refers to the positive constant in technology level, and K applies to capital. Mankiw, Romer, & Weil (1992) generated a human capital augmented version of the Solow-Swan theory. The Cobb-Douglas as below:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} \left(A(t)L(t)\right)^{1-\alpha-\beta} \quad 3.1$$

where $_{H(t)}$ denote as the human capital and diminishes likewise with the physical capital. In Solow-Swan, fraction income $_{sY(t)}$ is saved respectively on period, yet in Cobb-Douglas, it is commit into physical and human capital, where $s = s_K + s_H$. The steady state equilibrium growth path is determined by $\dot{k} = \dot{h} = 0$ and yield $y^* = (k^*)^{\alpha}(h^*)^{\beta}$.

3.3 Model Specification

This section presents the five different models employed in this study to address the relationship of fiscal or monetary policies in increasing the economic growth.

3.3.1 Fiscal Model of Economic Growth Determination

In the past, the seminal work of Barro (1990) with the endogenous growth theory stresses the relationship between fiscal policy and long-run economic growth. Following the Owusu-Nantwi and Erickson (2016), Eberhardt and Presbitero (2015) in examining the impact of fiscal policy on growth. Thus, to examine the impact of fiscal on growth, the **Model 1** is specified as below:

$$GDPC_t = \beta_0 + \beta_1 TE_t + \beta_2 T_t + \beta_3 TD_t + \beta_4 HC_t + \beta_5 FDI_t + \varepsilon_t \qquad 3.2$$

where GDPC is the gross domestic product per capita, the fiscal policy is formed from TE represent government expenditure, T represent a tax, TD represent debt, HC represent human capital, FDI represent a foreign direct investment, ε_t is an error term, t is a time series. The constant is denoted by β_0 while the coefficients are $\beta_1 - \beta_5$ that show how much an increment in a unit in each variable of the fiscal policy will affect the growth rate.

3.3.2 Fiscal Model (Inclusion of Non-Tax) of Economic Growth

However, there is a limitation in above model where the area did not explore the growth effect of fiscal policy might not take into the structure of both taxation and expenditure (Benos, 2009). In examining the impact of non-tax on growth, the model follows the leads of Zhang, Ru, and Li (2016) and is specified as **Model 2** below:

$$GDPC_t = \beta_0 + \beta_1 TE_t + \beta_2 T_t + \beta_3 NT_t + \beta_4 TD_t + \beta_5 HC_t + \beta_6 FDI_t + \varepsilon_t \quad 3.3$$

where the fiscal policy is formed from the TE represent government expenditure, T represent a tax, NT represent non-tax, TD represents debt, HC refers to secondary school enrolment, and FDI refers to foreign direct investment, ε_t is an error term and t is a time series.

3.3.3 Monetary Model of Economic Growth Determination

In examining the impact of monetary policy, the study model follows the leads of Jain-Chandra and Unsal (2014), Ibarra and Trupkin (2016), Merrouche and Nier (2017), Apere and Karimo (2014) and thus this study model is specified as **Model 3** as below:

$$\mathrm{GDPC_t} = \beta_0 + \beta_1 \mathrm{MS_t} + \beta_2 \mathrm{IR_t} + \beta_3 CPI_t + \beta_4 \mathrm{ER_t} + \beta_5 \mathrm{HC_t} + \beta_6 \mathrm{FDI_t} + \varepsilon_t \quad 3.4$$

where the monetary policy is formed from MS represent broad money, IR represents interest rates, CPI represents consumer price index and ER represent exchange rate with GDPC, HC, FDI and ε as defined earlier in equation 3.2. The coefficients of

$\beta_1 - \beta_6$ show how much increments of each variable of the monetary policy will affect the growth rate.

3.3.4 Relative Effectiveness of Fiscal and Monetary Policies

Before the financial crisis, from the theoretical and empirical standpoint, fiscal requirements were sometimes taken as irrelevant in research articles and was even given a secondary role compared to monetary policy (da Silva, & Vieira, 2017, and Blanchard, Dell'Ariccia, & Mauro, 2010). However, Andersen and Jordan (1968) beg to differ and probe into the relative policies effectiveness of fiscal and monetary policies. Presently, this study following the model from Kandil (2015) in examining the relative effectiveness of fiscal and monetary policies with growth as specified in **Model 4**:

$$GDPC_t = \beta_0 + \beta_1 TE_t + \beta_2 T_t + \beta_3 MS_t + \beta_4 IR_t + \varepsilon_t \quad 3.5$$

where the GDPP refers to gross domestic product per capita, TE refers to government expenditure, T relates to tax, MS is money supply, and IR is interest rate.

3.3.5 The Interactions of Monetary Policy and Fiscal Policy

The expansion of short-term debt during the late worldwide global crisis incite, the likelihood of the interaction term. When the solvency of government finances was not challenged, models that applied to analyse monetary stabilization policies did not account for government budget and public debt dynamics (Benigno & Woodford, 2006 and da Silva, & Vieira, 2017). However, with the integrated financial market and development of debt in developing countries, it is prudent to analyse monetary policies

with debt. Consequently, the interaction of interest rate with debt and government expenditure is of the essence and indeed timely nowadays.

Following the lead of Mohanty (2012), this study focuses on the role of interest rate with the interaction of government debt and expenditure and is specified in **Model 5** as below:

$$GDPC_t = \beta_0 + \beta_1 MS_t + \beta_2 IR_t + \beta_3 ITD_t + \beta_4 TD_t + \varepsilon_t \qquad 3.6$$

where ITD represent interaction term of interest rate and debt; with GDP, MS, IR, TD, Δ, t, β and ε as defined in above equation. On the other hand, to examine the interaction of monetary policies on government expenditure with growth, the **Model 6** is specified as below:

$$GDPC_t = \beta_0 + \beta_1 MS_t + \beta_2 IR_t + \beta_3 TEI_t + \beta_4 TE_t + \varepsilon_t \qquad 3.7$$

where TEI represent interaction term of interest rate and expenditure; with GDP, MS, IR, TE, Δ, t, β and ε as defined in earlier equation.

3.4 Operational Justification of Variables

The first previous section of this chapter established the link between the dependent variables and the explanatory variables of the study. Thus, this section briefly describes the measurement and hypothesised the operational justification of the variables based on the theoretical and empirical literature reviews. The variables will be vindicated starting from gross domestic product and then with the fiscal policy

variables like government expenditure, tax, non-tax, and public debt. Next, the monetary policy variables like money supply, interest rate, inflation and exchange rate. The endogenous growth has also stressed the enhancing-growth effect played by other mechanisms such as the quality of human capital and the degree of financial openness. Therefore, this study uses secondary school enrolment and foreign direct investment as the proxied of labour and capital.

3.4.1 Real Gross Domestic Product per capita (GDPC)

The real Gross Domestic Product Per Capita (GDPC) is measured as the value of economic output balance for price variations (inflation or deflation) and divided by the economy population. GDP per capita reflecting the true purchasing power of the population as in the studies of Egger and Winner (2006), Busse and Hefeker (2007), Hong (2008), and Masron and Naseem (2017). Therefore, the economic growth in this study is proxied by real growth per capita (GDPC) as in the studies of Alguacil, Cuadros, and Orts (2011), Gerard and Ngangue (2015), Sturgill (2014), Iamsiraroj and Ulubaşoğlu (2015), Baharumshah, Slesman, and Wohar (2016), and Hajian, Mohamed, and Habibullah (2017).

3.4.2 Government expenditure (TE)

Government expenditure is defined as the total spending of capital and development expenditure by the function of central government at any level and not including net lending. Government expenditure usually funded by revenue. Given that, the expenditure that financed from the higher level of taxes also poses a severe threat particularly when the resources are not allocating efficiently. Benos (2009) note that higher levels expenditure will have their full growth benefits for economies only if

they are financed by increases in non-distortionary taxes. Expenditure is hypothesised to be positive to growth in Keynesian theory, negatively to growth in Neoclassical theory.

3.4.3 Tax (T)

The tax in this study is measured by tax revenue (T) and refer to the compulsory transfers to the central government for public purposes (World Bank, 2016). The most common measure of tax policy is tax revenues as a policy outcome, and by definition, tax revenues equal to tax rate multiply with tax base (Riera-Crichton, Vegh, & Vuletin (2017). Furthermore, the lack of readily available multi-country data on tax rates has led researchers to look for alternative measures of tax policy like tax revenue.

By what means taxes are raised should depend on how revenues are spent as both side of the government actions cannot be separated (Burgess & Stern, 1993 and Zhang, Ru, & Li, 2016). According to Romero-Avila and Strauch (2008), productive expenditure and distortionary taxation affect economic growth. Besides, direct also cause accumulation of capital. This variable is hypothesised to be positive to growth in Keynesian theory, neutral to growth in Neoclassical theory.

3.4.4 Non-Tax (NT)

Non-tax economic policies contribute significantly to the growth as this revenue is considered to be a more stable source of income than the tax itself. In addition, non-tax are also less susceptible to an economic downturn. Nowadays government need a more stable source of income mainly developing countries as their economies are more dependent on revenue from direct taxes and petroleum. Besides, non-tax is ground

upon consumption. This variable is hypothesised to be positive to growth in Endogenous theory.

3.4.5 Total Debt (TD)

The debt in this study is measured by total debt (TD). TD comprises of both external and domestic debts from the accruement of past borrowing. In developing countries, indebtedness has been recognized as the essential in the development policy as it quickens the pace of infrastructure development and growth of the country. The neoclassical view considers public debt as detrimental to growth, and the Ricardian view regards government debt as equivalent to future taxes, a neutral effect of debt on growth (Barik, 2012). The neoclassical and Ricardian schools are concerned with the long-run effects with the former suggesting negative nexus between debt and growth and the latter indicating neutral effect between debt and growth (Mankiw, Romer, & Weil, 1992 and Barro,1990). The Keynesian that concern of the short run suggest the positive effect of debt on growth indicate that output is demand determined (Elmendorf & Mankiw, 1999).

The element in this study concerns the presence of a negative long-run relationship between TD and growth with reviews of study from Modigliani (1961), Diamond (1965), Blanchard (1985), Barro (1990), and Saint Paul (1992) studies. This variable has been employed in the previous studies such as Barik (2014), Akram (2015), Owusu-Nantwi and Erickson (2016), Baharumshah, Soon, and Lau (2017). Therefore, this study hypothesized a negative linkage between debt and growth.

Starting from the work of Reinhart and Rogoff (2010) a significant strand of literature has to discuss the extent that debt accumulation has a detrimental and causality effect on growth including the work of Panizza, and Presbitero (2014, 2013), Eberhardt and Presbitero (2015), and Pereima, Merki, and Correia (2015). Besides, high public debt limits the effectiveness of productive public expenditures on long-run growth; leading debt caused expenditure (Teles & Mussolini, 2014). Debt also has known to produced interest rate as excessive public debt could have an unfavourable effect on growth through interest rates (Gale & Orszag, 2003; Kumar & Baldacci, 2010). High public debt could create expectations of future financial repression (Cochrane, 2011) that lead to higher real interest rates (Laubach, 2009) wherein this case; higher debt could have an adverse effect even in the short run.

3.4.6 Money supply (MS)

The money supply is total quantity of money in the economic system. Money is related to production, investment, and consumption activity as in M1 money definition for immediate purchasing power, and by the same token, M2 money in description pertain of M1 with an addition of saving deposits as representative of future purchasing ability. The money supply in this study is measured by Money and Quasi Money (MS).

Besides, money also causal to price level and in line with Quantity Theory of Money where money supply expansions only cause price inflation. The Classical and Keynesians even came to an agreement that money is neutral after the prices adjust back to general equilibrium, and therefore it does not affect real variables except for the price level.

Following Keynesian, money is neutral in the long run but not in the short term due to the sluggish adjustment of prices whereas Classical is more accepting of the view that money is neutral even in the relatively short run. Neutrality of money indicates that the level of money does not have any impact on the level of real economic activity. This variable has been employed in the previous studies such as Ma and Lin (2016). This study hypothesized a positive linkage between money supply and growth.

3.4.7 Interest rates (IR)

The interest rate channel has become a key component in the monetary policy transmission through the combination of sticky prices and rational expectations at least for a time (Taylor, 1995) and to represent the overall effect of all remaining channels in monetary transmission (Mies, Morandé, & Tapia, 2003). The interest rate also reflects the cost price of capital and an excellent reference for consumer consumption and investment (Zhou, 2015). Also, the money view also emphasizes the changes in the monetary aggregate affecting the output via interest rate channel (Mishkin, 2010).

This transmission of monetary policy through interest rate mechanism has been a standard feature in the traditional Keynesian model in a schematic diagram (Mishkin, 1995). The interest rate in this study is measured by money market rate (IR), and the rates are the modes of the three-month interbank rates quoted by money brokers. The variable is hypothesised to be negative to growth in this study.

The causality between interest rate and output implying interest rate channel is yet another crucial intermediate target in complementing with monetary targets. The interest rate channel transmits monetary policy to output and inflation through market

interest and is proved to be useful in developed financial markets (Vo & Nguyen, 2017). However, higher interest rates could also bring about an appreciation of the exchange rate, leading to tightening monetary conditions and putting downward pressure on the demand for credit (Elekdag & Han, 2015).

3.4.8 Exchange rate (ER)

The exchange rate is defined as the information market variables (Raghavan, Athanasopoulos, & Silvapulle, 2009, and Alavi, Moshiri, & Sattarifar, 2016) and even suggested as a means for escaping from a liquidity trap (Mehrotra, 2007). The exchange rate in this study is measured by the official exchange rate (ER), and the rate is determined in the legally sanctioned exchange market and computed as an annual average grounded on monthly averages (local currency unit proportion to the U.S. dollar).

As stated in Mehrotra (2007), this trade-weighted ER is believed to capture more broadly the movements in the ER that may have inflationary consequences in the ASEAN-5 economy. The exchange rate channel is asset channel that lets the transmission of monetary policy over net exports and interest rate parity particular in developed countries (Vrolijk, 1997; Mies, Morandé, & Tapia, 2003, and Bryant, Hooper, & Mann, 2010). Yet, the exchange rate channel is not evinced in developing countries like ASEAN-5.

The exchange rate channel becomes essential as international capital flows typically resulting from a country globalisation of economies and the financial liberalisation process. However, in the case of the government that usually intervene or in control

of the exchange rates, this might yield to undeveloped debt and capital security markets, consequently results in the absence of exchange rate channel in the country (Mishra & Montiel, 2013; Vo & Nguyen, 2017). This variable has been employed in the previous studies such as Raghavan, Athanasopoulos, and Silvapulle (2009), and Alavi, Moshiri, and Sattarifar (2016). Therefore, this study hypothesized positive linkage between exchange rate and growth.

3.4.9 Inflation (CPI)

The inflation in this study is measured with consumer price index (CPI) by the Laspeyres formula, as the percentage change in the cost to the average consumer on a basket of commodities and services which may change at a specified interval or fixed over time (World Bank, 2015). The view of inflation revolved in the classical economist is around the Quantity Theory of Money, the equation of exchange by Irving Fisher in his Purchasing Power of Money (1922), where if output remains unchanged or monetary expansion is greater than the output growth, will lead to increase in price.

Fischer (1993) was the first to identify a non-linear relationship where low inflation rates have a positive impact on growth and turn negative as inflation increases. Then, Tobin (1965) also discovered inflation has a positive effect on growth, and money is a substitute for capital. Contrary, Sidrauski (1967) finds that there are no effects of inflation on growth where money is super neutral. However, Bruno and Easterly (1998) found a negative effect on growth in the high inflationary country. The inflation thresholds above is negatively associated with economic growth (Khan & Senhadji,

2001 and Ibarra & Trupkin, 2016). Moreover, Stockman (1981) also money is a complement to capital when inflation generates negative effects on growth.

Inflation also is known as the cost channel. When the central bank tightens monetary policy by increasing the interest rates, the firms will increase the production cost to compensate for the increased financial input costs (Barth III & Ramey, 2002). Consequently, the overall increase in the price level causes an increase in inflation. Vietnam evidently displays the cost channel in their monetary policy transmission because of the dependence of firms on bank credit for their investment projects (Vo & Nguyen, 2017).

This variable has been employed in the previous studies such as Al-Zoubi, Saqfalhait, and Al-Majali (2013), and Teles, Uhlig, and Valle e Azevedo (2016). Therefore, this study hypothesized a negative linkage between inflation and growth when inflation rates above the threshold, but a positive linkage to growth if the inflation rate is low.

3.4.10 Human capital (HC)

Human capital is defined as the enrolment in the secondary education of both sexes at public and private secondary school from UNESCO Institute. Crawford (1991) human capital compared to physical labour, the former incorporates expandable, self-producing, transportable, and shareable characteristics. According to Barro (1991), the school enrolment although not exempt from measurement problem, it is likely to be more voracious and uniform cross-sectional. In fact, human capital skill is included in both the neoclassical and endogenous growth (Doppelhofer & Miller, 2004 and Mankiw, Romer & Weil, 1992 and Romer, 1990).

However, the Malthusian theorem says that population growth hinders the economic growth and welfare of a country, as population growth has a negative relationship with growth (Akram, 2015). School enrolment represented human capital in Barro (1991) and Ahmed (2012) studies. Often, the stock of human capital is cited as the contributor to extraordinary Asian performance as the private sector is still underdeveloped (Cheng, Razak, & Abdullah, 2013). Thus, this study use enrolment in secondary education, both sexes as a proxy for labour. The variable is hypothesised to be positive for growth when overeducation in a country but negative to growth when undereducation occurs in the country.

3.4.11 Foreign Direct Investment (FDI)

The inward foreign direct investment (FDI) is measured as the total incurrence of foreign liabilities by the residents, and the foreign capital is committed to local resources. It is found that only inflows of FDI, but not any other type of capital flows, are positively correlated with economic growth (Reisen, Helmut, & Soto, 2001). Also, the inflow of FDI tends to be more stable than other types of capital inflows with the potential of reducing vulnerability to sudden stops inflows (Laureti & Postiglione, 2005). Moreover, existing literature has found FDI has a positive effect on economic growth only when the host economy has a robust financial system (Blomstrom & Wolf, 1994 and Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004), or a high level of human capital (Borensztein et al. 1998). Consequently, FDI would be the conditioning information that accounts for differences in economic growth in this study.

Additionally, inflows capital might also have brought about a build-up of financial imbalances, which is alluded to by King (2010). For instance, capital inflows will

"pushed down" long-term interest rates and this, in turn, led to the build-up of imbalances. The capital in this study is proxied by inward foreign direct investment (FDI) as in the studies of Blomstrom and Kokko (1998), Laureti and Postiglione (2005), Reisen, Helmut, and Soto (2001), and Alguacil, Cuadros, and Orts (2011). As such, this study also hypothesized a positive linkage between FDI and growth.

3.5 Estimation Procedures

Selecting time series estimation over panel provides truthfulness of every country's characteristic as each of the countries do not possess similar economic structure in practical. This study intends to determine the influential channel between growth with fiscal and monetary policies in the long run and short term by including dummy from the economic crisis, and control variables like foreign direct investment and human capital.

An examination of how different policies are likely to influence a given outcome, ARDL estimation will be employed in answering both the long and short-run relationship between the exogenous and endogenous variables as described in model accordingly. With the manifestations of downward sloping growth in ASEAN-5 countries, exploration of possible causal mechanisms will be carried out with Toda and Yamamoto estimation, in the hope of achieving stated outcomes of every country policies.

3.5.1 Stationarity Analysis

Time series data mostly are trending, and the series levels (or log-levels) forms are mostly non-stationary, with mean and variance non-constant, and exhibit stochastic

trends. If data have a unit root, then the non-stationary in the mean and variance of the series; that is non-zero long-run mean, and time-dependent variance of a variable suffers from a permanent random shocks effects and inferences. Unit root was traditionally tested using Augmented Dickey-Fuller by Dickey and Fuller (1979) as a prerequisite for determining long-run cointegration with the premise of present shocks are only temporal and do not have a long run effect (Glynn, Perera & Verma, 2007).

3.5.1.1 Unit Root Test without Structural Breaks

Unit root test helps in determining the order of transformation (integration) denoted as (d) before stationary is achieved. In a non-stationary series, y_t must be differenced d times, before it becomes stationary. For a stationary time series data, there will be a convergence towards the initial equilibrium or trend of the series, and by the concept of stationarity, it also related to the properties of the stochastic processes. This test also aids in knowing whether permanent or temporal shocks affect variables in the long run and serves as a precursor in examining the interrelationship among series (Kerry, 2000).

3.5.1.2 Augmented Dickey-Fuller Unit Root Test

The ADF test is conducted on two equations depending on the behaviour of the data as below:

$$\Delta Y_t = u + \alpha y_{t-1} + \sum_{i=1}^{p} \beta \Delta Y_{t-i} + \varepsilon_t \qquad 3.8$$

$$\Delta Y_t = u + \beta_t + \alpha y_{t-1} + \sum_{i=1}^{p} \beta \Delta Y_{t-i} + \varepsilon_t \qquad 3.9$$

where Equation 3.8 is a model with intercept and Equation, 3.9 is a model with both intercept and trend. Equation Y_t is variable of interest, Δ is the first difference operator, u is intercept trend, t is time trend. y_{t-1} is lag variable of interest, Δy_{t-1} is first difference lagged and usually taken to eliminate the problem of serial correlation (Dickey & Fuller, 1979), and ε is the white noise process with $\varepsilon_t \sim iid(0, \sigma^2)$. p shows the of lags number and to be determined with Akaike Information Criterion (AIC), Schwarz Information Criterion (SBC), or Hannan- Quinn Criterion (HQ) in ensuring white noise process of the residuals.

The ADF null hypothesis test states that series is associated with unit root, that is $\alpha = 0$ while the alternative series is stationary $\alpha < 0$. Accordingly, if t-test statistic is less than the critical test tabulated at the appropriate significance level, then the hypothesis $\alpha = 0$ is rejected, implying series is stationary, that is $\alpha < 0$. Therefore, rejection of the null hypothesis of that series is stationarity. When the series are free from the unit root at level, then the order of the integration of the integration is denoted as *I(0)* or *d=0.* Whereas, if the series had a unit root but integrated of order one process, as *I(1),* then the series became stationary after first difference transformation (Glynn et al., 2007).

However, Perron (1989) indicates the inadequacy of ADF in taking into the consideration of an existing break that may leads to bias and less power in rejecting the null hypothesis when a structural break exists. Thus, he developed a test that takes care of an exogenous or known break period under the null hypothesis to solve the problem associated with ADF test. Moreover, he also constructed a fixed break date that selected autonomously from the data using a dummy variable to denote the

exogenous break period. Accordingly, some scholars proposed more advanced tests that endogenously determine a breakpoint from a given data.

3.5.1.3 Unit Root Test with Structural Break

Such tests include, Banerjee, Lumsdaine and Stock (1992), Lumsdaine and Pappel (1997), Perron (1997), and Zivot and Andrews (1992). Banerjee et al., employ sub-samples to determine the break date which affects the power of the rejection or otherwise of the hypothesis. On the other hand, Zivot and Andrews use the full sample and choose the most negative t-statistic from the unit root test as the break point date. Furthermore, Lumsdaine and Papell (1997) capture two endogenously determined structural breaks under the alternative hypothesis and allow for both the level and trend breaks.

However, these tests were censured for size distortion and type one error considering the existence of break under the alternative hypothesis alone. It leads to the conclusion that the series are trend stationary while associated with unit root due to structural breaks which lead to a misleading conclusion because of false rejection of the null hypothesis (Lee & Strazicich, 2001; 2003). As an alternative, Lee and Strazicich (2003, 2013) (LS) developed a minimum two, and one breaks Lagrange Multiplier (LM) unit root test where the rejection of null hypothesis entails stationarity in the trend series. Given that, the null hypothesis rejection in the LM test will means stationarity in the trend.

3.5.1.4 LS Unit Root Minimum LM test with Two Structural Breaks

Lee and Strazicich (2013) (LS) test is break point nuisance unvarying under both the null and alternative hypothesis indicating neither distortion in size (d) nor location (λ) . Furthermore, LM test is not a break location dependent. Therefore, the tests can consider up to two different breaks under the unit root null without relying on nuisance parameters. This important distinctive feature makes LM test free from spurious rejection. LM test is unaffected by size and incorrect estimation irrespective of whether structural breaks are in presence or non (Adebola & Dahalan, 2012 and Lee & Strazicich, 2013).

The LM test solves the problem of divergence emanating from the magnitude increase of the break due to the independence of the test on break location, although the asymptotic distribution of the null hypothesis of the LM intercept and trend model rely on break location (λ). The LM minimum t-statistic for the model does not deviate when the break is present under the unit root null hypothesis regardless the magnitude of the break. The LS test fits appropriate in this study due to the structural changes in the ASEAN-5. Unlike the endogenous break determined test of Perron (1989, 1997), Lee and Strazicich (2003, 2013) minimum break(s), LM test follows the data generating process shown as below.

$$y_t = \delta Z_t + x_t, \quad X_t = \beta X_{t-1} + \varepsilon_t \qquad 4.0$$

where Z_t is a vector containing exogenous variables. The null hypothesis, given as $\beta = 1, \varepsilon_t$ is white noise process that is $\varepsilon_t \sim iid(0, \sigma^2)$ which can be relaxed to ensure the absence of serial correlation. The test considers two different structural changes.

Model A of the two breaks LM test permits dual changes in the intercept defined as $Z_t = [1, t, D_{1t}, D_{2t}]$, in which $D_{jt} = 1$ for time $t \geq T_{Bj} + 1, j = 1,2$ and zero otherwise. The second model (Model C) account of two shifts in intercept and trend. Consequently, defined as $Z_t = [1, t, D_{1t}, D_{2t}, DT^*_{1t}, DT_{2t}]$, $DT^*_{jt} = t - T_{Bj}$ for $t \geq T_{Bj} + 1, j = 1,2$ and zero otherwise. For a break in the trend model $Z_t = [1, t, DT^*_{1t}, DT^*_{2t}]$, $DT^*_{jt} = t$ for $t \geq T_B + 1$ and zero otherwise. T_{Bj} indicates the break period. The break period in this test is embedded in both null and alternative hypothesis as $\beta = 1$ and $\beta < 1$ respectively. The equation below will be obtained based on β's values.

Null hypothesis

$$y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + v_{1t} \quad 4.1$$

Alternative hypothesis

$$y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + v_{2t} \quad 4.2$$

where v_{1t} and v_{2t} are white noise errors, $B_{jt} = 1$ for $t = T_{Bj} + 1, j = 1,2$ and zero otherwise. Here, to ensure time-invariance to the break size, a dummy variable B_{jt} is included in Equation 4.1. Similar models should be repeated with additional D_{jt} and DT_{jt} terms to Equation 4.1 and Equation 4.2 respectively to account for the model that allows for two shifts in both intercept and trend.

The following Lagrange Multiplier (LM) regression equation will be estimated to derive the two breaks unit root *t*-statistics.

$$\Delta y_t = \delta^{'} \Delta Z_t + \phi \widetilde{S}_{t-1} + \mu_t \quad 4.3$$

where $\widetilde{\delta}$ is the coefficient of Δy_t on $\Delta Z_t; \widetilde{S}_t = y_t - \widetilde{\psi}_x - Z_t\widetilde{\delta}, t = 2,...., T; \psi_x$ is $y_t - Z_t\widetilde{\delta}$. The null hypothesis is defined as $\phi = 0$ and the LM *t*-statistics is given as $\widetilde{\rho} = Tx\widetilde{\phi}$ and $\widetilde{\tau} =$ *t*-statistics for testing the unit root of LM test $\phi = 0$. The minimum LM two breaks unit root uses grid search to endogenously determine the break point T_{Bj} as written below:

$$LM_p = \inf_{\lambda} \widetilde{\rho}(\lambda) \quad 4.4$$

$$LM_\tau = \inf_{\lambda} \widetilde{\tau}(\lambda) \quad 4.5$$

The break periods are indicated by the minimum *t*-statistics. If all the variables are stationary *I(0)* then OLS regression in the model is appropriate. But since this study series is a mixture of *I(0)* and *I(1),* then the series will not behave in constants which required in OLS, thus leading to autoregressive distributed lag model. Above all, this study uses ADF and LS test to determine the presence of unit root, as LS is marked to have stronger explanatory power in handling small sample size.

3.5.2 Autoregressive Distributed Lag

Autoregressive distributed lag (ARDL) model introduces by Pesaran, Shin, & Smith (2001) to incorporate I(0) and I(1) variables in the same estimation with the exception that none of the variables should be I(2). The generalised ARDL $(p, q_1, q_2, ...q_k)$ model by Pesaran, Shin and Smith (1999 & 2001), and Pesaran and Shin (1998) as below:

$$\alpha(L,p)y_t = \alpha_0 + \sum_{i=1}^{k} \beta_1(L,q_i)x_{it} + \varepsilon_t \qquad 4.6$$

where L is a symbol for lag operator which is determined as $L^j y_t = y_{t-j}, \alpha_0$ is a constant; x_{it} and y_t are exogenous and endogenous variables respectively, x_{it} is the *i*th exogenous variable for $i = 1,2,3...,k$ and

$$\alpha(L,p) = 1 - \alpha_1 L^1 - \alpha_2 L^2 - ... - \alpha_p L^p$$
$$\beta_1(L,q_i) = \beta_{i0} + \beta_{i1} L^1 + \beta_{i2} L^2 + ... + \beta_{iq_i} L^{q_i}$$

There is no any difference among lags of variables and all are equal over time such as $y_t = y_{t-1} = y_{t-2} = ... = y_{t-p}$ and $x_{it} = x_{i,t-1} = x_{i,t-2} = ... = x_{i,t-q}$ where $x_{i,t-q}$ is the *q*th lag of *i*th exogenous variable. Thus, the long-run equation for ARDL model can be framed as follow:

$$y = \alpha + \sum_{i=1}^{k} \beta_i x_i + \nu_t \qquad \alpha = \frac{\alpha_0}{\alpha(L,p)},\ \beta_i = \frac{\beta_i(L,p)}{\alpha(L,p)} = \frac{\sum_{j=1}^{q} \beta_{ij}}{\alpha(L,p)},\ \nu = \frac{\varepsilon_t}{\alpha(L,p)} \qquad 4.7$$

The ARDL model will represented by Error Correction Model (hereafter ECM) as follow:

$$\Delta y_t = \Delta\hat{\alpha}_0 + \sum_{j=1}^{p} \hat{\alpha}_j \Delta y_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{q_i} \hat{\beta}_{ij} \Delta x_{i,t-j} + \gamma_0 \left(y_{t-1} - \sum_{i=1}^{k} \gamma_i x_{i,t-1} \right) + u_t \qquad 4.8$$

where Δ stands for the first difference; $\hat{\alpha}_j, \hat{\beta}_{ij}$, and are the short run estimated coefficients from Equation 4.7; and all γ_i, where *i* runs from 1 to k, are the long-run

coefficients in the model in Equation 4.8 and γ_0 is the speed of adjustment due to shocks in the short run towards the long run equilibrium.

Alternatively, Equation 4.8 can be represented in Error Correction Model as follow:

$$\Delta y_t = \hat{\alpha}_0 + \sum_{j=1}^{p} \hat{\alpha}_j \Delta y_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{q_i} \beta_{ij} \Delta \hat{x}_{i,t-j} + \alpha(L,p) ECM_{t-1} + u_t$$
$$ECM_t = y - \hat{\alpha} - \sum_{i=1}^{k} \hat{\beta}_i x_{it} \quad (4.9)$$

where $\alpha(L,p)$ is the coefficient that gauges the speed of adjustment and the primary objective of ECM in capturing the short-run dynamics. The value of the coefficient term should lie between -2 and 0 (Samargandi, Fidrmuc, & Ghosh, 2015). The coefficient of ECM term, fallen outside the range, would imply clues for over correction or divergence from the equilibrium.

Thus, above ARDL model suggested by Pesaran, Shin, & Smith (2001) into Equation 4.6 and Equation 4.8 can be converted in terms of the model in this study as follows:

$$\log(\mathrm{GDPC}_t) = a_0 + a_1 \log(\mathrm{TE}_t) + a_2 \log(\mathrm{T}_t) + a_3 \log(\mathrm{TD}_t) + a_4 \log(\mathrm{HC}_t) + a_5 \log(\mathrm{FDI}_t) + \varepsilon_t \quad (5.0)$$

$$\Delta LnGDPC_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \delta_i \Delta LnTE_{t-i} + \sum_{i=1}^{q2} \gamma_i \Delta LnT_{t-i} + \sum_{i=1}^{q3} \eta_i \Delta LnTD_{t-i} + \sum_{i=1}^{q4} \lambda_i \Delta LnHC_{t-i}$$
$$+ \sum_{i=1}^{q5} \theta_i \Delta LnFDI_{t-i} + \rho_1 LnGDPC_{t-1} + \rho_2 LnTE_{t-1} + \rho_3 LnT_{t-1} + \rho_4 LnTD_{t-1} + \rho_5 LnHC_{t-1} + \rho_6 LnFDI_{t-1} + \varepsilon_t \quad (5.1)$$

$\beta_i, \delta_i, \gamma_i, \eta_i, \lambda_i,$ and θ_i are the coefficient estimates of all the first differences variables in the above equation and explain the short run effects while the second part long-run effects are described by the estimates of $\rho_1, \rho_2, \rho_3, \rho_4, \rho_5$ and ρ_6. And in ECM, the model can be described as below:

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnTE_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnT_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnTD_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnHC_{t-i} + \sum_{i=1}^{q5} \lambda_{6i} \Delta LnFDI_{t-i} + \lambda_7 ECM(-1) + v_t \quad 5.2$$

By specifying the long run growth model in Equation 5.0, Equation 5.1, and ECM in Equation 5.3, the short-run and the long-run effects of all the right-hand side variables in Equation 5.0 would be estimated in one step. Above descriptions applies likewise to another model in this study:

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnTE_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnT_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnNT_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnTD_{t-i} + \sum_{i=1}^{q5} \lambda_{6i} \Delta LnHC_{t-i} + \sum_{ii=1}^{q6} \lambda_{7i} \Delta LnFDI_{t-i} + \lambda_8 ECM(-1) + v_t \quad 5.3$$

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnMS_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnIR_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnER_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnCPI_{t-i} + \sum_{i=1}^{q5} \lambda_{6i} \Delta LnHC_{t-i} + \sum_{i=1}^{q6} \lambda_{7i} \Delta LnFDI_{t-i} + \lambda_8 ECM(-1) + v_t \quad 5.4$$

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnTE_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnT_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnMS_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnIR_{t-i} + \lambda_6 ECM(-1) + v_t \quad 5.5$$

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnMS_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnIR_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnITD_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnTD_{t-i} + \lambda_6 ECM(-1) + v_t \quad 5.6$$

$$\Delta LnGDPC_t = \lambda_0 + \sum_{i=1}^{p} \lambda_{1i} \Delta LnGDPC_{t-i} + \sum_{i=1}^{q1} \lambda_{2i} \Delta LnMS_{t-i} + \sum_{i=1}^{q2} \lambda_{3i} \Delta LnIR_{t-i} + \sum_{i=1}^{q3} \lambda_{4i} \Delta LnTEI_{t-i} + \sum_{i=1}^{q4} \lambda_{5i} \Delta LnTE_{t-i} + \lambda_6 ECM(-1) + v_t \quad 5.7$$

ARDL approach has several advantages where first, this method avoids the uncertainty of unit root pretesting. Second, both short and long-run dynamics will be captured when testing for the existence of cointegration. Third, the ARDL cointegration has been established in assisting to correct residual serial correlation and endogeneity bias (Pesaran & Shin (1998) and Inder (1993). Finally, this method allows the application to small sample size (Trinh, 2014). This study selects the optimum lags by well-known set criteria such as Akaike Information Criteria, Bayesian Schwartz Information Criteria, or Hannan-Quinn Criteria depending on the optimal results. Also, cumulative sum of recursive residuals (CUSUM) test and the cumulative sum of squares of recursive residuals (CUSUMSQ) test are applied to detect structural instability and model misspecification within the 5% critical bounds.

In addition, ARDL involves checking whether a long-run relationship exists among the variables with bounds testing approach (Pesaran et al., 2001). The null hypothesis of no long-run relationship is examined with the F-test of the joint significance of the lagged level coefficients of the equation, $H_0 : \eta_1 = \eta_2 = 0$ against the alternative that $H_1 : \eta_1 \neq 0, \eta_2 \neq 0$. Pesaran et al., (2001) have tabulated the appropriate critical values

and depending on the number of regressors and on whether an intercept and a time trend is included in the equation. A pair of the critical values is given, with an upper and a lower bound, respectively. If the F-statistic is greater than the upper bound, the null hypothesis is rejected with the long-run relationship exists between the test variables. If the F-statistic is smaller than the lower bound, then the null cannot be rejected with no long-run relationship. If the statistic falls between the two bounds, the result is inconclusive; it is only at this stage that the analyst may need to conduct unit root tests (Pesaran & Pesaran, 1997).

Usually, data of time series are non-stationary, where values of the series do not fluctuate around a constant variance or with constant mean. Tests like Jarque and Bera (1980) and Ramsey (1969) and autoregressive conditional heteroscedasticity (ARCH) will be conducted in this study to ensure the efficiency, robustness and biases exempted. Test of normality is also performed to verify the normal distribution of the residuals that associated with the regression model (Jarque & Bera, 1980). For correct specification of the equation, Ramsey (1969) test is conducted, and the ARCH effect is to reassert if the model suffers from heteroscedasticity.

3.5.2.1 Autocorrelation

Autocorrelation is formed in the model when incorrect model specification, or omitting variable that ought to be included when errors of measurement in the dependent variable are not random. Then the error term will pick up any systematic mistakes and misspecification of the functional form. In short, autocorrelation is a correlation of time series data with its past and future value. Autocorrelation hypothesis is shown as below where null hypothesis means no correlation between

error term u_i and u_j alternative hypothesis means the correlation between error term, u_i and u_j:

$$H_0 : No \quad correlation$$
$$H_1 : Autocorrelation \qquad 5.8$$

Breusch-Godfrey (BG) is used in this study in testing autocorrelation. BG test allows for non-stochastic regressors such as the lagged value of the regressors or higher order moving averages of white noise error terms. Hence, the null hypothesis to be tested is as: $H_0 : \rho_1 = \rho_2 = ... = \rho_\rho = 0$. If the p-value of the Chi-squared test is more than 0.01, H_0 is not rejected and there is no autocorrelation problem. If the model suffers from autocorrelation, then differencing the data will solve the problem and afterwards run the regression using the differenced variable.

3.5.2.2 Heteroscedasticity

Heteroscedasticity happens when the conditional variance of Y_i increases as X increases and the variance of Y_i are not the same (the variance of u is unequal). Heteroscedasticity is a common problem in time series data. Hence, ARCH test will be conducted to detect the presence of this issue. Where the null hypothesis is as follow:

$$H_0 : \alpha_1 = \alpha_2 = K = \alpha_p = 0(NoARCH)$$
$$H_1 : \alpha \neq 0 \qquad 5.9$$

Obtaining R^2 from the auxiliary regression, the ARCH test can be computed with the formula of $(N-p)R^2$. The test statistic is distribute as chi-square with p degrees of freedom $(\chi^2{}_p)$. Whenever comparing p-value with a critical value, if p>0.01, we do not reject H_0 of no heteroscedasticity problem. Alternatively, to correct the standard errors in the model that suffers from the heteroscedastic problem, use the White Heteroscedastic robust errors that available in Microfit or convert all the variables into log form and then run a regression as logarithms help solve the problem of heteroskedasticity (Chingarande, 2012).

3.5.2.3 Misspecification

The Ramsey RESET test for model misspecification. Say, $Y_i = \lambda_1 + \lambda_2 \mathrm{X}_i + \mu_{3i}$, the estimated Y_i that is a return to obtain a new R^2 and let it be R^2_{new}. The R^2_{new} is used together with the R^2 of the pilot equation to execute the F-test. If the F-value is significant (f > 0.01), do not reject the null hypothesis and say the model is correctly specified.

3.5.2.4 Normality

Jarque and Bera (1987) test of normality is an asymptotic, or large sample test based on the OLS residuals. JB test is used to check if the errors of the regression model are in a normal distribution which (with any mean or variance) has a skewness coefficient of zero, and kurtosis coefficient of three. The normality hypothesis is when null hypothesis the error term *u* follows normal distribution while the alternative hypothesis is the error term *u* follows a normal distribution as like below:

$$\begin{aligned} H_0 &: \text{Normal Distribution} \\ H_1 &: \text{Not Normal Distribution} \end{aligned} \qquad 6.0$$

JB test has excellent asymptotic power and asymptotic validity where it performed well, even for small size sample. Alternatively, if the residual is not in normal distribution, increase the sample size of each variable to solve this issue.

3.5.3 Toda-Yamamoto Causality

The concept of causality has gained a considerable debate and defined variously by different philosophers from both science and social perspectives (Granger, 1980). According to Granger (1969 & 1980), the causal relationship is established based on three assumptions. First, the current and past event may affect and cause future incidents, but the past events cannot be caused by future events. Second, multivariate stochastic variables are not associate with the superfluous information. Thus constant causal relationship exists throughout the period. Third, the linearity of predictors exist among the variable and that only stationary variables are admitted into the model. The implication of causal relationship between variables is that it helps to prevent decision-making based on uncertainty. The knowledge of the causal effect will enable appropriate policy prescription and recommendation. It also believed the direction of causality enhances forecasting process (Hacker & Hatemi-J, 2006).

The traditional Granger causality test was established based on asymptotic distribution theory and thus results to false conclusion especially when variables are cointegrated (Granger & Newbold, 1974). Causality modelling in the traditional sense was detected to neglected some elements of the forecasting which lead to wrong outcomes of non-causality in the presence of causation. Consequently, implies in some cases causality exists but spuriously not discovered due to the inadequate of the employed techniques (Granger, 1988). Majority of the causality tests in the past were conducted on the

vector error correction models, cointegration as well as simple vector autoregressive framework which all suffer from size distortion and nuisance parameters in the estimates (Guru-Gharana, 2012). Other limitation includes of the null hypothesis at level suffers from non-standard asymptotic distribution while, the integrated Granger causality suffers from independence of nuisance parameter estimates (Toda & Phillips, 1993 and Sims, Stock, & Watson, 1990).

Furthermore, most previous studies were carried out based on the bivariate model without controlling for possible explanatory variables which may also lead to a different result. The advantage of estimating multivariate model is a highlight in Stock and Watson (2001) study. Moreover, vector error correction model hypothesis of Granger non-causality employs nonlinear parameter restriction matrices. In detail, the Wald and likelihood ratio test statistics for Granger test associates with rank deficiency which leads to size distortion under the null hypothesis (Toda & Phillips, 1993). The Granger dictates testing for stationarity and cointegration process are less relevant if the study existent is to find a causal relationship between variables (Hacker & Hatemi, J. 2006). Finally, the traditional Granger causality test loses it powers when structural changes exist between post sample and actual sample (Granger, 1980).

Toda and Yamamoto (1995) noted that the advantage his method is that you don't have to convert VAR into ECM or test for cointegration and, therefore, a pretest bias can be avoided. A multivariable VAR model can remedy the deficiency described but still, suffers from the non-stationary issues. The non-stationary problem is worsening in multivariable VAR due to for time series variables to have the same probability stochastic trend is low. Thus, multivariable testing of Granger-Causality to confirm

the cointegrating relationship is problematic. Consequently, this study adopts the TY method to avoid integration and complexity and to improve the power of the Granger-Causality test. TY methodology of statistical inference makes parameter estimation valid even when the VAR system is not co-integrated. In short, the asymptotic property does not depend on whether the equation is integrated or cointegrated. For testing TY, we have no need to bind all the variables to be stationary at the level or first difference.

The shortcomings of the traditional causality model motivate TY to develop a modified Wald test statistic based on an augmented vector autoregressive framework that applies the asymptotic chi-square distribution to solve the difficulties encountered in the asymptotic Granger causality test. Their approach can also test for coefficient linearity and non-linearity restriction through Wald criterion application on estimated level VAR (Hacker & Hatemi-J, 2006). TY proposed an augmented VAR *(p+d)* framework that can be employed to test causality among variables of the model. Thus, helps in capturing the necessitated information on causality (Granger, 1980 and Zellner, 1978). Furthermore, including control variables in the test of causality may lead to the presence of causality between variables under investigations. In other words, causality might not be found in the absence of control variables (Granger, 1980).

To augmented VAR *(p +d)* model is specified in below equation,

$$y_t = \hat{v} + \hat{A}_1 y_{t-1} + \ldots + \hat{A}_p y_{t-p} + \ldots + \hat{A}_{p+d} y_{t-p-d} + \hat{\varepsilon}_t \qquad 6.1$$

The p order of the VAR model is known, whereas d is the maximal order of integration of the variables in the model, the circumflex represent estimated variables using ordinary least squares (OLS). The j^{th} element of y_t is not influenced by the k^{th} element. The Wald test statistics of Toda-Yamamoto (1995) causality is asymptotically distributed regardless of the series co-integration level, co-integrated or not (Toda & Yamamoto, 1995). The model in its general form is present in Equation 6.2 below:

$$y_t = \beta_0 + \beta_1 t + ... + \beta_q t^q + \eta_t \qquad 6.2$$

η_t is k^{th}-order of the VAR process which is further define as $I(d)$ and possibly $CI(d,b)$.

$$\eta = J_1 \eta_{t-1} + ... + J_k \eta_{t-k} + \varepsilon_t \qquad 6.3$$

where k in Equation 6.3 represent a known lag length to be employed in the estimation process. Therefore,

$$y_t = \gamma_0 + \gamma_1 t + ... + \gamma_q t^q + j_1 y_{t-1} + ... + j_k y_{t-k} + \varepsilon_t \qquad 6.4$$

The restricted hypothesis is formulated $H_0 : f(j) = 0$. The estimated version of the equation on which the hypothesis is tested is given by Equation 6.5.

$$y_t = \hat{\gamma}_0 + \hat{\gamma}_1 t + ... + \hat{\gamma}_q t^q + \hat{j}_1 y_{t-1} + ... + \hat{j}_k y_{t-k} + \hat{j}_p y_{t-p} + \hat{\varepsilon}_t \qquad 6.5$$

Else, it can be represented in a matrix form as shown in Equation 6.6.

$$\begin{bmatrix} GDPC_t \\ TE_t \\ T_t \\ TD_t \\ HC_t \\ FDI_t \end{bmatrix} = \begin{bmatrix} a_0^{GDPC} \\ a_0^{TE} \\ a_0^{T} \\ a_0^{TD} \\ a_0^{HC} \\ a_0^{FDI} \end{bmatrix} + \begin{bmatrix} a_{11}a_{12}a_{13}a_{14}a_{15}a_{16} \\ a_{21}a_{22}a_{23}a_{24}a_{25}a_{26} \\ a_{31}a_{32}a_{33}a_{34}a_{35}a_{36} \\ a_{41}a_{42}a_{43}a_{44}a_{45}a_{46} \\ a_{51}a_{52}a_{53}a_{54}a_{55}a_{56} \\ a_{61}a_{62}a_{63}a_{64}a_{65}a_{66} \end{bmatrix} \begin{bmatrix} GDPC_{t-1} \\ TE_{t-1} \\ T_{t-1} \\ TD_{t-1} \\ HC_{t-1} \\ FDI_{t-1} \end{bmatrix} + \begin{bmatrix} a_{11}a_{12}a_{13}a_{14}a_{15}a_{16} \\ a_{21}a_{22}a_{23}a_{24}a_{25}a_{26} \\ a_{31}a_{32}a_{33}a_{34}a_{35}a_{36} \\ a_{41}a_{42}a_{43}a_{44}a_{45}a_{46} \\ a_{51}a_{52}a_{53}a_{54}a_{55}a_{56} \\ a_{61}a_{62}a_{63}a_{64}a_{65}a_{66} \end{bmatrix} \begin{bmatrix} GDPC_{t-n} \\ TE_{t-n} \\ T_{t-n} \\ TD_{t-n} \\ HC_{t-n} \\ FDI_{t-n} \end{bmatrix} + \begin{bmatrix} \varepsilon_{GDPC_t} \\ \varepsilon_{TE_t} \\ \varepsilon_{T_t} \\ \varepsilon_{TD_t} \\ \varepsilon_{HC_t} \\ \varepsilon_{FDI_t} \end{bmatrix} \quad 6.6$$

where $GDPC$ represents real gross domestic product per capita, TE, T, TD, HC, an FDI denote total expenditure, tax, total debt, human capital, and foreign direct investment, respectively. Testing the null hypothesis of whether total expenditure causes growth or not, the following restriction is specified as $H_0 a_{12}^{(1)} =,..,= a_{12}^{(n)} = 0$ where $a_{12}^{(i)}$ are the coefficients of the lag values of total expenditure for 1,.., n^{th} lags in the model except the unrestricted lag denoted as $d_{\max}$. Similarly, all other five Models follow the same process. The significance of the modified wald (MWALD) statistics of the restricted lagged values of the explanatory variables indicates the rejection of the null hypothesis of no Granger causality.

3.6 Sources of Data

The data used for the analysis incorporate a panel of selected ASEAN-5 countries during 1970-2015. Initially, this research plan to utilise data from 1960-2015, yet due to Singapore gained its independence on 9 August 1965 this study will use data start from 1970-2015. The rest of the ASEAN countries like Malaysia became independent on 31 August 1957, Indonesia from 17 August 1945 meanwhile Thailand was never colonised and founded in the year of 1238.

Singapore is a high-income group, Malaysia, and Thailand as an upper middle income, while Indonesia and Philippines the lower middle income as characterised by World Development Indicators in July 2016. Consequently, leading this study to be conducted in time series. This study data retrieved from Balance of Payments databases, Government Finance Statistics Yearbook and data files, International Debt, International Monetary Fund, International Financial Statistics, National Accounts and data files, OECD GDP estimates, UNESCO Institute of Statistics, World Bank national accounts data and World Development Indicators.

3.7 Chapter Summary

This chapter discusses the theoretical framework, measurement of fiscal and monetary policies, stationary analysis, and model specifications. Methods of analysis in answering the objectives of this study shown with ARDL and Toda-Yamamoto causality. Finally, the sources of data.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The chapter displays the descriptive and inferential analyse. It presents descriptive and correlation analyses in Section 4.2, and results of the test for stationarity with and without structural breaks in Section 4.3. The section likewise gives results with The Autoregressive Distributed lagged technique that considers Bound Testing across Indonesia, Malaysia, Philippines, Singapore, and Thailand (ASEAN-5) countries in section 4.4. This study intends to analyse the long-run effects and the short run dynamics fiscal and monetary policies, to examine the impact, the influence of relative effectiveness of fiscal and monetary policies and the interaction effect of monetary policy on fiscal government debt and expenditure. This study will also examine the causal relationship between fiscal and monetary policies with Toda-Yamamoto causality in Section 4.5. Finally, this study concludes with the summary of this chapter in Section 4.6.

4.2 Descriptive Analysis

The descriptive analysis is conducted to explain the essential features of the data and stimulate the econometrics employed in the study. The analysis includes descriptive statistics and correlation coefficients of key variables of the research. These are present in the following tables.

Table 4. 1
Descriptive Statistic (ASEAN-5)

Series	Mean	Std. Dev.	Minimum	Maximum
Indonesia				
GDPC	955.95	451.90	330.28	1967.80
TE	27507.22	26510.03	2327.58	91082.30
T	15513.05	14468.13	1455.74	52234.01
NT	5615.30	5938.32	379.45	20473.74
TD	36703.99	31909.28	2457.86	117177.20
MS	95200.00	108000.00	885.00	357000.00
IR	14.62	9.39	4.01	62.79
CPI	36.95	40.19	1.15	131.49
ER	4514.46	4314.31	362.83	13389.41
HC	12184374.00	7315235.00	2459875.00	31837324.00
FDI	9090.00	6370.00	2470.00	27600.00
Malaysia				
GDPC	5660.37	2550.07	2334.36	10856.63
TE	27507.22	26510.03	2327.58	91082.30
T	15513.05	14468.13	1455.74	52234.01
NT	5615.30	5938.32	379.49	20473.74
TD	36703.99	31909.28	2457.86	117177.20
MS	124000.00	142000.00	1580.00	519000.00
IR	4.49	1.87	2.12	8.46
CPI	65.47	26.27	23.34	113.63
ER	2.94	0.57	2.18	3.92
HC	1729387.00	701872.00	609376.00	2893240.00
FDI	3580.00	3820.00	94.00	14800.00
Philippines				
GDPC	1683.00	326.69	1257.00	2635.04
TE	18205.88	13353.45	6066.35	56529.59
T	11046.91	11419.64	507.42	51608.76
NT	1395.17	1310.04	91.74	6011.79
TD	37710.62	18722.92	9394.64	64888.13
MS	46500.00	56100.00	1600.00	211000.00
IR	10.60	4.94	2.23	28.32
CPI	45.31	37.73	1.90	117.43
ER	27.83	17.17	5.90	56.04
HC	4464600.00	1861603.00	1665923.00	7875023.00
FDI	1170.00	828.00	173.00	3210.00
Singapore				
GDPC	26358.05	14092.16	6506.94	51855.08
TE	16210.28	15118.71	1837.36	59824.34
T	12316.34	12624.31	853.50	44194.53
NT	5716.05	4381.14	94.66	14225.96
TD	305555.30	603313.90	284.85	2748296.00
MS	99900.00	124000.00	1260.00	404000.00
IR	4.13	3.17	0.05	11.69
CPI	74.47	22.06	30.74	113.77
ER	1.89	0.47	1.25	3.06
HC	215062.70	26090.17	149143.00	255716.00
FDI	15661.70	23069.04	161.000	92593.03

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI inward foreign direct investment respectively. The figures for GDPC, TE, T, NT and TD are in US dollars, MS and FDI expressed in million US dollars. HC in number. The number of observations in this study is 46 for each variable.

Table 4. 2..Continue
ASEAN-5 Descriptive Statistic

Series	Mean	Std. Dev.	Minimum	Maximum
Thailand				
GDPC	2930.88	1551.62	929.09	5774.65
TE	30711.78	24419.05	6539.65	91911.25
T	20762.25	20509.41	750.26	80599.79
NT	2557.78	2765.25	178.06	11346.13
TD	52876.93	47786.55	1118.39	177562.40
M2	146000.00	177000.00	2270.00	824000.00
MIR	8.95	6.20	1.21	20.62
CPI	59.20	30.77	12.77	111.35
ER	28.59	7.44	20.34	44.43
HC	2959361.00	1449795.00	532872.00	5027453.00
FDNI	3630.00	4580.00	54.00	22800.00

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI inward foreign direct investment respectively. The figures for GDPC, TE, T, NT and TD are in US dollars, MS and FDI expressed in million US dollars. HC in number. The number of observations in this study is 46 for each variable.

Indonesia recorded an average growth of 956 USD, a minimum of 330 USD growth, and a maximum of 1968 USD growth. Malaysia recorded an average growth of 5660 USD, a minimum of 2334 growth, and a maximum of 1085663 USD growth. Philippines documented an average growth of 1683 USD, a minimum of 1257 USD growth, and a maximum of 2635 USD growth. Singapore documented an average growth of 26358 USD, a minimum of 6507 USD growth, and a maximum of 51855 USD growth. Thailand recorded average growth of 2931 USD, a minimum of 929 USD growth, and a maximum of 5775 USD growth.

From this simple description, the most inconsistent growth in the ASEAN-5 is Singapore with a standard deviation of 14092 USD. Follow by Malaysia and Thailand with a standard deviation of 2550 USD and 1552 USD. The least inconsistent growth has been Indonesia with 452 USD and Philippines with 327 USD growth. Variable that experienced a rapid and inconsistent growth and thus, most unstable is money supply followed by human capital across the ASEAN-5 countries except the Philippines appear vice versa. Nevertheless, this study employs the techniques that appropriately determined the stationarity properties of the raw data. This study

includes the use of LS unit root with two break LM test to identify structural breaks in the data generating process which can also contribute to the non-normality of the data.

4.2.1 Correlation and Multicollinearity Analysis

The results of the correlation test between the dependent variable and independent variables proved to be very useful in pre-estimation analysis about the potential relationships suggested by theories. The study conducts correlation analysis to see the magnitude and direction of the association between regressors and regressand. The results show whether there exist a high order of linear correlation (multicollinearity) amongst the regressors. This assists in observing the possibility of getting redundant variables in the estimation process. Multicollinearity is a statistical problem that overestimates standard errors which lead to smaller t-statistic thus, a case of size distortion.

Table 4.2 vi

Indonesia Summary of Correlation Analysis: 1970-2015

Series	GDPC	TE	T	NT	TD	MS	IR	CPI	ER	HC	FDI
GDPC	1.00										
TE	0.94***	1.00									
	(0.00)										
T	0.95***	0.99***	1.00								
	(0.00)	(0.00)									
NT	0.93***	0.99***	0.98***	1.00							
	(0.00)	(0.00)	(0.00)								
TD	0.97***	0.97***	0.98***	0.96***	1.00						
	(0.00)	(0.00)	(0.00)	(0.00)							
MS	0.94***	0.99***	0.99***	0.98***	0.98***	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
IR	-0.46***	-0.53***	-0.50***	-0.54***	-0.45***	-0.50***	1.00				
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)					
CPI	0.94***	0.97***	0.96***	0.97***	0.97***	0.96***	-0.49***	1.00			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
ER	0.88***	0.83***	0.82***	0.82***	0.89***	0.81***	-0.29*	0.92***	1.00		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)			
HC	0.98***	0.92***	0.93***	0.92***	0.96***	0.93***	-0.45***	0.94***	0.89***	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
FDI	0.82***	0.91***	0.93***	0.91***	0.88***	0.93***	-0.48***	0.85***	0.63***	0.82***	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI foreign direct investment respectively. ***, **, and * indicate rejection of null hypothesis of no correlation among the variables at 1%, 5% and 10% respectively. The values in parentheses denote the probability values.

Table 4.2 vii

Malaysia Summary of Correlation Analysis: 1970-2015

Series	GDPC	TE	T	NT	TD	MS	IR	CPI	ER	HC	FDI
GDPC	1.00										
TE	0.93***	1.00									
	(0.00)										
T	0.94***	0.99***	1.00								
	(0.00)	(0.00)									
NT	0.92***	0.99***	0.98***	1.00							
	(0.00)	(0.00)	(0.00)								
TD	0.97***	0.97***	0.98***	0.96***	1.00						
	(0.00)	(0.00)	(0.00)	(0.00)							
MS	0.93***	0.98***	0.99***	0.98***	0.99***	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
IR	-0.36**	-0.43***	-0.37**	-0.43***	-0.39***	-0.42***	1.00				
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)					
CPI	0.99***	0.91***	0.91***	0.89***	0.95***	0.90***	0.32****	1.00			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)				
ER	0.70***	0.54***	0.52***	0.52***	0.63***	0.56***	-0.44***	0.70***	1.00		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)			
HC	0.98***	0.88***	0.88***	0.86***	0.93***	0.87***	-0.39***	0.99***	0.76***	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)		
FDI	0.85***	0.86***	0.89***	0.86***	0.87***	0.88***	-0.23	0.81***	0.42***	0.77***	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.12)	(0.00)	(0.00)	(0.00)	

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, M2 money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI foreign direct investment respectively. ***, **, and * indicate rejection of null hypothesis of no correlation among the variables at 1%, 5% and 10% respectively. The values in parentheses denote the probability values.

Table 4.2 viii

Philippines Summary of Correlation Analysis: 1970-2015

Series	GDPC	TE	T	NT	TD	MS	IR	CPI	ER	HC	FDI
GDPC	1.00										
TE	0.97***	1.00									
	(0.00)										
T	0.93***	0.98***	1.00								
	(0.00)	(0.00)									
NT	0.93***	0.97***	0.99***	1.00							
	(0.00)	(0.00)	(0.00)								
TD	0.73***	0.78***	0.80***	0.82***	1.00						
	(0.00)	(0.00)	(0.00)	(0.00)							
MS	0.95***	0.99***	0.99***	0.97***	0.80***	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
IR	-0.63***	-0.68***	-0.63***	-0.63***	-0.52***	-0.68***	1.00				
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)					
CPI	0.84***	0.90***	0.91***	0.92***	0.96***	0.92***	-0.63***	1.00			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
ER	0.60***	0.65***	0.67***	0.71***	0.97***	0.68***	-0.49***	0.91***	1.00		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)			
HC	0.83***	0.87***	0.88***	0.90***	0.98***	0.88***	-0.56***	0.99***	0.92***	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
FDI	0.43***	0.49***	0.54***	0.52***	0.66***	0.54***	-0.32**	0.65***	0.64***	0.65***	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI foreign direct investment respectively. ***, **, and * indicate rejection of null hypothesis of no correlation among the variables at 1%, 5% and 10% respectively. The values in parentheses denote the probability values.

Table 4.2 iv

Singapore Summary of Correlation Analysis: 1970-2015

Series	GDPC	TE	T	NT	TD	MS	IR	CPI	ER	HC	FDI
GDPC	1.00										
TE	0.90***	1.00									
	(0.00)										
T	0.93***	0.98***	1.00								
	(0.00)	(0.00)									
NT	0.96***	0.8***	0.89***	1.00							
	(0.00)	(0.00)	(0.00)								
TD	0.75***	0.91***	0.90***	0.69***	1.00						
	(0.00)	(0.00)	(0.00)	(0.00)							
MS	0.91***	0.97***	0.99***	0.85***	0.92***	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
IR	-0.82***	-0.72***	-0.74***	-0.79***	-0.57***	-0.72***	1.00				
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)					
CPI	0.96***	0.88****	0.88***	0.93***	0.71***	0.86***	-0.77***	1.00			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
ER	-0.90***	-0.79***	-0.79***	-0.89***	-0.55***	-0.74***	0.70***	-0.95***	1.00		
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)			
HC	0.90***	0.77***	0.77***	0.84***	0.62***	0.76***	-0.78***	0.94***	-0.88***	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
FDI	0.84***	0.91***	0.94***	0.78***	0.94***	0.95***	-0.63***	0.78***	-0.66***	0.70***	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI foreign direct investment respectively. ***, **, and * indicate rejection of null hypothesis of no correlation among the variables at 1%, 5% and 10% respectively. The values in parentheses denote the probability values.

Table 4.2 v

Thailand Summary of Correlation Analysis: 1970-2015

Series	GDPC	TE	T	NT	TD	MS	IR	CPI	ER	HC	FDI
GDPC	1.00										
TE	0.92***	1.00									
	(0.00)										
T	0.94***	0.98***	1.00								
	(0.00)	(0.00)									
NT	0.92***	0.98***	0.99***	1.00							
	(0.00)	(0.00)	(0.00)								
TD	0.91***	0.87***	0.90***	0.88***	1.00						
	(0.00)	(0.00)	(0.00)	(0.00)							
MS	0.89***	0.96***	0.98***	0.99***	0.89***	1.00					
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)						
IR	-0.83***	-0.70***	-0.70***	-0.69***	-0.67***	-0.67***	1.00				
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)					
CPI	0.99***	0.89***	0.90***	0.89***	0.89***	0.86***	-0.86***	1.00			
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
ER	0.72***	0.48***	0.49***	0.49***	0.61***	0.50***	-0.76***	0.78***	1.00		
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)			
HC	0.97***	0.84***	0.85***	0.84***	0.87***	0.81***	-0.85***	0.99***	0.82***	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
FDI	0.83***	0.82***	0.85***	0.89***	0.81***	0.90***	-0.64***	0.82***	0.61***	0.79***	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Note: GDPC represents gross domestic product per capita, TE total expenditure, T tax, NT non-tax, TD total debt, MS money supply, IR interest rate, CPI consumer price index, ER nominal exchange rate, HC human capital and FDI foreign direct investment respectively. ***, **, and * indicate rejection of null hypothesis of no correlation among the variables at 1%, 5% and 10% respectively. The values in parentheses denote the probability values.

Tables 4.2(i) to 4.2(v) depict the correlation coefficients and their respective probability values for each pair of the relationship among the variables for ASEAN-5. The results show that government expenditure, tax, non-tax, debt, money supply, inflation, exchange rate, foreign direct investment, and human capital are positively associate with growth. Interest rate is negatively related to growth and statistically significant at 1% level for Indonesia, Malaysia, Philippines, and Thailand respectively. For Singapore, the results show government expenditure, tax, non-tax, debt, money supply, inflation, foreign direct investment, and human capital are positively associate with growth except for interest rate and exchange rate, are negatively associated with growth and significant at 1% level of significance. This study is a preliminary indication that there would be the possibility of a relationship between the regressors and regressand.

The correlation among the regressors helps to predict the possibility of having multicollinearity in the model. From Tables 4.2 (i) to 4.2(v) for ASEAN-5 countries, the probability values indicate that the null hypothesis of no correlation among pairs of variables is rejected in almost all countries except for the pairs of FDI with IR for Malaysia. The highly associated regressors are NT and TE (0.99) and MS and T (0.99), NT and TE (0.99), MS and TE (0.99), HC and CPI (0.99), MS and T (0.99). The least correlated variables have been FDI and IR (-0.23), IR and TD (-0.45), FDI and IR (-0.32), ER and TE (0.48), ER and TD (-0.55) for ASEAN-5. This analysis indicates that at least the highly-correlated variables such as MS and TE and MS and T for Philippines and Singapore must be transformed to avoid false conclusion due to the problem of multicollinearity.

Next, the study starts with testing for stationarity properties which consider structural breaks in addition to the traditional ADF test. The consideration of structural breaks in the time series data of developing and emerging countries of ASEAN-5 countries is one of the methodological contributions in this study

4.3 Unit Root Test

The test for stationarity is one of the pre-requisite in estimating cointegration. The stationarity of the properties is investigated using the traditional ADF if shocks are temporal and do not have the long run effect on the series (Glynn, Perera, & Verma, 2007). Tables 4.3 present the estimation of the ADF unit root test for ASEAN-5 countries on the macroeconomic fundamentals of growth. These compromises of natural logarithms of gross domestic product per capita (LGDPC), total expenditure (LTE), tax (LT), non-taxes (LNT), public debt (LTD). Also, money and quasi money

(LMS), official exchange rate (LER), consumer price index (LCPI), foreign direct investment (LFDI), secondary school enrolment (LHC), except interest rates (IR).

4.3.1 Augmented Dickey-Fuller unit root test

The ADF results show that all the series are non-stationary at the level under both intercepts and intercept with trend models except total government expenditure, tax, money and quasi-money, interest rates, official exchange rate, consumer price index and foreign direct investment for ASEAN-5 in below Table 4.3.

Table 4.3

Augmented Dickey-Fuller Unit Root Test (ASEAN-5)

Series	Constant without trend		Constant with trend	
	Level	First difference	Level	First difference
Indonesia				
LGDPC	-0.90	-4.14***	-2.32	-4.14**
LTE	-0.79	-4.94***	-2.16	-4.88***
LT	-0.18	-3.75***	-1.52	-3.75**
LNT	-1.26	-6.96***	-2.89	-7.05***
LTD	-2.66*	-2.70*	-1.97	-4.74***
LITD	-2.95**	-6.65***	-3.16	-6.64***
LTEI	-3.95***	-6.45***	-3.94**	-6.41***
LMS	-2.81*	-4.34***	-3.05	-4.93***
IR	-3.28**	-7.05***	-3.88**	-6.96***
LER	-0.64	-5.10***	-2.11	-5.04***
LCPI	-2.25	-4.31***	-2.75	-5.14***
LFDI	-0.12	-4.71***	-1.38	-4.85***
LHC	-1.21	-3.62***	-1.89*	-3.68**
Malaysia				
LGDPC	-0.44	-4.73***	-2.43	-4.68***
LTE	-1.68	-4.79***	-3.22*	-4.94***
LT	-1.24	-4.19***	-3.52**	-4.18**
LNT	-1.12	-5.30***	-2.32	-5.29***
LTD	-1.54	-3.65***	-2.73	-3.76**
LITD	-4.79***	-6.09***	-4.72***	-6.02***
LTEI	-4.64***	-6.03***	-4.58***	-5.97***
LMS	-2.46	-4.99***	-3.60**	-5.46***
IR	-2.67*	-5.20***	-2.97	-5.17***
LER	-1.16	-4.12***	-3.22*	-4.20***
LCPI	-3.01**	-3.97***	-3.51***	-5.26***
LFDI	-1.97*	-6.55***	-3.52*	-6.52***
LHC	-2.44	-3.88***	-2.53	-4.38***
Philippines				
LGDPC	0.21	-3.70***	-0.92	-3.85**
LTE	0.32	-3.44**	-1.19	-3.50*
LT	-1.09	-2.90*	-4.68***	-4.63***
LNT	-1.35	-5.23***	-2.81	-5.21***
LTD	-2.93*	-4.79***	-1.12	-6.40***
LITD	-2.16	-6.77***	-2.14	-7.01***
LTEI	-2.62*	-6.28***	-2.36	-6.57***
LMS	-0.93	-3.56**	-2.71	-3.56**
IR	-1.56	-6.87***	-2.60	-7.20***
LER	-1.30	-3.44**	-1.24	-3.58**
LCPI	-3.20**	-3.86***	-0.48	-6.51***
LFDI	-1.91	-6.61***	-2.87	-6.53***
LHC	-4.48***	-3.04**	-4.08**	-3.54**

Note: ***, ** and * represent significance level at 1%, 5% and 10% respectively. The figures are the t-statistics for testing the null hypothesis that the series has a unit root.

Table 4.3 …Continue

Augmented Dickey-Fuller Unit Root Test (ASEAN-5)

Series	Constant without trend		Constant with trend	
	Level	First difference	Level	First difference
Singapore				
LGDPC	-2.55	-5.65***	-1.63	-6.94***
LTE	-0.66	-3.34**	-2.79	-3.30*
LT	-1.01	-4.57***	-3.18	-4.53***
LNT	-3.45**	-4.46***	-2.83	-5.72***
LTD	-0.05	-4.75***	-2.33	-4.72***
LITD	-3.49**	-5.53***	-3.71**	-5.58***
LTEI	-3.33**	-5.49***	-3.40*	-5.57***
LMS	-2.47	-3.32**	-2.24	-3.69**
IR	-1.98	-6.92***	-4.26***	-6.87***
LER	-2.26	-3.52**	-3.19*	-3.58**
LCPI	-3.04**	-5.00***	-4.17***	-6.04***
LFDI	-0.72	-7.02***	-4.35***	-6.94***
LHC	-2.44	-5.75***	-4.02**	-5.43***
Thailand				
LGDPC	-1.23	-3.47**	-1.67	-3.65**
LTE	-0.11	-4.96***	-1.60	-4.90***
LT	-1.40	-3.73***	-2.33	-3.76**
LNT	-0.23	-3.65***	-2.07	-3.59**
LTD	-1.90	-3.36**	-1.93	-3.49***
LITD	-3.49**	-5.53***	-3.71**	-5.58***
LTEI	-3.33**	-5.49***	-3.40*	-5.57***
LMS	-1.32	-3.32**	-2.05	-3.22*
IR	-2.08	-6.05***	-4.50***	-6.01***
LER	-1.27	-4.52***	-2.01	-4.49***
LCPI	-3.71***	-3.56**	-2.73	-5.36***
LFDI	-0.78	-5.38***	-2.50	-5.30***
LHC	-1.94	-4.06***	-2.56	-4.12*

Note: ***, ** and * represent significance level at 1%, 5% and 10% respectively. The figures are the t-statistics for testing the null hypothesis that the series has a unit root.

The ADF results show that all the series are non-stationary at the level under both intercepts and intercept with trend models for Indonesia except total debt outstanding, money and quasi-money, interest rates and secondary school enrolment. These series are stationary at level. Nevertheless, the test rejects the null hypothesis of the unit root at first difference for LGDPC, LTE, LT, LNT, LER, LCPI, and LFDI. These series are stationary at level. Nevertheless, the test rejects the null hypothesis of the unit root at first difference for LGDPC, LNT, LTD, and LHC for Malaysia.

For the Philippines, the ADF results show that all the series are non-stationary at the level under both intercepts and intercept with trend models except tax, total debt outstanding, consumer price index and secondary school enrolment. These series are

stationary at level. Nevertheless, the test rejects the null hypothesis of the unit root at first difference for LGDPC, LTE, LNT, LMS, IR, LER, and LFDI. For Singapore, the ADF results show that all the series are non-stationary at the level under both intercepts and intercept with trend models except non-taxes, interest rates, official exchange rate, consumer price index, foreign direct investment and secondary school enrolment. These series are found to be stationary at level. Nevertheless, the test rejects the null hypothesis of the unit root at first difference for LGDPC, LTE, LT, LTD, and LMS. In short, the ADF unit root test reveals the mixture data series of *I(0)* and *I(1)*.

The ADF results show that all the series are non-stationary at the level under both intercepts and intercept with trend models for Thailand except total debt outstanding, interest rates and consumer price index. These series are stationary at level. Nevertheless, the test rejects the null hypothesis of the unit root at first difference for LGDPC, LTE, LT, LNT, LMS, LER, LFDI, and LHC.

4.3.2. Lee and Strazicich unit root test (Structural Break)

However, it is contended that existence of the structural break in the data generating process leads to size distortion and incorrect conclusion in the ADF model (Perron, 1989 and Lee & Strazicich, 2003). Thus, in addition to the traditional ADF test, this study employs Lee & Strazicich (LS) Lagrange multiplier with two structural breaks to check the unit root properties of the series further. The test is break point independent and nuisance invariant under both null and alternative hypotheses. It shows neither size nor location dependence and unaffected by incorrect estimation irrespective of the existence or otherwise of break (Lee & Strazicich, 2013). The LS

test results are presented in Table 4.4(i) to Table 4.4(ix) for level and first difference estimations for ASEAN-5 countries.

Table 4.4 i
Indonesia LS Two-Break Minimum LM Unit Root Test

Series	Model A					Model C				
	$\hat{k}$	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	$\hat{k}$	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
LGDPC	1	1982	2.78**	-3.32	0.06	1	1992	0.97	-4.62	0.02
		1998	2.75**		0.06		1999	-1.81*		-0.04
LTE	1	2005	1.14	-2.48	0.03	1	1977	-2.04**	-3.74	-0.05
		2009	0.87		0.02		2004	3.44***		0.08
LT	1	1985	-2.52**	-2.18	-0.06	1	1996	-2.72**	-3.65	-0.06
		1999	-1.48		-0.03		2003	3.29***		0.08
LNT	1	1992	1.53	-4.41[B]	0.04	1	1988	-2.83**	-5.57[C]	-0.06
		1996	2.05**		0.05		1994	3.24***		0.07
LTD	1	1993	2.23**	-1.15	0.05	1	1992	-3.33***	-3.39	-0.08
		2009	-0.97		-0.02		2003	-1.73*		-0.04
LITD	1	2003	-3.27***	-4.39[B]	-0.07	1	1994	-1.29	-6.00[B]	-0.03
		2008	-0.10		-0.00		1998	-2.60**		-0.06
LTEI	1	1984	-1.66*	-4.69[A]	-0.04	1	1994	-0.54	-5.40[C]	-0.01
		2003	-3.78***		-0.09		1998	-2.46**		-0.06
LMS	1	1979	3.68***	-2.46	0.08	1	1978	-4.55***	-4.57	-0.10
		1997	-7.42***		-0.17		1997	0.87		0.02
IR	1	1994	0.06	-4.68[A]	0.00	1	1996	7.49**	-11.11[A]	0.17
		2002	-0.92		-0.02		2000	-7.79***		-0.18
LER	1	2000	1.30	-2.22	0.03	1	1992	1.26	-4.33	0.03
		2009	-1.01		-0.02		1998	-1.33		-0.03
LCPI	1	1996	-0.95	-2.93	-0.02	1	1980	-5.25***	-4.90	-0.12
		2000	0.98		0.02		1997	2.65**		0.06
LFDI	1	2004	2.91**	-2.60	0.07	1	1994	1.76*	-6.02[B]	0.04
		2009	1.59		0.04		2001	3.13***		0.07
LHC	1	1997	-1.44	-1.51	-0.03	1	1988	-4.36***	-4.26	-0.10
		2007	-2.02**		-0.05		2007	3.84***		0.09

Critical Values	1%	5%	10%
Model A	-4.57	-3.94	-3.56
Model C	-6.28	-5.62	-5.25

Note: $\hat{k}$ is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 ii

Indonesia LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
DGDPC	1	1991	0.04	-4.39[B]	0.00	1	1996	-6.91***	-9.48[A]	-0.16
		1995	0.50		0.01		2000	6.92***		0.16
DLTE	1	2000	2.01**	-6.53[A]	0.05	1	1996	-4.44***	-7.11[A]	-0.10
		2011	0.58		0.01		2000	4.70***		0.11
DLT	1	1989	2.04**	-4.33[B]	0.05	1	1997	7.02***	-7.01[A]	0.16
		2000	1.47		0.03		2001	-7.30***		-0.17
DLNT	1	1987	-1.21	-7.87[A]	-0.03	1	1991	1.91*	-8.45[A]	-0.03
		1991	0.52		0.01		2002	-1.46		-0.03
DLTD	1	2000	-2.83**	-5.90[A]	-0.07	1	1998	-2.30**	-7.83[A]	-0.05
		2008	3.77***		0.09		2007	5.36***		0.13
DLITD	1	1990	0.29	-7.41[A]	0.01	1	1997	9.84***	-10.71[A]	0.23
		2003	-2.29**		-0.05		2001	-9.46***		-0.22
DLTEI	1	1987	0.56	-7.41[A]	0.01	1	1996	-5.78***	-7.74[A]	-0.13
		2003	-2.60**		-0.06		2008	5.72***		0.13
DLMS	1	1989	1.88*	-6.08[A]	0.04	1	1997	6.63***	-7.16[A]	0.15
		2001	1.23		0.03		2001	-6.38***		-0.15
DIR	1	2005	0.40	-6.89[A]	0.01	1	1997	-9.37***	-10.79[A]	-0.22
		2009	-0.08		-0.00		2001	9.92***		0.23
DLER	1	1996	0.32	-5.98[A]	0.01	1	1997	-10.85***	-10.65[A]	-0.25
		2001	-2.46**		-0.06		2001	11.09***		0.26
DLCPI	1	1980	-0.30	-4.47[B]	-0.01	1	1976	-3.59***	-6.04[B]	-0.08
		2002	-0.89		-0.02		1994	1.32		0.03
DLFDI	1	1995	1.08	-5.64[A]	0.03	1	1996	-3.60***	-8.70[A]	-0.08
		2004	3.49***		0.08		2005	6.85***		0.16
DLHC	1	1987	-0.60	-5.18[A]	-0.01	1	1988	-2.17**	-6.48[A]	-0.05
		2010	-0.08		-0.00		2011	3.85***		0.09
Critical Values		1%	5%	10%						
Model A		-4.57	-3.94	-3.56						
Model C		-6.28	-5.62	-5.25						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 iii

Malaysia LS Two-Break Minimum LM Unit Root Test

		Model A					Model C			
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
LGDPC	1	1988	-0.73	-3.47	-0.08	1	1989	3.22***	-4.33	-0.10
		1998	2.17**				1999	-3.89***		
LTE	1	1992	-1.19	-3.69[A]	0.08	1	1982	-2.97**	-4.76	-0.11
		1996	-1.20				2005	3.05***		
LT	1	1988	-1.56	-3.44	-0.08	1	1988	0.55	-4.20	-0.10
		1997	-6.07***				1999	-1.68*		
LNT	1	1997	-5.43***	-3.15	-0.07	1	1996	-4.10***	-4.58	-0.10
		2005	2.13**				2007	2.93**		
LTD	1	1981	5.05***	-2.74	-0.06	1	1986	-5.13***	-4.75	-0.11
		1997	-2.68**				1994	3.42***		
LITD	1	1983	-2.25**	-6.60[A]	-0.15	1	1983	0.88	-5.99[B]	-0.14
		1999	-3.51***				1999	-0.91		
LTEI	1	1983	-2.40**	-6.37[A]	-0.15	1	1983	1.10	-5.90[B]	-0.13
		1997	-2.42**				1999	-0.94		
LMS	1	1989	-7.08***	-2.23	-0.05	1	1978	-1.61	-4.74	-0.11
		1997	-3.63***				1998	-1.93*		
IR	1	1979	1.32	-4.20[B]	-0.10	1	1985	-2.22**	-5.00	-0.11
		1985	2.31**				1998	3.23***		
LER	1	1997	5.80***	-2.96	-0.07	1	1999	2.91**	-4.126	-0.09
		2009	-2.46**				2008	-0.89		
LCPI	1	1987	0.51	-2.25	-0.05	1	1984	-7.13***	-6.04[B]	-0.14
		2008	-1.96*				1995	2.38**		
LFDI	1	1983	-0.82	-4.12[B]	-0.09	1	1985	-0.45	-4.70	-0.11
		2000	-4.64***				1997	-2.50**		
LHC	1	1977	0.89	-1.84	-0.04	1	1978	-3.86***	-3.38	-0.08
		2004	-1.74*				1997	0.19		

Critical Values	1%	5%	10%
Model A	-4.57	-3.94	-3.56
Model C	-6.28	-5.62	-5.25

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the t value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 iv

Malaysia LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
DLGDPC	1	1985	-1.67*	-5.89[A]	-0.14	1	1987	1.75*	-6.00[B]	-0.14
		1996	-0.11				2001	-1.61		
DLTE	1	1991	2.87**	-4.65[A]	-0.11	1	1991	-4.80***	-6.56[A]	-0.15
		2002	1.12				2006	3.79***		
DLT	1	1989	2.47**	-5.12[A]	-0.12	1	1997	4.54***	-4.94	-0.12
		2000	2.43**				2003	-4.18***		
DLNT	1	1985	0.05	-6.58[A]	-0.15	1	1997	4.86***	-7.75[A]	-0.18
		2000	1.85*				2001	-1.52		
DLTD	1	1982	1.37	-4.85[A]	-0.11	1	1986	-2.89**	-5.15	-0.12
		1988	-1.35				1991	1.97*		
DLITD	1	1991	-1.32	-6.33[A]	-0.15	1	1998	-5.44***	-6.30[B]	0.15
		1997	-2.11**				2011	3.17***		
DLTEI	1	1980	-0.47	-6.32[A]	-0.15	1	1986	-0.05	-6.33[A]	-0.15
		1997	-1.96*				2000	-3.64***		
DLMS	1	1984	-1.02	-5.72[A]	-0.13	1	1988	-4.34***	-7.40[A]	-0.17
		1995	0.10				1992	2.84**		
DIR	1	1984	-1.05	-4.93[C]	-0.12	1	1985	-4.80***	-6.63[A]	-0.15
		1996	0.59				1989	2.92***		
DER	1	1980	1.37	-3.94[B]	-0.09	1	1997	-4.63***	-5.51	-0.13
		2011	-0.16				2003	3.82***		
DLCPI	1	1984	-2.09**	-4.53[B]	-0.11	1	1976	-4.61***	-7.41[C]	-0.17
		1998	-1.10				1982	-1.76*		
DLFDI	1	1981	-0.08	-6.78[A]	-0.16	1	2000	5.00***	-7.38[A]	-0.17
		1991	0.38				2004	-4.80		
DLHC	1	1976	-1.51	-5.34[A]	-0.12	1	1995	2.03**	-5.60[C]	-0.13
		1995	1.09				2007	-0.62		
Critical Values	1%		5%	10%						
Model A	-4.57		-3.94	-3.56						
Model C	-6.28		-5.62	-5.25						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the t value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 v

Philippines LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
LGDPC	1	2000	-1.28	-1.71	-0.03	1	1982	-5.75***	-4.66	-0.13
		2009	-1.67*		-0.04		1996	5.05***		0.12
LTE	1	1988	-3.46***	-2.06	-0.08	1	1982	-2.88**	-3.08	-0.07
		1992	-1.40		-0.03		2008	2.90**		0.07
LT	1	1987	-1.44	-1.94	-0.03	1	1975	0.07	-3.76	0.00
		1997	-3.35***		-0.08		1999	-2.68**		-0.06
LNT	1	1989	-1.33	-1.98	-0.03	1	1981	-3.43***	-4.16	-0.08
		1994	-1.64		-0.04		1997	-0.09		-0.00
LTD	1	1981	2.58**	-1.55	0.06	1	1987	-5.09***	-5.47[C]	-0.12
		2008	-1.76*		-0.04		2003	-4.34***		-0.10
LITD	1	1992	0.81	-2.92	0.02	1	1980	-0.98	-5.55[C]	-0.02
		2008	-0.30		-0.01		2006	-1.88*		-0.04
LTEI	1	1989	0.29	-3.26	0.01	1	1982	-2.18**	-4.54	-0.05
		2008	-0.43		-0.01		2006	-1.17		-0.03
LMS	1	1983	-4.25***	-3.01	-0.10	1	1983	-1.62	-3.79	-0.04
		1997	-3.33***		-0.08		1998	-1.59		-0.04
IR	1	1980	1.58	-3.30	0.04	1	1980	0.58	-6.72[A]	0.01
		1998	-0.90		-0.02		2000	-3.60***		-0.08
LER	1	1992	1.02	-1.79	0.02	1	1982	4.04***	-4.16	0.09
		1999	1.63		0.04		2007	-4.27***		-0.10
LCPI	1	1987	0.97	-0.84	0.02	1	1982	3.37***	-5.49[C]	0.08
		1993	0.46		0.01		1995	-6.98***		-0.16
LFDI	1	1987	1.61	-3.97	0.04	1	1991	4.11***	-4.99	0.09
		2007	-0.22		-0.01		2010	-3.89***		-0.09
LHC	1	1986	3.12***	-2.53	0.07	1	1975	1.86*	-4.08	0.04
		2000	-2.19**		-0.05		2007	-3.27***		-0.07
Critical Values	1%		5%	10%						
Model A	-4.57		-3.94	-3.56						
Model C	-6.28		-5.62	-5.25						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the t value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 vi

Philippines LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
DGDPC	1	1976	-0.20	-4.98[A]	-0.01	1	1982	-4.23***	-6.41[A]	-0.10
		1984	-2.70**		-0.06		1986	3.77***		0.09
DLTE	1	1983	-4.12***	-4.40[B]	-0.10	1	1981	-3.53***	-5.12	-0.08
		1996	-0.62		-0.01		1990	3.86***		0.09
DLT	1	1981	-1.95*	-3.79[C]	-0.05	1	1981	-0.36	-4.30	-0.01
		1997	-4.66***		-0.11		1995	-3.04***		-0.07
DLNT	1	1981	-1.76*	-5.26[A]	-0.04	1	1984	0.42	-7.66[A]	0.01
		1992	-1.96*		-0.05		1993	-6.48***		-0.15
DLTD	1	1988	-1.38	-7.30[A]	-0.03	1	1998	-1.99*	-7.70[A]	-0.05
		2004	-1.92*		-0.05		2008	4.59***		0.11
DLITD	1	1996	-1.03	-6.51[A]	-0.02	1	1981	-4.71***	-8.80[A]	-0.11
		2007	-1.00		-0.02		1985	2.23**		0.05
DLTEI	1	1996	-0.80	-5.70[A]	-0.02	1	1981	-2.57**	-7.12[A]	-0.06
		2006	-0.09		-0.00		2011	-1.58		-0.04
DLMS	1	1988	1.29	-4.07[B]	0.03	1	1983	3.58***	-5.08	0.08
		2003	0.03		0.00		1997	-0.33		-0.01
DIR	1	1976	0.41	-7.06[A]	0.01	1	1983	-9.71***	-11.02[A]	-0.23
		2010	0.36		0.01		1987	10.02****		0.23
DLER	1	1983	3.97***	-4.49[B]	0.09	1	1981	3.53***	-5.13	0.08
		1995	-0.13		-0.00		1985	-3.58***		-0.08
DLCPI	1	1976	-1.65*	-6.85[A]	-0.04	1	1982	5.24***	-8.43[A]	0.12
		2003	0.13		0.00		1986	-4.21***		-0.10
DLFDI	1	1987	1.28	-5.09[A]	0.03	1	1994	-0.47	-10.17[A]	-0.01
		2004	1.52		0.04		2009	8.88***		0.21
DLHC	1	1976	1.58	-3.79[C]	0.04	1	1977	-3.36***	-4.66	-0.08
		1980	-2.09**		-0.05		1987	3.99***		0.09
Critical Values	1%	5%	10%							
Model A	-4.57	-3.94	-3.56							
Model C	-6.28	-5.62	-5.25							

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4E vi

Singapore LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
LGDPC	1	1997	-2.778**	-1.89	-0.06	1	1983	-3.83**	-4.91	-0.09
		2008	-1.91*		-0.04		1991	2.70**		0.06
LTE	1	2004	-1.924	-3.25	-0.04	1	1993	1.75*	-4.43	0.04
		2008	-1.77*		-0.04		2003	-0.85		-0.02
LT	1	1988	-0.18	-4.28[B]	-0.00	1	1988	1.36	-4.51	0.03
		1997	-2.42**		-0.06		2000	-2.76**		-0.06
LNT	1	1996	-2.02**	-1.42	-0.05	1	1975	-0.36	-5.22	-0.01
		2002	-1.15		-0.03		2000	-3.76***		-0.09
LTD	1	1993	-0.58	-2.51	-0.01	1	1996	5.47***	-4.98	0.12
		1998	-2.69**		-0.06		2001	-5.40***		-0.12
LITD	1	1996	-3.27***	-5.60[A]	-0.07	1	1975	0.68	-6.00[B]	0.02
		2007	1.19		0.03		1996	0.50		0.01
LTEI	1	1976	3.44***	-5.60[A]	0.08	1	1975	1.11	-5.88[B]	0.03
		1998	-3.30***		-0.08		1998	-1.03		-0.02
LMS	1	1996	-0.30	-2.70	-0.01	1	1998	-6.67***	-5.77[B]	-0.15
		2001	-1.07		-0.02		2007	3.36***		0.08
IR	1	1979	3.45***	-5.51[C]	0.08	1	1978	3.10***	-6 .38[A]	0.07
		1984	-1.69*		-0.04		1982	-3.90***		-0.09
LER	1	1997	1.92*	-3.74	0.04	1	1999	3.33***	-4.74	0.08
		2007	-0.69		-0.02		2008	-1.63		-0.04
LCPI	1	1983	0.64	-2.10	0.02	1	1979	-3.86***	-6.40[A]	-0.09
		2008	-1.54		-0.04		2002	-2.93**		-0.07
LFDI	1	1978	1.92*	-5.35[A]	0.04	1	1978	-0.18	-5.79[B]	-0.00
		1994	1.42		0.03		2000	-1.81*		-0.04
LHC	1	1992	-0.95	-2.05	-0.02	1	1991	-3.72***	-4.40	-0.08
		2010	-1.24		-0.03		1997	0.09		0.00
Critical values			5%	10%						
1%										
Model A		-4.57	-3.94	-3.56						
Model C		-6.28	-5.62	-5.25						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 viii

Singapore LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
DGDPC	1	1985	-0.78	-7.39[A]	-0.02	1	1997	-5.04***	-7.77[A]	-0.12
		2008	2.17**		0.05		2001	-3.03***		-0.07
DLTE	1	1995	2.23**	-4.20[A]	0.05	1	1992	0.06	-4.86	0.00
		2005	1.93*		0.05		2003	-0.13		-0.00
DLT	1	1987	1.05	-5.12[A]	0.02	1	1995	-2.81**	-5.89[B]	-0.07
		2006	2.25**		0.05		2004	3.09***		0.07
DLNT	1	1986	1.44	-6.76[A]	0.03	1	1981	-5.25***	-9.54[A]	-0.12
		2003	1.80*		0.04		2002	2.74**		0.06
DLTD	1	1990	0.19	-4.96[A]	0.00	1	1996	8.25***	-11.81[A]	0.19
		1995	-0.29		-0.01		2000	-7.74***		-0.18
DLITD	1	1979	-0.72	-5.71[A]	-0.02	1	1996	4.73***	-6.56[A]	0.11
		1999	1.50		0.04		2007	-3.26***		-0.08
DLTEI	1	1984	0.29	-5.66[A]	0.01	1	1996	4.31***	-6.57[A]	0.10
		2003	0.40		0.01		2007	-2.71**		-0.06
DLMS	1	1992	-0.99	-4.11[B]	-0.02	1	1996	-1.74*	-4.66	-0.04
		2011	-1.25		-0.03		2005	-0.85		-0.02
DIR	1	1976	-0.91	-7.26[A]	-0.02	1	1976	0.17	-7.42[A]	0.00
		1980	-0.08		-0.00		1980	-1.72*		-0.04
DLER	1	1985	-0.45	-4.04[B]	-0.01	1	1996	1.41	-5.17	0.03
		2001	-0.59		-0.01		2008	-2.39**		-0.06
DLCPI	1	1982	-0.54	-7.63[A]	-0.01	1	1976	-6.26***	-10.66[A]	-0.15
		2007	2.01**		0.05		1985	1.03		0.02
DLFDI	1	1980	1.04	-7.19[A]	0.02	1	1978	-1.70*	-7.79[A]	-0.04
		1986	0.93		0.02		1983	2.18**		0.05
DLHC	1	1989	-2.31**	-6.01[A]	-0.05	1	1986	2.26**	-7.35[A]	0.05
		1993	2.52**		0.06		1993	1.60*		0.04

Critical Values	1%	5%	10%
Model A	-4.57	-3.94	-3.56
Model C	-6.28	-5.62	-5.25

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the t value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 ix

Thailand LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
LGDPC	1	1998	3.25***	-3.01	0.07	1	1988	3.57***	-4.69	0.08
		2010	-2.24***		-0.05		1999	-3.30***		-0.08
LTE	1	2000	-2.44**	-2.51	-0.06	1	1998	-4.35***	-4.63	-0.10
		2009	1.86*		0.04		2005	4.64***		0.11
LT	1	1982	1.32	-2.00	0.03	1	1992	-1.67*	-4.06	-0.04
		2000	-1.43		-0.03		1998	0.03		0.00
LNT	1	1988	2.23**	-2.41	0.05	1	1987	2.84**	-3.48	0.07
		2009	2.43**		0.06		1998	-3.21***		-0.07
LTD	1	1997	0.42	-2.28	0.01	1	1993	1.24	-4.51	0.03
		2006	-1.73*		-0.04		2001	-2.60**		-0.06
LITD	1	1996	-3.27***	-5.60[A]	-0.07	1	1975	0.68	-6.00[B]	0.02
		2007	1.19		0.03		1996	0.50		0.01
LTEI	1	1976	3.44***	-5.60[A]	0.08	1	1975	1.11	-5.88[B]	0.03
		1998	-3.30***		-0.08		1998	-1.03		-0.02
LMS	1	1985	1.25	-1.78	0.03	1	1988	0.79	-4.30	0.02
		1998	1.46		0.03		1999	-3.52***		-0.08
IR	1	1997	0.76	-4.82[A]	0.02	1	1995	2.99**	-6.64[A]	0.07
		2005	1.12		0.03		1999	-0.86		-0.02
LER	1	1999	1.90*	-2.47	0.04	1	1999	2.07**	-4.06	0.05
		2009	-1.60		-0.04		2008	-1.39		-0.03
LCPI	1	1999	-0.02	-2.20	-0.00	1	1982	-6.04***	-6.76[C]	-0.14
		2008	-1.87*		-0.04		1995	4.05***		0.09
LFDI	1	1987	2.31**	-3.67[C]	0.05	1	1987	1.74*	-5.06	0.04
		2001	-1.33		-0.03		2010	3.19***		0.07
LHC	1	1997	1.16	-3.30	0.03	1	1983	-1.86*	-3.71	-0.04
		2009	-3.93***		-0.09		1994	2.13**		0.05

Critical Values	1%	5%	10%
Model A	-4.57	-3.94	-3.56
Model C	-6.28	-5.62	-5.25

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the t value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Table 4.4 x

Thailand LS Two-Break Minimum LM Unit Root Test

	Model A					Model C				
Series	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ	k	$\hat{T}_B$	$\hat{t}_{\gamma j}$	*Test Statistic*	λ
DGDPC	1	1985	-0.45	-4.93[A]	-0.01	1	1995	-4.12***	-5.76[B]	-0.10
		1997	-4.21***		-0.10		2000	3.94***		0.09
DLTE	1	2006	2.36**	-5.73[A]	0.06	1	1997	7.09***	-10.11[A]	0.17
		2010	-0.54		-0.01		2008	-4.33***		-0.10
DLT	1	1997	-4.33***	-5.32[A]	-0.10	1	1995	-3.17***	-5.61[C]	-0.07
		2001	1.98*		0.05		2002	1.80*		0.04
DLNT	1	1997	-3.29***	-4.40[B]	-0.08	1	1988	-4.10***	-5.80[B]	-0.10
		2001	1.89*		0.04		2001	2.28**		0.05
DLTD	1	1998	-0.58	-3.71[C]	-0.01	1	1993	-3.27***	-5.64[B]	-0.08
		2003	-0.01**		-0.00		2000	-1.68*		-0.04
DLITD	1	1979	-0.72	-5.71[A]	-0.02	1	1996	4.73***	-6.56[A]	0.11
		1999	1.50		0.04		2007	-3.26***		-0.08
DLTEI	1	1984	0.29	-5.66[A]	0.01	1	1996	4.31***	-6.57[A]	0.10
		2003	0.40		0.01		2007	-2.71**		-0.06
DLMS	1	1993	-0.96	-3.14	-0.02	1	1995	-3.13***	-6.54[A]	-0.07
		1997	-2.55**		-0.06		2011	0.62		0.01
DIR	1	1989	1.50	-6.35[A]	0.04	1	1996	-6.05***	-7.75[A]	-0.14
		2000	-1.52		-0.04		2001	5.67***		0.13
DLER	1	1997	3.57***	-6.41[A]	0.08	1	1995	4.33***	-7.88[A]	0.10
		2001	-2.71**		-0.06		2002	-5.16***		-0.12
DLCPI	1	1981	-0.61	-5.13[A]	-0.01	1	1982	-5.37***	-6.79[A]	-0.13
		1998	-2.58**		-0.06		1998	3.68***		0.09
DLFDI	1	1990	-1.53	-5.95[A]	-0.04	1	1989	-2.05**	-6.72[A]	-0.05
		1999	-1.98*		-0.05		2010	6.00***		0.14
DLHC	1	1977	-0.39	-4.09[B]	-0.01	1	1994	3.19***	-5.33[C]	0.07
		1991	0.24		0.01		2000	-2.64**		-0.06
Critical Values		1%	5%	10%						
Model A		-4.57	-3.94	-3.56						
Model C		-6.28	-5.62	-5.25						

Note: k is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. T_B denotes the estimated break points. $\hat{t}_{\gamma j}$ is the *t* value of DT_{jt}, for j=1. The symbol, λ represents critical value break points. See Lee and Strazicich (2003) for the critical values. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

Indonesia LS results are in line with the ADF results except for tax, money supply, and human capital which are found stationary at first difference while non-tax and foreign direct investment are found stationary at level. Therefore, the integration order of the variables is determined to be *I(0)* are government expenditure, the interaction of interest rate and debt, the interaction of interest rate and government spending, interest rate, inflation, foreign direct investment. On the other hand, *I(1)* for growth, total debt, tax, non-tax, money supply, exchange rate, and human capital. In the estimation process, the study inference on integration order on both intercept with and

without the trend for all variables. Hence, Table 4.4 (i) and Table 4.4 (ii) shows the order of integration as the mixture of *I(0)* and *I(1)* for all variables used in this study.

Malaysia LS results are in line with the ADF results except for tax, money supply, and exchange rate which are found stationary at first difference. Therefore, the integration order of the variables is determined to be *I(0)* are government expenditure, total debt, non-tax, interest rate, inflation, foreign direct investment, the interaction of interest rate and debt, the interaction of interest rate and government spending. On the other hand, *I(1)* for tax, money supply, exchange rate, human capital and growth for Malaysia. In the estimation process, the study inference on integration order based on intercept without trend for all variables. Hence, Table 4.4 (iii) and Table 4.4 (iv) shows the order of integration as a mixture of *I(0)* and *I(1)* for all variables used in this study.

Philippines LS results are in line with the ADF results except for LT and LHC which are found stationary at first difference while IR found stationary at level. Therefore, the integration order of the variables is determined to be *I(0)* are total debt, the interaction of interest rate and debt, interest rate, and inflation. On the other hand, *I(1)* are growth, government expenditure, tax, non-tax, the interaction of interest rate and government spending, money supply, exchange rate, foreign direct investment and human capital. In the estimation process, the study inference on integration order based on intercept without trend for all variables. Hence, Table 4.4 (v) and Table 4.4 (vi) shows the order of integration as the mixture of *I(0)* and *I(1)* for all variables used in this study.

Thailand LS results are in line with the ADF results except for LFDI which are found stationary at level. Therefore, the integration order of the variables is determined to be *I(0)* are the interaction of interest rate and debt, the interaction of interest rate and government expenditure, interest rate, inflation and foreign direct investment. On the other hand, *I(1)* for growth, government spending, tax, non-tax, debt, money supply exchange rate and human capital. In the estimation process, the study inference on integration order based on the intercept with the trend for all variables. Hence, Table 4.4(ix) and Table 4.4(x) shows the order of integration as the mixture of *I(0)* and *I(1)* for all variables used in this study.

Singapore LS results are in line with the ADF results except for LHC, LNT, and LER which are found stationary at first difference while LT and LMS which are found stationary at level. Therefore, the integration order of the variables is determined to be *I(0)* are the tax, the interaction of interest rate and debt, the interaction of interest rate and government expenditure, money supply, interest rate, inflation, foreign direct investment. However, *I(1)* for growth, government spending, non-tax, total debt, exchange rate and human capital. In the estimation process, the study inference on integration order based on intercept without trend for all variables. In short, Table 4.4 (vii) and Table 4.4 (viii) also shows the order of integration as the mixture of *I(0)* and *I(1)* for all variables used in this study.

From the Table 4.4 (i) to Table 4.4(viii), the timing of the structural breaks for in this study also coincides with other researchers. Malaysia crisis year is in the year of 1985 and 1987 and line with Athukorala (2010) with the 'Volker shock' or known as the collapsing of the world commodity trade. This study also in line with Yasin (1999)

and Kasri (2011), for the Indonesia crisis in the year of 1996 and 2000 that known as The Banking and Currency Crisis or the Twin Crisis. Also in line with Solon and Floro (1993), for the Philippines crisis in the year of 1983, 1984 and 1986 with the sharp contraction in the manufacturing sector growth. Thailand crisis is in the year of 1995, 1997 and 2000 in line with Jitsuchon (2000). This study is in line with Gill (2013) for Singapore crisis in the year of 1997 (Asian Financial Crisis), in the year 2001 (recession), and in the year 2008 (Great Recession).

The difference between ADF unit root test and LS unit root test is the ADF test is without the inclusion of structural break in the analysis while the LS test is the identification of structural break in each of the variables. The structural break dummy is included in the regression to determine whether crisis influenced the growth of per capita in ASEAN-5 countries. The coefficients of the LM break dummy are positive and statistically different from zero. The positive sign and significance level reveal that sudden shocks in the growth series increase the magnitude of growth in ASEAN-5 countries. The crisis year represents by the dummy is uniquely determined with the LS unit root test for each country.

4.4 Autoregressive Distributed Lag (ARDL) Estimates

In this study, the similarities in the ADF unit root test and LS unit root test is the absence of *I(2)* for all the variables in ASEAN-5 countries. Consequently, ascertains the application of ARDL approach with absolute certainty and this methodology is explained and applied in the following section. Usage of an ARDL modelling for univariate cointegration test, with growth as the dependent variable with the best lag distribution of the independent variables; government expenditure, tax, non-tax, debt,

money supply, interest rate, inflation, exchange rate, human capital and foreign direct investment, was modelled. Also, the function includes appropriate dummy variables selectively from LS structural unit root break on ASEAN-5 countries.

4.4.1 Bounds Test Results, Growth

The cointegration test implies that all variables move together and thereby any disequilibrium that occurs among the variables represent the short run phenomenon. The cointegration framework has the advantage where we can estimate the short-run and long-run elasticities for the growth equation. The bounds testing approach to cointegration has some advantages. The first is that it can be applied irrespective of whether the underlying regressors purely *I(0),* or *I(1),* or mutually cointegrated. This study, also confirms that there is the mixed order of *I(0)* and *I(1)* integration of the variables, and absence of *I(2)* for all the variables in ASEAN-5 countries with ADF unit root test and LS unit root test.

Another advantage of using the bounds testing approach to cointegration where Monte Carlo studies suggest that it performs better than the Engle and Granger (1987), Johansen and Juselius (1990), and Phillips and Hansen (1990) cointegration test in small samples and likewise in this study that consists of 42 sample sizes. Also, the bounds testing approach to cointegration within the ARDL framework is that it addresses the potential endogeneity problem of the fiscal and monetary policies variables in the growth equation. Consequently, the ARDL bound testing is the most appropriate method in this study in estimating whether all the variables are cointegrated.

The bound test of this study is based on F-statistic and follows a non-standard distribution. Under this, the null hypothesis indicates that there is no cointegration among the variables. The result of the F-statistic is compare with the critical value provided by Narayan (2005). Considering the calculated F-statistics is greater than the appropriate upper bound critical values then the null hypothesis is rejected, implying the existence of cointegration. If, however the statistic is below the lower bound, the null cannot be rejected, indicating the lack evidence existence of cointegration. When the calculated F-statistics lies within the lower and upper bounds, the result, however, is inconclusive. The below table depicts the bound test results for ASEAN-5.

Table 4.5 i

Fiscal Policy ARDL Bounds

Model 1			**Model 2**		
Indonesia (4, 4, 4, 3, 4, 4)			**Indonesia (4, 3, 1, 4, 0, 2, 2)**		
F-stat		6.42***	F-stat		5.82***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.46	3.65	10%	2.33	3.54
5%	2.92	4.27	5%	2.76	4.12
1%	4.03	5.60	1%	3.79	5.41
Malaysia (4, 4, 4, 3, 4, 4)			**Malaysia (4, 3, 4, 4, 1, 4, 4)**		
F-stat		4.27**	F-stat		3.55*
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.46	3.65	10%	2.33	3.54
5%	2.92	4.27	5%	2.76	4.12
1%	4.03	5.60	1%	3.79	5.41
Philippines (4, 4, 4, 3, 4, 4)			**Philippines (4, 3, 1, 4, 0, 2, 2)**		
F-stat		5.97***	F-stat		7.32***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.46	3.65	10%	2.33	3.54
5%	2.92	4.27	5%	2.76	4.12
1%	4.03	5.60	1%	3.79	5.41
Singapore (3, 0, 0, 0, 0, 0)			**Singapore (1, 3, 1, 3, 0, 2, 3)**		
F-stat		6.53***	F-stat		6.49***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.46	3.65	10%	2.33	3.54
5%	2.92	4.27	5%	2.76	4.12
1%	4.03	5.60	1%	3.79	5.41
Thailand (4, 4, 4, 3, 4, 4)			**Thailand (4, 3, 1, 4, 0, 2, 2)**		
F-stat		7.37***	F-stat		6.17***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.46	3.65	10%	2.33	3.54
5%	2.92	4.27	5%	2.76	4.12
1%	4.03	5.60	1%	3.79	5.41

Note: The critical values for the lower I(0) and upper bounds I(1) are taken from Narayan (2005). Narayan (2005) critical values (k=5 and k=6 for Model 1 and Model 2, respectively, for n=46). ***, ** and * represent significant at 1%, 5% and 10% respectively.

Table 4.5 i depicts the ASEAN-5 Fiscal Policy on ARDL bound test results. The value of the F-statistic is greater than the upper bound level which confirms there is a cointegration between fiscal variables with growth. At 1% significant level for Indonesia, Philippines, Singapore, and Thailand, while 5% significant level for Malaysia in examining the impact of fiscal policy (without and with the inclusion of non-tax) on growth.

Table 4.5 ii

Monetary and Relative Effectiveness ARDL Bounds

Model 3			**Model 4**		
Indonesia (1, 0, 0, 0, 0, 0, 0)			**Indonesia (2, 0, 2, 0, 0)**		
F-stat		4.17**	F-stat		6.52***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.33	3.54	10%	2.64	3.77
5%	2.76	4.12	5%	3.18	4.45
1%	3.79	5.41	1%	4.39	5.91
Malaysia (4, 4, 1, 0, 4, 4, 4)			**Malaysia (4, 4, 4, 1, 4)**		
F-stat		8.53***	F-stat		5.00**
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.33	3.54	10%	2.64	3.77
5%	2.76	4.12	5%	3.18	4.45
1%	3.79	5.41	1%	4.39	5.91
Philippines (1, 1, 1, 1, 0, 0, 0)			**Philippines (1, 0, 0, 1, 1)**		
F-stat		7.16***	F-stat		19.13***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.33	3.54	10%	2.64	3.77
5%	2.76	4.12	5%	3.18	4.45
1%	3.79	5.41	1%	4.39	5.91
Singapore (1, 0, 1, 0, 1, 0, 0)			**Singapore (1, 3, 2, 3, 2)**		
F-stat		6.36***	F-stat		11.81***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.33	3.54	10%	2.64	3.77
5%	2.76	4.12	5%	3.18	4.45
1%	3.79	5.41	1%	4.39	5.91
Thailand (1, 1, 3, 0, 1, 0, 2)			**Thailand (2, 0, 3, 1, 0)**		
F-stat		9.21***	F-stat		7.00***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.33	3.54	10%	2.64	3.77
5%	2.76	4.12	5%	3.18	4.45
1%	3.79	5.41	1%	4.39	5.91

Note: The critical values for the lower I(0) and upper bounds I(1) are taken from Narayan (2005). Narayan (2005) critical values (k=6 and k=4 for Model 3 and Model 4, respectively, for n=46). ***, ** and * represent significant at 1%, 5% and 10% respectively.

Table 4.5 ii depicts the ASEAN-5 Monetary, and Relative Effectiveness Policies on ARDL bound test results. The value of the F-statistic is greater than the upper bound level which confirms there is a cointegration between monetary variables with the growth at 1% for Indonesia, the Philippines, Thailand, and Singapore and at 5% significant level for Malaysia, in examining the impact of monetary policy on growth. On the other hand, in considering the impact of relative effectiveness policies on growth, there is a cointegration at 1% significance level for Indonesia, the Philippines, Thailand, and Singapore and 5% significance level for Malaysia.

Table 4.5 iii

Interaction of Monetary Policy with Fiscal ARDL Bounds

Model 5			**Model 6**		
Indonesia (2, 4, 0, 3, 0)			**Indonesia (5, 6, 6, 5, 0)**		
F-stat		5.96***	F-stat		3.93*
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.64	3.77	10%	2.64	3.77
5%	3.18	4.45	5%	3.18	4.45
1%	4.39	5.91	1%	4.39	5.91
Malaysia (4, 1, 4, 4, 0)			**Malaysia (4, 1, 4, 4, 3)**		
F-stat		4.80**	F-stat		5.52**
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.64	3.77	10%	2.64	3.77
5%	3.18	4.45	5%	3.18	4.45
1%	4.39	5.91	1%	4.39	5.91
Philippines (5, 0, 6, 6, 6)			**Philippines (5, 5, 6, 5, 1)**		
F-stat		15.48***	F-stat		7.81***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.64	3.77	10%	2.64	3.77
5%	3.18	4.45	5%	3.18	4.45
1%	4.39	5.91	1%	4.39	5.91
Singapore (3, 0, 1, 0, 4)			**Singapore (3, 0, 2, 1, 2)**		
F-stat		9.97***	F-stat		6.00**
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.64	3.77	10%	2.64	3.77
5%	3.18	4.45	5%	3.18	4.45
1%	4.39	5.91	1%	4.39	5.91
Thailand (2, 0, 0, 0, 4)			**Thailand (1, 0, 3, 3, 0)**		
F-stat		7.83***	F-stat		6.45***
Critical Values	Lower bound	Upper bound	Critical Values	Lower bound	Upper bound
10%	2.64	3.77	10%	2.64	3.77
5%	3.18	4.45	5%	3.18	4.45
1%	4.39	5.91	1%	4.39	5.91

Note: The critical values for the lower I(0) and upper bounds I(1) are taken from Narayan (2005). Narayan (2005) critical values (k=4, n=46). ***, ** and * represent significant at 1%, 5% and 10% respectively.

Table 4.5 iii depicts the ASEAN-5 interaction of monetary policy with fiscal components on growth. The value of the F-statistic is greater than the upper bound level which confirms there is a cointegration between monetary variables and debt with growth at 1% significant level for Indonesia, the Philippines, Thailand, and Singapore and at 5% significant level for Malaysia. Also, the F-statistic is greater than the upper bound level which confirms there is a cointegration between monetary variables and government spending with growth at 10% significant level for Indonesia, and 1% for the Philippines and Thailand and at 5% significant level for Malaysia and Singapore.

Evidence of the existence of the cointegration between variables, lead to the selection of the lag length using a model selection procedure based on the Hannan-Quinn Criterion as supported by Liew (2004). According to him, there is no significant gain in differentiating these criteria unless one has a considerable large sample size. This selection criterion is useful since it allows for selection of model with higher lag. Then the lag length is reduced until the model is parsimonious and passes the diagnostic test. These results from all six Models in this study hence allow the long- and short-run estimation of the variables in ARDL Model.

4.4.2 Estimation of Long-Run Relationship, Growth

The second stage of an ARDL modelling for univariate cointegration test is to estimate the long-run coefficients of the model. Table 4.6 presents the solved static long run results of the ARDL Model.

Table 4.6

Long Run Elasticity (ASEAN-5)

Model 1	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
	(1, 0, 3, 0, 0, 0)	**(4, 4, 4, 3, 4, 4)**	**(1, 1, 2, 0, 2, 0)**	**(3, 0, 0, 0, 0, 0)**	**(4, 4, 4, 3, 4, 4)**
LTE	0.06	-0.20*	0.59***	-0.65***	-0.22
	(0.69)	(-1.89)	(4.66)	(-3.12)	(-1.37)
	[0.50]	[0.09]	[0.00]	[0.00]	[0.18]
LT	0.06	0.17	-0.12	0.63***	0.39***
	(0.74)	(1.29)	(-1.38)	(4.47)	(3.36)
	[0.46]	[0.22]	[0.18]	[0.00]	[0.00]
LTD	0.29***	0.06	0.75	-0.06*	-0.01
	(6.00)	(0.70)	(1.57)	(-1.78)	(0.10)
	[0.00]	[0.50]	[0.13]	[0.08]	[0.93]
LHC	0.02	0.17	-0.86	0.76***	0.01
	(0.21)	(0.81)	(-1.24)	(10.64)	(0.12)
	[0.83]	[0.44]	[0.22]	[0.00]	[0.91]
LFDI	0.09*	0.03	-0.05	0.25***	0.14***
	(1.76)	(1.28)	(-1.55)	(3.58)	(4.89)
	[0.09]	[0.23]	[0.13]	[0.00]	[0.00]
DUM	0.14**	-0.10***	-0.00	-0.10	-0.04
	(2.21)	(-2.64)	(-0.03)	(-1.11)	(-0.57)
	[0.04]	[0.02]	[0.98]	[0.28]	[0.58]
C	-0.06	4.67	8.90*	4.35**	3.46**
	(-0.05)	(1.43)	(1.80)	(1.23)	(2.74)
	[0.96]	[0.18]	[0.08]	[0.04]	[0.01]
Model 2	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
	(1, 2, 3, 2, 1, 0, 0)	**(4, 3, 4, 4, 1, 4, 4)**	**(1, 1, 1, 1, 0, 1, 0)**	**(1, 3, 1, 3, 0, 2, 3)**	**(2, 0, 3, 4, 4, 4, 4)**
LTE	0.32	0.57*	0.49***	-0.43***	0.18***
	(1.03)	(2.00)	(8.07)	(-4.47)	(3.38)
	[0.31]	[0.07]	[0.00]	[0.00]	[0.01]
LT	-0.10	0.04	-0.34***	0.38***	-0.13***
	(-0.42)	(0.26)	(-4.15)	(5.05)	(-3.05)
	[0.68]	[0.80]	[0.00]	[0.00]	[0.01]
LNT	-0.06	-0.28	0.37***	0.20***	0.20***
	(-0.80)	(-1.59)	(4.12)	(5.36)	(5.84)
	[0.43]	[0.14]	[0.00]	[0.00]	[0.00]
LTD	0.20**	0.00	0.05	0.01	0.27***
	(2.25)	(0.00)	(0.30)	(0.60)	(7.66)
	[0.03]	[0.99]	[0.77]	[0.56]	[0.00]
LHC	0.05	0.23***	-0.29	0.69***	-0.09***
	(0.45)	(4.74)	(-1.01)	(20.89)	(-3.60)
	[0.66]	[0.00]	[0.32]	[0.00]	[0.00]
LFDI	0.10	0.10	0.00	0.03	0.04***
	(1.62)	(1.75)	(0.19)	(0.60)	(5.01)
	[0.12]	[0.11]	[0.85]	[0.55]	[0.00]
DUM	-0.25	-0.08*	0.02	-0.002	-0.06**
	(-0.17)	(-1.96)	(0.47)	(-0.06)	(-2.21)
	[0.87]	[0.08]	[0.64]	[0.95]	[0.04]
C	0.23	4.33	7.02**	0.50**	3.50***
	(1.55)	(1.23)	(2.90)	(11.58)	(11.58)
	[0.13]	[0.15]	[0.01]	[2.24]	[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table4.6 …Continue

Long Run Elasticity (ASEAN-5)

Model 3	**Indonesia (1, 0, 0, 0, 0, 0, 0)**	**Malaysia (4, 4, 1, 0, 4, 4, 4)**	**Philippines (1, 1, 1, 1, 0, 0, 0)**	**Singapore (1, 0, 1, 0, 1, 0, 0)**	**Thailand (1, 1, 3, 0, 1, 0, 2)**
LMS	0.27***	0.37***	-0.04	0.35***	0.35***
	(7.44)	(4.27)	(0.26)	(2.89)	(7.51)
	[0.00]	[0.00]	[0.80]	[0.01]	[0.00]
IR	-0.01	-0.03***	-0.04**	-0.03	-0.02***
	(-1.69)	(-5.26)	(-2.60)	(-1.37)	(-3.76)
	[0.10]	[0.00]	[0.01]	[0.18]	[0.00]
LCPI	-0.39***	-0.19	0.09	0.12	-0.40***
	(-3.51)	(-0.71)	(0.37)	(0.50)	(-4.43)
	[0.00]	[0.49]	[0.71]	[0.62]	[0.00]
LER	0.10**	0.69***	-0.33	0.54	-0.10
	(2.01)	(3.52)	(-1.60)	(1.52)	(-1.08)
	[0.05]	[0.00]	[0.12]	[0.14]	[0.29]
LHC	-0.04	-0.71***	0.57	0.02	-0.00
	(-0.69)	(-3.09)	(1.16)	(0.09)	(-0.05)
	[0.50]	[0.01]	[0.25]	[0.93]	[0.96]
LFDI	0.02	0.17***	-0.05	0.16	0.09***
	(1.10)	(5.25)	(-1.32)	(1.64)	(3.73)
	[0.28]	[0.00]	[0.20]	[0.11]	[0.00]
DUM	-0.01	-0.10***	0.05	-0.03	0.04
	(-0.20)	(-3.33)	(0.56)	(-0.39)	(1.20)
	[0.84]	[0.00]	[0.58]	[0.70]	[0.24]
C	0.04**	9.80***	2.07	-0.02	-0.54**
	(5.01)	(4.49)	(0.32)	(-1.35)	(-0.63)
	[0.07]	[0.00]	[0.75]	[0.19]	[0.06]
Model 4	**Indonesia (2, 0, 2, 0, 0)**	**Malaysia (4, 4, 4, 1, 4)**	**Philippines (1, 0, 0, 1, 1)**	**Singapore (1, 3, 2, 3, 2)**	**Thailand (2, 0, 3, 1, 0)**
LTE	-0.17	1.53**	-0.46	0.02**	-0.19**
	(-1.71)	(2.23)	(-1.24)	(-2.53)	(-2.13)
	[0.97]	[0.04]	[0.22]	[0.02]	[0.04]
LT	0.10	-1.64*	0.37	0.99	0.23**
	(1.61)	(-1.90)	(1.37)	(-0.01)	(2.23)
	[0.12]	[0.07]	[0.18]	[0.99]	[0.03]
LMS	0.30***	0.54**	0.49***	0.56***	0.33***
	(15.99)	(2.14)	(4.02)	(14.31)	(8.77)
	[0.00]	[0.05]	[0.00]	[0.00]	[0.00]
IR	-0.01	-0.04	-0.12**	0.01	-0.03***
	(-1.37)	(-1.04)	(-2.45)	(0.71)	(-2.78)
	[0.18]	[0.31]	[0.02]	[0.49]	[0.01]
DUM	0.04	-0.33	0.19	-0.03	0.08
	(0.72)	(-1.53)	(1.41)	(-0.56)	(1.38)
	[0.48]	[0.14]	[0.17]	[0.58]	[0.18]
C	0.01***	-0.02**	-0.07***	0.01	-0.01
	(3.36)	(-2.21)	(-2.92)	(-1.39)	(-1.60)
	[0.00]	[0.06]	[0.01]	[0.18]	[0.12]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.6 …Continue

Long Run Elasticity (ASEAN-5)

Model 5	**Indonesia (2, 4, 0, 3, 0)**	**Malaysia (4, 1, 4, 4, 0)**	**Philippines (5, 0, 6, 6, 6)**	**Singapore (3, 0, 1, 0, 4)**	**Thailand (2, 0, 0, 0, 4)**
LMS	0.17*	0.30	0.26**	0.42***	0.32***
	(1.89)	(1.63)	(2.46)	(80.78)	(17.18)
	[0.07]	[0.12]	[0.03)	[0.00]	[0.00]
IR	-0.01	0.03	-0.09**	0.01	-0.01**
	(-1.66)	(0.94)	(-2.32)	(0.88)	(-2.40)
	[0.11]	[0.36]	[0.04]	[0.39]	[0.02]
LITD	-0.09	-1.78*	-1.11**	0.04*	0.10
	(-0.68)	(-1.74)	(-2.27)	(3.48)	(1.19)
	[0.50]	[0.96]	[0.04]	[0.00]	[0.24]
LTD	0.22*	0.05	-0.61*	0.03*	0.02
	(1.79)	(0.20)	(-2.14)	(1.94)	(0.38)
	[0.09]	[0.84]	[0.06]	[0.06]	[0.71]
C	0.32	2.54***	8.71***	-0.01***	-0.04**
	(0.32)	(2.87)	(7.24)	(-4.57)	(-3.57)
	[0.75]	[0.01]	[0.00]	[0.00]	[0.06]
DUM	-0.02	-0.56***	0.12	-0.02	0.30
	(-0.32)	(-3.44)	(1.29)	(-0.39)	(0.41)
	[0.75]	[0.00]	[0.22]	[0.70]	[0.69]
Model 6	**Indonesia (5, 6, 6, 5, 0)**	**Malaysia (4, 1, 4, 4, 3)**	**Philippines (5, 5, 6, 5, 1)**	**Singapore (3, 0, 2, 1, 2)**	**Thailand (1, 0, 3, 3, 0)**
LMS	0.38***	0.19*	-0.17***	0.47***	0.71***
	(15.59)	(1.97)	(-3.55)	(10.90)	(4.01)
	[0.00]	[0.06]	[0.00]	[0.00]	[0.00]
IR	-0.00	0.00	-0.00	-0.00	-0.06**
	(-0.11)	(0.19)	(-0.07)	(-0.36)	(-2.78)
	[0.92]	[0.85]	[0.94]	[0.72]	[0.01]
LTEI	-0.25	-1.12	-0.47**	0.02	-0.36*
	(-1.30)	(-1.63)	(-2.86)	(1.19)	(-1.97)
	[0.22]	[0.12]	[0.01]	[0.24]	[0.06]
LTE	-0.04	0.19	0.62***	-0.25***	0.20
	(-1.03)	(1.40)	(4.86)	(-2.82)	(1.31)
	[0.32]	[0.18]	[0.00]	[0.01]	[0.20]
C	-2.07***	3.31***	5.48***	1.13***	-9.25**
	(-6.42)	(7.77)	(11.42)	(3.03)	(-2.12)
	[0.00]	[0.00]	[0.00]	[0.01]	[0.04]
DUM	-0.02	-0.42***	-0.03	0.00	0.00
	(-0.62)	(-3.90)	(-0.42)	(0.08)	(0.03)
	[0.95]	[0.00]	[0.69]	[0.93]	[0.98]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

In examining the impact of fiscal policy on growth in Model 1, the estimated coefficients for government expenditure is (-0.19) and (-0.65) in Malaysia and Singapore and statistically significant at 10% level and 1% level. But, (0.59) and statistically significant at 1% level in the Philippines. Government spending is negative in Malaysia and Singapore but positive in the Philippines. There is a long run cointegration between government expenditure and growth in Malaysia, Singapore, and the Philippines. The result of this study also consistent with Hasnul (2015) and Phua (2014) where government expenditure is negative in Malaysia.

The estimated coefficients for the tax are (0.39) and (0.63) in Thailand and Singapore respectively and statistically significant at 1% level. There are a long run cointegration and positive relationship between tax and growth in Thailand and Singapore. The estimated coefficients for debt is (0.29) in Indonesia and statistically significant at 1% level, but (-0.06) in Singapore and statistically significant at 10% level. Results in the table show that debt increase growth in Indonesia while vice versa in Singapore. This study is in line with Hadiwibowo (2010) that says budget deficits might serve the objective of long-run economic growth in Indonesia. Total debt is positive in Indonesia and following Keynesian economics that claimed that these two series are positively related while Singapore is following the neo-classical economics that claimed the opposite. This study also consistent with Rahman (2012), there is no long-run relationship between budget deficit and economic growth of Malaysia and in line with Ricardian equivalence hypothesis.

The estimated coefficients for human capital is (0.76) in Singapore and statistically significant at 1% level. There are a long run cointegration and positive relationship between human capital and growth in Singapore. This study is in line with Mallick, Das, and Pradhan (2016) that says Singapore had a positive and statistically significant impact of education expenditure on economic development. The estimated coefficients for foreign direct investment are (0.09), (0.14) and (0.25) in Indonesia, Thailand, and Singapore respectively, and statistically significant at 10% level, 1% level, and 1% level. In short, there is a long run cointegration and positive relationship between foreign direct investment and growth in Indonesia, Thailand, and Singapore.

This study is line with Lindblad (2015) that says the attitude of Bulletin of Indonesian Economic Studies towards FDI in Indonesia has remained unequivocally positive over the past 50 years. Similar to Roy and Mandal (2012) that says a cointegrating relationship exists between FDI and growth in Indonesia, Thailand, and Singapore. The estimated coefficients for dummy variables is (-0.10) and statistically significant at 5% level in Malaysia, and positive (0.14) and statistically significant at 5% level in Indonesia. Results in the table show that crisis decrease growth in Malaysia, but crisis increase growth in Indonesia.

In examining the impact of fiscal policy with the inclusion of non-tax on growth, the estimated coefficients for government expenditure are (0.57), (0.49), and (0.18) and statistically significant at 10%, 1%, and 1% level, in Malaysia, Philippines, and Thailand. Government expenditure is (-0.43) and statistically significant at 1% in Singapore. There is a long run cointegration between spending and growth and spending decreased growth in Singapore, but government spending increased growth in Malaysia, Philippines, and Thailand.

The estimated coefficients for the tax are (-0.34) and (-0.13) in Philippines and Thailand, but tax (0.38) in Singapore and all statistically significant at 1% level. Results in the table show that tax decrease growth in Philippines and Thailand but vice versa in Singapore and there is a long run cointegration between tax and growth. Tax exhibiting negative impact and government expenditure showing a positive impact on growth in Thailand is in line with Puapan (2011).

The estimated coefficients for non-tax are (0.37), (0.20), and (0.20) in Philippines, Thailand and Singapore and all statistically significant at 1% level. Results in the table show that there is a long-run cointegration between non-tax and growth and non-tax increase growth in Singapore. This study is in line with Venkadasalam (2014) that the effect of the post-government service and tax in Singapore shows a significant positive relationship with their nation's development.

The estimated coefficients for debt are (0.19) and (0.27) in Indonesia and Thailand respectively, and statistically significant at 5% and 1% level. There are a long run cointegration and positive relationship between debt and growth in Indonesia and Thailand. The estimated coefficients for human capital are (0.23) and (0.69) respectively in Malaysia and Singapore, and both statistically significant at 1% level. Human capital is (-0.09) in Thailand and statistically significant at 1% level. There is a long run cointegration between human capital and growth and is positive in Malaysia and Singapore but negative in Thailand. Likewise, with Mallick, Das, and Pradhan (2016) that says Malaysia and Singapore had a positive and statistically significant impact of education expenditure on economic development.

The estimated coefficients for foreign direct investment is positive (0.04) in Thailand and statistically significant at 1% level. In short, there is a long run cointegration and positive relationship between foreign direct investment and growth in Thailand. The estimated coefficients for dummy variables are (-0.08) and (-0.06) respectively and statistically significant at 10%, 5% level in Malaysia and Thailand. Results in the table show that crisis decrease growth in Malaysia and Thailand.

In examining the impact of monetary policies on growth in Model 3, the estimated coefficients for money supply are (0.27), (0.37), (0.35), (0.35) respectively in Indonesia, Malaysia, Singapore, and Thailand and all are statistically significant at 1% level. This study is in line with AbuDalu, Ahmed, Almasaied, & Elgazoli (2014) that says money supply had a positive and significant impact on ASEAN-5 except the Philippines. The estimated coefficients for interest rate are (-0.03), (-0.04), and (-0.02) in Malaysia, Philippines, Thailand and statistically significant at 1%, 5%, 1% level indicating interest rate decrease growth. The negative relationship between interest rate and growth in Malaysia, Philippines, Thailand in line with the money view that play emphasis on changes in the monetary aggregate affected the output via interest rate channel.

The estimated coefficient for inflation (-0.40) both in Indonesia and Thailand, statistically significant at 1% level indicating inflation decreased growth. This study also in line with Liwan and Lau (2007) that in Thailand, inflation has an adverse impact on growth. The estimated coefficients for exchange rate are (0.69) and (0.09) respectively in Malaysia and Indonesia, and statistically significant at 1% and 5% level indicating exchange rate increase growth. There is a long run cointegration between exchange rate and growth in Malaysia and Indonesia. This study is in line with AbuDalu et al., (2014) that says exchange rates had a positive and significant impact on Malaysia and Indonesia. Likewise, this study also in line with Semuel & Teddy (2014) that there is a significant positive relationship between the exchange rates of the growth in Indonesia.

The estimated coefficients for human capital is (-0.71) in Malaysia and statistically significant at 1% level indicating human capital decreased growth in Malaysia. There is a long run cointegration between human capital and growth in Malaysia. The estimated coefficients for foreign direct investment are (0.17) and (0.09) respectively in Malaysia and Thailand and both statistically significant at 1% level indicating that foreign direct investment increased growth. There is a long run cointegration between foreign direct investment and growth in Malaysia and Thailand. This study also in line with Liwan and Lau (2007) that investment has a positive impact on growth for Malaysia and Thailand. The estimated coefficients for dummy variables is (-0.10) and statistically significant at 1% level in Malaysia. Results in the table show that crisis decrease growth in Malaysia.

In examining the relative effectiveness of fiscal and monetary policies on growth, the estimated coefficients for government expenditure is (1.53) in Malaysia and statistically significant at 5% level. However, the estimated coefficients for public spending are (-0.17), (-0.19), and (-0.33) in Indonesia, Thailand, and in Singapore and statistically significant at 10%, 5%, and 5% level. Results in the table show that government expenditure increase growth in Malaysia but, government spending decreased growth in Indonesia, Thailand, and in Singapore. The estimated coefficients for the tax is (-1.64) in Malaysia and statistically significant at 10% level, but the tax is (0.23) in Thailand and statistically significant at 5% level. Results in the table show that tax decrease growth in Malaysia. On the other hand, tax increase growth in Thailand. In short, there is a long run cointegration between tax and growth in Malaysia and Thailand.

The estimated coefficients for money supply are (0.54), (0.30), (0.49), (0.33), and (0.56) respectively in Malaysia, Indonesia, Philippines, Thailand and Singapore and statistically significant at 5%, 1%, 1%, 1%, 1% level. In short, there is a long run cointegration between money supply and growth in Asean-5 countries. The estimated coefficients for the interest rate are (-0.12) and (-0.03) respectively in Philippines and Thailand and statistically significant at 5% and 1% level. Results in the table show that interest rate decrease growth and there is a long run cointegration and positive relationship between interest rate and growth in Philippines and Thailand.

In measuring the relative effectiveness of fiscal and monetary policy on growth, we found that Malaysia fiscal policy is more effective than monetary policy in stimulating growth with government expenditure is significantly at a higher probability value of 0.04 while money supply is significant at 0.05. This result is in line likewise with Khalid and Fakhzan (2013) that says on the fiscal regime is active in Malaysia. While, monetary policy is more effective than fiscal policy in stimulating growth in Indonesia, Thailand, and Singapore.

In Indonesia, money supply is significant at 1% of 0.00 and in Thailand, both money supply and interest rate are significant at 1% while both government spending and tax are significant at 5%. In Singapore, money supply is significant at 1% while public expenditure significant at 5%. This result also in line Khalid and Fakhzan (2013) that Thailand and Singapore monetary policy is mostly active compared to fiscal policy. Furthermore, this study also consistent with Lew (2007) that says monetary policy plays a role in stimulating growth in Indonesia and Thailand. In short, both monetary

and fiscal policies do have significant effects on growth in Malaysia, Indonesia, Thailand and Singapore countries except the Philippines.

The Philippines clearly shows that fiscal policies do not play a role in stimulating growth in Model 4. In the Philippines, money supply and the interest rate are significant at 1% and 5% while fiscal policy indicator is found to be not important in the long run. This study is in line with Atchariyachanvanich (2007) that says the Philippines are classified as monetary-policy-dominated countries because no fiscal instrument is found statistically significant in any equation. Our result differs with Halcon and De Leon (2004) that claim that the fiscal policy component had driven economic growth from 1986:1 until 2003:1. The differ of result might due to the usage of this study Model that include not only government expenditure and money supply but also tax, interest rate, and longer time span.

In Model 4, in line with the theory is the relationship of interest rate is negative with growth over the long haul in Philippines and Thailand. The relationship of the money supply is positive with growth in ASEAN-5 countries as expected likewise, and the relationship of total expenditure is negative with growth in Indonesia and Singapore. Government spending is found to be positive in Malaysia while the tax is negative with growth over the long haul. Meanwhile, expenditure is found to be negative in Thailand while the tax is positive with growth over the long haul.

In examining the interaction of monetary policy interest rate with debt, the estimated coefficients for the interaction of interest rate with debt are (-1.78) and (-1.14), respectively in Malaysia and Philippines and statistically significant at 10% and 5%

level. However, the interaction of interest rate with debt is (0.04) in Singapore and statistically significant at 1% level. In short, the interaction term of interest rate with debt is negative in Malaysia and Philippines, but Singapore interaction term of interest rate with debt is positive in the long run. In line with Mohanty (2012) study, Malaysia, Philippines, and Singapore are following non-Ricardian where changes in fiscal shortfalls prompt to changes in interest rates. On the other hand, Indonesia and Thailand are following Ricardian theory. The budget deficits and debt have no consequences for interest rates.

The estimated coefficients for debt are (0.22) and (0.03) respectively in Indonesia and Singapore and both statistically significant at 10%, but debt is (-0.61) in the Philippines and statistically significant at 10%. The estimated coefficients for dummy variables is negative (-0.56) and statistically significant at 1% level in Malaysia. Results in the table show that crisis decrease growth in Malaysia. The estimated coefficients for money supply are (0.17), (0.26), (0.32), and (0.42) respectively in Indonesia, Philippines, Thailand and Singapore and statistically significant at 10%, 5%, 1%, and 1% level. The estimated coefficients for interest rate are (-0.09) and (-0.01) respectively in Philippines and Thailand and both statistically significant at 5% level.

In examining the interaction of monetary policy interest rate with government expenditure, the estimated coefficients for the interaction of interest rate with public spending are (-0.47) and (-0.36), respectively in Philippines and Thailand and statistically significant at 5% and 10% level. In sum, the interaction term of interest rate with expenditure is negative in Philippines and Thailand. High fiscal deficit and

high real interest rate, in the long haul such policy mix, drive government debt to develop quickly and in this manner, will bring down the level of output in the nation. This study is line with Blinder (1980), Nordhaus et al., (1994), and Lambertini (2006) that stressed because of the resistance, policy mix approach always gave imperfect outcomes.

The estimated coefficients for government spending is (0.62) in the Philippines and is statistically significant at 1%, but government expenditure is (-0.25) in Singapore and statistically significant at 1%. Results in the table show that expenditure increase growth in the Philippines but that government spending decrease growth in Singapore. The estimated coefficients for dummy variables is negative (-0.42) and statistically significant at 1% level in Malaysia. Results in the table show that crisis decrease in Malaysia.

The estimated coefficients for money supply are positive (0.19), (0.38), (0.71), and (0.47) respectively in Malaysia, Indonesia, Thailand and Singapore and statistically significant at 10%, 1%, 1%, and 1% level. Results in the table show that money supply increase and growth in Malaysia, Indonesia, Thailand, and Singapore except in the Philippines with (-0.17) and statistically significant at 1% level. The estimated coefficients for the interest rate is (-0.06) in Thailand and statistically significant at 5% level. There are a long run cointegration and negative relationship between interest rate and growth in Philippines and Thailand.

4.4.3 Estimation of Short Run Relationship, Growth

Now, with the acceptance of long-run coefficients of growth, the estimation of short-run coefficients can be conducted. Arising from this is the need to develop an ECM. An ECM has two important parts. First, estimated short-run coefficients. Second, error correction term (ECT) provides the speed of adjustment whereby short-run dynamics converge to the long-run equilibrium path. Likewise, Banerjee, Lumsdaine, and Stock (1992) that stated that a significant ECT is the further proof of the being of a steady long-term association. Table 4.7 summarises the error correction representation of all the six Model in ASEAN-5.

Table 4.7
Short Run Elasticity (ASEAN-5)

Model 1	**Indonesia (1,0,3,0,0,0)**	**Malaysia (4, 4, 4, 3, 4, 4)**	**Philippines (1, 1, 2, 0, 2, 0)**	**Singapore (1, 1, 1, 0, 1, 1)**	**Thailand (1, 3, 1, 0, 3, 4)**
D(LGDPC(-1))		0.86**			
		(2.89)			
		[0.01]			
D(LGDPC(-2))		0.10			
		(0.30)			
		[0.77]			
D(LGDPC(-3))		1.25***			
		(4.10)			
		[0.00]			
D(LTE)	0.02	-0.03	0.02	-0.11***	-0.07
	(0.64)	(-0.48)	(0.36)	-4.90	(-1.48)
	[0.53]	[0.64]	[0.72]	[0.00]	[0.15]
D(LTE(-1))		0.28**			-0.01
		(2.29)			(-0.21)
		[0.04]			[0.84]
D(LTE(-2))		0.18*			0.07*
		(1.84)			(1.72)
		[0.08]			[0.09]
D(LTE(-3))		0.11			
		(1.33)			
		[0.20]			
D(LT)	0.10***	0.20***	0.14***	0.11***	0.22***
	(3.25)	(3.38)	(2.98)	4.11	(7.27)
	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]
D(LT(-1))	0.02	-0.20	0.14***		
	(1.42)	(-1.63)	(3.70)		
	[0.17]	[0.12]	[0.00]		
D(LT(-2))	0.05**	-0.11			
	(2.69)	(-1.01)			
	[0.01]	[0.33]			
D(LT(-3))		-0.12			
		(-1.63)			
		[0.12]			
D(LTD)	0.11***	0.07	0.18**	-0.01**	-0.00
	(3.06)	(1.52)	(2.18)	-2.65	(-0.09)
	[0.00]	[0.15]	[0.04]	[0.01]	[0.93]
D(LTD(-1))		-0.07			
		(-1.50)			
		[0.15]			
D(LTD(-2))		0.07			
		(1.67)			
		[0.11]			

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 1	**Indonesia (1,0,3,0,0,0)**	**Malaysia (4, 4, 4, 3, 4, 4)**	**Philippines (1, 1, 2, 0, 2, 0)**	**Singapore (1, 1, 1, 0, 1, 1)**	**Thailand (1, 3, 1, 0, 3, 4)**
D(LHC)	0.01	0.22	0.16	0.13***	-0.01
	(0.22)	(0.79)	(0.86)	4.74	(-0.63)
	[0.83]	[0.44]	[0.40]	[0.00]	[0.54]
D(LHC(-1))		0.27**	0.26		0.01
		(2.36)	(1.40)		(0.87)
		[0.03]	[0.17]		[0.39]
D(LHC(-2))		0.17			-0.04**
		(1.53)			(-2.79)
		[0.15]			[0.01]
D(LHC(-3))		0.18			
		(1.47)			
		[0.16]			
D(LFDI)	0.03*	0.02	-0.01	0.04***	0.01
	(2.00)	(1.69)	(-1.61)	(5.23)	(1.01)
	[0.05]	[0.11]	[0.12]	[0.00]	[0.32]
D(LFDI(-1))		-0.02			-0.02*
		(-1.48)			(-1.95)
		[0.16]			[0.06]
D(LFDI(-2))		0.00			-0.02
		(0.08)			(-1.65)
		[0.93]			[0.11]
D(LFDI(-3))		-0.02**			-0.02**
		(-2.15)			(-2.68)
		[0.05]			[0.01]
D(DUM)	0.05***	-0.08***	-0.00	-0.02	-0.01
	(2.82)	(-3.92)	(-0.03)	(-1.25)	(-0.63)
	[0.01]	[0.00]	[0.98]	[0.22]	[0.54]
ECT_{t-1}	-0.36***	-0.80***	-0.24***	-0.17***	-0.23**
	(-4.30)	(-3.15)	(-3.28)	-3.52	(-2.73)
	[0.00]	[0.01]	[0.00]	[0.00]	[0.01]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 2	**Indonesia (1,2,3,2,1,0,0)**	**Malaysia (4, 3, 4, 4, 1, 4, 4)**	**Philippines (1, 1, 1, 1, 0, 1, 0)**	**Singapore (1, 3, 1, 3, 0, 2, 3)**	**Thailand (2, 0, 3, 4, 4, 4, 3)**
D(LGDPC(-1))		0.50**			0.58**
		(2.34)			(2.54)
		[0.03]			[0.02]
D(LGDPC(-2))		0.37			
		(1.49)			
		[0.15]			
D(LGDPC(-3))		0.69**			
		(2.23)			
		[0.04]			
D(LTE)	-0.02	0.02	0.11**	-0.15***	0.18**
	(-0.45)	(0.34)	(2.66)	(-3.56)	(2.67)
	[0.65]	[0.74]	[0.01]	[0.00]	[0.02]
D(LTE(-1))	-0.16**	0.05		0.05	
	(-2.52)	(0.59)		(1.29)	
	[0.02]	[0.56]		[0.21]	
D(LTE(-2))		-0.11		0.06**	
		(-1.56)		(2.10)	
		[0.14]		[0.05]	
D(LT)	0.11***	0.12**	-0.00	0.24***	0.09*
	(3.33)	(2.20)	(-0.08)	(6.75)	(2.06)
	[0.00]	[0.04]	[0.94]	[0.00]	[0.05]
D(LT)(-1))	0.09**	-0.10			0.25***
	(2.39)	(-1.57)			(4.04)
	[0.02]	[0.14]			[0.00]
D(LT)(-2))	0.07***	-0.11			0.15***
	(3.85)	(-1.66)			(3.23)
	[0.00]	[0.12]			[0.00]
D(LT)(-3))		-0.07			
		(-1.60)			
		[0.13]			
D(LNT)	-0.11	0.07**	0.09***	0.03	0.05
	(-0.65)	(2.14)	(3.13)	(1.53)	(1.37)
	[0.52]	[0.05]	[0.00]	[0.14]	[0.19]
D(LNT(-1))	0.06***	0.13**		-0.01	0.02
	(3.45)	(2.42)		(-0.45)	(0.49)
	[0.00]	[0.03]		[0.66]	[0.63]
D(LNT(-2))		0.14***		-0.03*	0.07*
		(2.99)		(-1.99)	(1.91)
		[0.01]		[0.06]	[0.07]
D(LNT(-3))		0.07**			0.08***
		(2.36)			(3.24)
		[0.03]			[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 2	**Indonesia (1,2,3,2,1,0,0)**	**Malaysia (4, 3, 4, 4, 1, 4, 4)**	**Philippines (1, 1, 1, 1, 0, 1, 0)**	**Singapore (1, 3, 1, 3, 0, 2, 3)**	**Thailand (2, 0, 3, 4, 4, 4, 3)**
D(LTD)	-0.05	0.03	0.02	0.00	0.16***
	(-0.81)	(0.91)	(0.30)	(0.55)	(3.59)
	[0.42]	[0.38]	[0.77]	[0.58]	[0.00]
D(LTD(-1))					-0.20***
					(-4.06)
					[0.00]
D(LTD(-2))					-0.20***
					(-3.53)
					[0.00]
D(LTD(-3))					-0.25***
					(-4.57)
					[0.00]
D(LHC)	0.02	0.29**	0.14	0.57***	-0.09***
	(0.46)	(2.23)	(0.80)	(3.61)	(-2.59)
	[0.65]	[0.04]	[0.43]	[0.00]	[0.02]
D(LHC(-1))		0.41***		0.43**	0.13***
		(3.56)		(2.73)	(3.71)
		[0.00]		[0.01]	[0.00]
D(LHC(-2))		0.18			0.12***
		(1.58)			(2.50)
		[0.13]			[0.02]
D(LHC(-3))		0.18			0.14***
		(1.64)			(3.59)
		[0.12]			[0.00]
D(LFDI)	0.03*	0.03**	0.00	0.02**	0.01
	(1.91)	(2.57)	(0.19)	(2.21)	(1.17)
	[0.07]	[0.02]	[0.85	[0.04]	[0.26
D(LFDI(-1))		-0.02**		0.00	-0.03***
		(-2.18)		(0.29)	(-3.91)
		[0.04]		[0.78]	[0.00]
D(LFDI(-2))		-0.01		-0.01	-0.01*
		(-1.28)		(-1.69)	(-1.74)
		[0.22]		[0.10]	[0.09]
D(LFDI(-3))		-0.01			
		(-1.58)			
		[0.13]			
D(DUM)	0.07***	-0.03*	0.01	-0.00	-0.06**
	(3.10)	(-1.84)	(0.46)	(-0.65)	(-2.41)
	[0.00]	[0.08]	[0.65]	[0.95]	[0.03]
D(TREND)				0.00*	
				(1.78)	
				[0.09]	
ECT $_{t-1}$	-0.31**	-0.44***	-0.38***	-0.35***	-0.97***
	(-2.39)	(-4.21)	(-4.85)	(-3.17)	(-5.19)
	[0.02]	[0.00]	[0.00]	[0.00]	[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 3	**Indonesia (1,0,0,0,0,0,0)**	**Malaysia (4, 4, 1, 0, 4, 4, 4)**	**Philippines (1, 1, 1, 1, 0, 0, 0)**	**Singapore (1, 0, 1, 0, 1, 0, 0)**	**Thailand (1, 1, 3, 0, 1, 0, 2)**
D(LGDPC(-1))		0.51**			
		(2.74)			
		[0.02]			
D(LGDPC(-2))		0.28			
		(1.57)			
		[0.14]			
D(LGDPC(-3))		0.72**			
		(2.69)			
		[0.02]			
D(LMS)	0.10***	0.01	0.05	0.09	-0.02*
	(3.82)	(0.18)	(1.18)	(1.59)	(-0.45)
	[0.00]	[0.86]	[0.25]	[0.12]	[0.66]
D(LMS(-1))		-0.07**			
		(-2.54)			
		[0.03]			
D(LMS(-2))		-0.06**			
		(-2.98)			
		[0.01]			
D(LMS(-3))		-0.10**			
		(-2.74)			
		[0.02]			
D(IR)	-0.00***	-0.02***	-0.00	-0.00	-0.00
	(-3.26)	(-5.65)	(-0.75)	(-0.60)	(-0.50)
	[0.00]	[0.00]	[0.46]	[0.55]	[0.62]
D(IR(-1))					0.01***
					(3.11)
					[0.00]
D(LCPI)	-0.14***	-0.13	-0.12*	0.03	-0.17***
	(-3.97)	(-0.61)	(-1.94)	(0.48)	(-3.60)
	[0.00]	[0.55]	[0.06]	[0.63]	[0.00]
D(LER)	0.03*	-0.14*	-0.05	-0.18	-0.31***
	(1.94)	(-2.14)	(-1.58)	(-1.55)	(-5.04)
	[0.06]	[0.05]	[0.12]	[0.13]	[0.00]
D(LER(-1))		-0.03			
		(-0.26)			
		[0.80]			
D(LER(-2))		-0.34**			
		(-2.71)			
		[0.02]			
D(LER(-3))		-0.15			
		(-1.17)			
		[0.26]			

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 3	**Indonesia (1,0,0,0,0,0,0)**	**Malaysia (4, 4, 1, 0, 4, 4,4)**	**Philippines (1, 1, 1, 1, 0, 0, 0)**	**Singapore (1, 0, 1, 0, 1, 0, 0)**	**Thailand (1, 1, 3, 0, 1, 0, 2)**
D(LHC)	-0.02	-0.06	0.08	0.01	-0.00
	(-0.74)	(-0.39)	(0.98)	(0.09)	(-0.05)
	[0.46]	[0.70]	[0.34]	[0.93]	[0.96]
D(LHC(-1))		0.14			
		(1.07)			
		[0.30]			
D(LHC(-2))		0.26*			
		(1.83)			
		[0.09]			
D(LHC(-3))		0.28*			
		(2.12)			
		[0.05]			
D(LFDI)	0.01	0.04***	-0.01	0.04***	0.02***
	(1.03)	(6.35)	(-1.46)	(3.32)	(3.20)
	[0.31]	[0.00]	[0.15]	[0.00]	[0.00]
D(LFDI(-1))		-0.03**			-0.01
		(-2.84)			(-1.66)
		[0.01]			[0.11]
D(LFDI(-2))		-0.01			
		(-0.97)			
		[0.35]			
D(LFDI(-3))		-0.03***			
		(-3.74)			
		[0.00]			
D(DUM)	-0.00	-0.07***	0.01	-0.01	0.02
	(-0.20)	(-3.99)	(0.54)	(-0.42)	(1.23)
	[0.84]	[0.00]	[0.59]	[0.68]	[0.23]
ECT_{t-1}	-0.35***	-0.67***	-0.14**	-0.27**	-0.44***
	(-3.17)	(-8.73)	(-2.57)	(-2.10)	(-6.30)
	[0.00]	[0.00]	[0.01]	[0.04]	[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 4	**Indonesia (2, 0, 2, 0, 0)**	**Malaysia (4, 4, 4, 1, 4)**	**Philippines (1, 0, 0, 1, 1)**	**Singapore (1, 3, 2, 3, 2)**	**Thailand (2, 0, 3, 1, 0)**
D(LGDPC(-1))	0.30**	0.15			-0.33**
	(2.67)	(0.85)			(-2.30)
	[0.01]	[0.40]			[0.03]
D(LGDPC(-2))		0.01			
		(0.05)			
		[0.96]			
D(LGDPC(-3))		0.37**			
		(2.10)			
		[0.05]			
D(LTE)	-0.06	-0.06	-0.04*	-0.08**	-0.04**
	(-1.49)	(-1.00)	(-1.84)	(-2.42)	(-2.39)
	[0.15]	[0.33]	[0.07]	[0.02]	[0.02]
D(LTE(-1))		-0.15**		0.04	
		(-2.12)		(1.27)	
		[0.05]		[0.22]	
D(LTE(-2))		-0.22***		0.10***	
		(-3.51)		(3.15)	
		[0.00]		[0.00]	
D(LTE(-3))		-0.16**			
		(-2.30)			
		[0.03]			
D(LT)	0.04	0.09*	0.03*	0.27***	0.22***
	(1.30)	(1.95)	(1.91)	(6.48)	(6.07)
	[0.20]	[0.06]	[0.06]	[0.00]	[0.00]
D(LT(-1))	-0.05**	0.07		-0.07	0.09***
	(-2.34)	(1.12)		(-1.68)	(3.00)
	[0.03]	[0.28]		[0.10]	[0.01]
D(LT(-2))		0.12**			0.09***
		(2.03)			(3.35)
		[0.05]			[0.00]
D(LT(-3))		0.13**			
		(2.46)			
		[0.02]			
DLMS	0.11**	0.09***	0.10***	-0.11	-0.05
	(2.27)	(2.98)	(3.63)	(-1.65)	(-1.12)
	[0.03]	[0.01]	[0.00]	[0.11]	[0.27]
D(LMS(-1))				-0.11*	
				(-1.75)	
				[0.09]	
D(LMS(-2))				-0.14*	
				(-2.10)	
				[0.04]	
DIR	-0.00**	-0.01**	-0.00***	0.01***	-0.01***
	(-2.85)	(-2.04)	(-3.95)	(3.97)	(-4.38)
	[0.01]	[0.05]	[0.00]	[0.00]	[0.00]
DIR(-1)		-0.00		0.00	
		(-1.36)		(1.89)	
		[0.19]		[0.07]	
DIR(-2)		-0.01			
		(-1.63)			
		[0.12]			
DIR(-3)		-0.01***			
		(-3.60)			
		[0.00]			

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 4	**Indonesia (2, 0, 2, 0, 0)**	**Malaysia (4, 4, 4, 1, 4)**	**Philippines (1, 0, 0, 1, 1)**	**Singapore (1, 3, 2, 3, 2)**	**Thailand (2, 0, 3, 1, 0)**
DDUM	0.01	-0.03	0.02	-0.01	0.02
	(0.86)	(-1.50)	(1.53)	(-0.62)	(1.36)
	[0.40]	[0.15]	[0.13]	[0.54]	[0.19]
ECT_{t-1}	-0.37**	-0.09**	-0.09**	-0.30**	-0.20***
	(2.24)	(-2.64)	(-2.69)	(-2.45)	(-3.86)
	[0.03]	[0.02]	[0.01]	[0.02]	[0.00]
Model 5	**Indonesia (2, 4, 0, 3, 0)**	**Malaysia (4, 1, 4, 4, 0)**	**Philippines (5, 0, 6, 6, 6)**	**Singapore (3, 0, 1, 0, 4)**	**Thailand (2, 0, 0, 0, 4)**
dLGDPC1	0.19	0.27*	-0.74***	0.091	0.24*
	(1.60)	(1.81)	(-5.11)	(0.68)	(1.84)
	[0.12]	[0.08]	[0.00]	[0.51]	[0.08]
dLGDPC2		-0.37**	0.06	-0.36**	
		(-2.29)	(0.51)	(-2.94)	
		[0.03]	[0.62]	[0.02]	
dLGDPC3		0.37**	0.03		
		(2.42)	(0.23)		
		[0.02]	[0.82]		
dLGDPC4			0.42***		
			(2.55)		
			[0.03]		
dLMS	0.05*	0.13***	0.04***	0.22**	0.07***
	(1.95)	(4.15)	(3.59)	(2.94)	(5.09)
	[0.06]	[0.00]	[0.00]	[0.01]	[0.00]
dLMS1	0.04			0.22**	
	(1.45)			(2.94)	
	[0.16]			[0.01]	
dLMS2	-0.02				
	(-0.79)				
	[0.44]				
dLMS3	0.06***				
	(3.31)				
	[0.00]				
dIR	-0.00***	-0.00	-0.01***	0.01***	-0.00**
	(-4.25)	(-1.17)	(-3.59)	(3.47)	(-2.33)
	[0.00]	[0.25]	[0.00]	[0.00]	[0.03]
dIR1		-0.00	0.01		
		(-0.33)	(1.73)		
		[0.75]	[0.11]		
dIR2		-0.00	-0.00		
		(-0.12)	(-0.95)		
		[0.91]	[0.36]		
dIR3		-0.01***	-0.01		
		(-3.28)	(-1.65)		
		[0.00]	[0.12]		
dIR4			-0.00		
			(-1.14)		
			[0.27]		

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 5	**Indonesia (2, 4, 0, 3, 0)**	**Malaysia (4, 1, 4, 4, 0)**	**Philippines (5, 0, 6, 6, 6)**	**Singapore (3, 0, 1, 0, 4)**	**Thailand (2, 0, 0, 0, 4)**
dIR5			-0.01***		
			(-3.82)		
			[0.00]		
dLITD	0.05**	0.19**	0.01	0.02**	0.02
	(2.35)	(2.58)	(0.83)	(2.27)	(1.36)
	[0.03]	[0.02]	[0.64]	[0.03]	[0.18]
dLITD1	0.04	0.28**	0.35***		
	(1.53)	(2.27)	(5.11)		
	[0.14]	[0.03]	[0.00]		
dLITD2	0.06***	0.41**	0.27***		
	(2.96)	(3.98)	(3.40)		
	[0.01]	[0.00]	[0.00]		
dLITD3		0.18**	0.15**		
		(2.38)	(2.41)		
		[0.03]	[0.03]		
dLITD4			0.12*		
			(1.91)		
			[0.08]		
dLITD5			-0.08*		
			(-1.80)		
			[0.09]		
dLTD	0.05*	0.01	-0.06	-0.04***	0.11***
	(1.98)	(0.20)	(-0.79)	(-3.89)	(2.99)
	[0.06]	[0.85]	[0.45]	[0.00]	[0.01]
dLTD1			0.11**	-0.02	0.01
			(2.80)	(-1.24)	(0.20)
			[0.01]	[0.22]	[0.84]
dLTD2			0.05	-0.03**	-0.06
			(0.95)	(-2.39)	(-1.30)
			[0.36]	[0.02]	[0.20]
dLTD3			0.16***	-0.03**	-0.08*
			(3.95)	(-2.47)	(-1.77)
			[0.00]	[0.02]	[0.09]
dLTD4			0.13**		
			(2.70)		
			[0.02]		
dLTD5			-0.13**		
			(-2.55)		
			[0.02]		
dDUM	-0.01	-0.10***	0.02	-0.01	0.01
	(-0.32)	(-4.00)	(0.98)	(-0.40)	(0.41)
	[0.75]	[0.00]	[0.34]	[0.69]	[0.68]
ECT_{t-1}	-0.22**	-0.18***	-0.14**	-0.51**	-0.23***
	(-2.25)	(-3.21)	(-2.18)	(-2.86)	(-4.67)
	[0.03]	[0.00]	[0.05]	[0.01]	[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 6	**Indonesia (5, 6, 6, 5, 0)**	**Malaysia (4, 1, 4, 4, 3)**	**Philippines (5, 5, 6, 5, 1)**	**Singapore (3, 0, 2, 1, 2)**	**Thailand (1, 0, 3, 3, 0)**
dLGDPC1	0.46**	0.36**	-0.27	-0.24	
	(2.20)	(2.40)	(-1.48)	(-1.53)	
	[0.04]	[0.03]	[0.16]	[0.14]	
dLGDPC2	-0.37*	-0.06	0.21	-0.48***	
	(-1.81)	(-0.28)	(1.58)	(-3.61)	
	[0.09]	[0.78]	[0.22]	[0.00]	
dLGDPC3	0.37*	0.41**	0.12		
	(1.96)	(2.81)	(0.79)		
	[0.07]	[0.01]	[0.44]		
dLGDPC4	-0.53**		0.35*		
	(-2.74)		(1.96)		
	[0.02]		[0.07]		
dLMS	0.13***	0.12***	0.02	0.21***	0.14***
	(3.17)	(3.41)	(0.59)	(4.12)	(5.10)
	[0.01]	[0.00]	[0.56]	[0.00]	[0.00]
dLMS1	-0.06		-0.01		
	(-1.40)		(-0.35)		
	[0.18]		[0.74]		
dLMS2	-0.07		-0.09**		
	(-1.75)		(-2.57)		
	[0.10]		[0.02]		
dLMS3	0.11***		-0.08**		
	(3.82)		(-2.39)		
	[0.00]		[0.03]		
dLMS4	-0.02		-0.05		
	(-0.74)		(-1.41)		
	[0.47]		[0.18]		
dLMS5	0.07**				
	(2.62)				
	[0.02]				
dIR	-0.00*	-0.01**	-0.00	0.01**	-0.01***
	(-2.02)	(-2.12)	(-0.59)	(2.81)	(-3.01)
	[0.06]	[0.04]	[0.56]	[0.01]	[0.01]
dIR1	-0.00	-0.00	-0.00	0.01**	0.01**
	(-0.22)	(-0.37)	(-1.05)	(2.02)	(2.70)
	[0.83]	[0.72]	[0.31]	[0.05]	[0.01]
dIR2	-0.00*	-0.00	-0.01**		0.00**
	(-1.77)	(-0.80)	(-2.15)		(2.60)
	[0.09]	[0.43]	[0.05]		[0.01]
dIR3	0.00	-0.01***	-0.01*		
	(0.97)	(-3.26)	(-1.76)		
	[0.35]	[0.00]	[0.09]		
dIR4	-0.00**		-0.01**		
	(-2.28)		(-2.23)		
	[0.04]		[0.04]		
dIR5	-0.00*		-0.00**		
	(-1.77)		(-2.85)		
	[0.09]		[0.01]		

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

Table 4.7 …Continue

Short Run Elasticity (ASEAN-5)

Model 6	**Indonesia (5, 6, 6, 5, 0)**	**Malaysia (4, 1, 4, 4, 3)**	**Philippines (5, 5, 6, 5, 1)**	**Singapore (3, 0, 2, 1, 2)**	**Thailand (1, 0, 3, 3, 0)**
dLTEI	0.06**	0.15*	-0.01	0.03**	-0.02
	(2.10)	(1.86)	(-0.26)	(2.14)	(-0.79)
	[0.05]	[0.08]	[0.80]	[0.04]	[0.44]
dLTEI1	0.17*	0.14	0.22**		0.05**
	(1.80)	(1.21)	(2.94)		(2.27)
	[0.09]	[0.24]	[0.01]		[0.03]
dLTEI2	0.16**	0.29**	0.12		0.05**
	(2.17)	(2.97)	(1.43)		(2.66)
	[0.05]	[0.01]	[0.17]		[0.01]
dLTEI3	0.05	0.14**	0.11		
	(1.02)	(2.00)	(1.55)		
	[0.32]	[0.06]	[0.14]		
dLTEI4	0.07**		0.08		
	(2.53)		(1.24)		
	[0.02]		[0.24]		
dLTE	-0.02	0.03	0.10*	-0.03	0.04
	(-1.20)	(0.69)	(1.94)	(-0.78)	(1.59)
	[0.25]	[0.50]	[0.07]	[0.44]	[0.12]
dLTE1		-0.01		0.06	
		(-0.11)		(1.49)	
		[0.91]		[0.15]	
dLTE2		-0.13**			
		(-2.61)			
		[0.02]			
dDUM		-0.10***	-0.01	0.00	0.00
		(-4.39)	(-0.35)	(0.08)	(0.03)
		[0.00]	[0.67]	[0.94]	[0.98]
ECT $_{t-1}$	-0.54**	-0.23***	-0.36***	-0.45***	-0.20***
	(-2.62)	(-4.56)	(-3.44)	(-3.40)	(-3.20)
	[0.02]	[0.00]	[0.00]	[0.00]	[0.00]

Note: ***, **, * represent 1%, 5% and 10% significant level, respectively. P-value in [ ] and t-statistics in ( ).

In Model 1, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and fiscal policy. The speed of adjustment that will correct annually after the shock the quickest is Malaysia, followed by Indonesia, Philippines, Thailand, and the slowest in Singapore respectively by 80%, 36%, 34%, 23% and 17%. In the short-run of Model 1, the proportion of change in growth explained with tax by 22% and 20% in Malaysia and Thailand, respectively, debt by 18% and 11% in the Philippines and Indonesia, respectively, and human capital by 13% in Singapore.

In the short run, government expenditure impact on growth in Singapore, Malaysia, and Thailand. 1% decrease in government spending will increase the growth in the

present period by 11%. While, the lagged coefficients of expenditure will positively affect growth in the first and second succeeding years in Malaysia, positively in the first year in Thailand. In the short run, the tax impact on growth is relatively higher in Thailand, Malaysia, Philippines, and Indonesia. 1% increase in the tax will increase the growth in the present period by 22% in Thailand, 20% in Malaysia, by 14% in the Philippines and by 10% in Indonesia. The lagged coefficients of tax will positively affect growth in the second years in Indonesia, positively in the first year in the Philippines. In the short run, debt impact on growth is higher in Philippines and Indonesia but the least in Singapore. Debt has the direct implications in the short term only in Indonesia and Philippines. 1% increase in the debt will increase the growth in the present period by 11% in Indonesia but decrease growth by 18% and 1% respectively in Philippines and Singapore.

In the short run, human capital impact on growth in Singapore, Malaysia, and Thailand. 1% increase in the human capital will increase the growth in the present period by 13% in Singapore. The lagged coefficients of human capital will positively affect growth in the first years in Malaysia, negatively in the second year in Thailand. In the short run, foreign direct investment impact on growth Singapore, Indonesia, Malaysia, and Thailand. 1% increase in the foreign direct investment will increase the growth in the present period by 4% and 3% respectively in Singapore and Indonesia. The lagged coefficients of foreign direct investment will negatively affect growth in the third years in Malaysia, negatively in the first and second year in Thailand.

In Model 2, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and fiscal policy with the inclusion of non-

tax. The error correction term is coming out negative and significant at 1% level of significant for Malaysia, Philippines, Thailand, and Singapore while 5% level of significant for Indonesia. The speed of adjustment that will correct aftershock annually the quickest in Thailand, followed by Malaysia, Philippines, Singapore, and the slowest in Indonesia, respectively by 97%, 44%, 38%, 35% and 31%. Crisis represented by dummy significant by 1%, 5%, and 10% level of significant respectively in Indonesia, Thailand, and Malaysia. In the short-run, the proportion of change in growth majorly described with human capital by 57% and 29% in Singapore and Malaysia, respectively, government expenditure by 18% and 11% in Thailand and Philippines, respectively, and with tax by 11% in Indonesia.

In the short run government expenditure impact on growth in Singapore, Thailand, Philippines and Indonesia. Government spending has the most impact on Singapore, follow by Thailand and Philippines. 1% increase in the expenditure will increase the growth in the present period in Thailand and Philippines respectively, by 18% and 11%. However, 1% increase in the spending decreased growth in the current fiscal year by 15% in Singapore. The lagged coefficients of spending will negatively affect growth in the first year in Indonesia, but positively in the second year in Singapore. In the short run, tax impact on growth the greatest in Singapore, followed by Malaysia, Indonesia, and Thailand. 1% increase in the tax will increase the growth in the present period in Singapore, Malaysia, Indonesia, and Thailand respectively by 24%, 12%, 11% and 9%. The lagged coefficients of the tax will positively affect growth in the first and second years in Indonesia, and positively in the first and second year in Thailand.

Non-tax impact on growth in the short run in Philippines, Malaysia, Indonesia, and Thailand. In the short term, non-tax impact on growth the greatest in the Philippines followed by Malaysia. 1% increase in the non-tax will increase the growth in the present period in Philippines and Malaysia respectively by 9% and 7%. The lagged coefficients of non-tax will positively affect growth in the first, second and third year in Malaysia, positively in the first year in Indonesia, positively in the second, third year in Thailand, however negatively in the second year in Singapore. In the short run, debt impact on growth in Thailand. 1 % increase in the debt will increase the growth in the present period by 16% in Thailand. The lagged coefficients of debt will negatively affect growth in the first, second and third year in Thailand.

In the short run, human capital impact on growth the greatest in Singapore follow by Malaysia and Thailand. 1 % increase in the human capital will increase the growth in the present period in Singapore and Malaysia respectively by 57% and 29%. However, 1 % increase in the human capital will decrease the growth in the current fiscal year in Thailand by 9%. The lagged coefficients of human capital will positively affect growth in the first years in Malaysia, positively in the first, second and third year in Thailand, and positively in the first year in Singapore. In the short run, foreign direct investment impact on growth the utmost both in Indonesia and Malaysia follow by Singapore. 1 % increase in the foreign direct investment will increase the growth in the present period in Indonesia, Malaysia, and Singapore respectively, by 3%, 3%, and 2%. The lagged coefficients of foreign direct investment will negatively affect growth in the first year in Malaysia, negatively in the first and second year in Thailand.

In Model 3, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and monetary policy. The error correction term is coming out negative and significant at 1% level of significant for Malaysia, Indonesia, and Thailand while 5% level of significant for Philippines and Singapore. The speed of adjustment that will correct annually after the shock is quickest in Malaysia, Thailand, Indonesia, Singapore, and slowest in the Philippines respectively by 67%, 44%, 35%, 27% and 14%. Crisis represented by dummy is significant by 1% level of significant in Malaysia. The proportion of change in growth explained with exchange rate by 31% and 14% in Thailand and Malaysia, respectively, inflation by 14% and 12% in Indonesia and the Philippines respectively, and foreign direct investment by 4% in Singapore.

In the short run money supply impact on growth in Indonesia. 1% increase in the money supply will increase the growth in the present period in Indonesia by 10%. The lagged coefficients of the money supply will negatively affect growth in the first, second and third years in Malaysia. Interest rate impact on growth mostly in Malaysia follows by Indonesia in the short run. 1% increase in the interest rate will increase on growth in Malaysia and Indonesia respectively by 2% and 0.2%. The lagged coefficients of interest rate positively affect growth in the first and second years in Thailand. Inflation impact on growth mostly in Thailand, follow by Indonesia and Philippines. 1% increase in the inflation will decrease on growth in Thailand, Indonesia, Philippines by 17%, 14%, and 12%.

Exchange rate impact on growth mostly in Thailand follows by Malaysia and Indonesia. 1% increase in the exchange rate will decrease on growth in Thailand and

Malaysia respectively by 14% and 31%. However, 1% increase in the exchange rate will increase on growth in Indonesia by 3%. The lagged coefficients of the exchange rate will negatively affect growth for the second year in Malaysia. The lagged coefficients of human capital will positively impact growth in the second and third years in Malaysia. Foreign direct investment impact on growth mostly in Malaysia and Singapore and the least in Thailand. 1% increase in the foreign direct investment will decrease on growth in Malaysia, Singapore, and Thailand respectively by 4%, 4%, and 2%. The lagged coefficients of foreign direct investment will negatively affect growth in the first and third year in Malaysia.

In Model 4, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and relative effectiveness of fiscal and monetary policies. The error correction term is coming out negative and significant 1% level of significant for Thailand and Singapore while 5% level of significant for Malaysia, Indonesia, and the Philippines. The speed of adjustment that will correct annually after the shock is quickest in Indonesia, follow by Singapore, Thailand and slowest in Malaysia and Philippines respectively, by 37%, 30%, 20%, 9% and 9%. Crisis represented by dummy not significant in the short run in Asean-5 countries. The main proportion of change in growth explained with tax by 27%, 22%, and 9% in Singapore, Thailand, and Malaysia, respectively, and money supply by 11% and 10% in Indonesia and the Philippines, respectively.

In short-run, expenditure impact on growth in Philippines and Thailand. 1% increase in the expenditure will decrease on growth both in Philippines and Thailand by 4%. The lagged coefficients of expenditure will negatively affect growth in the first, second

and third year in Malaysia, but positively in Singapore in the second year. In short-run, the tax impact on growth mostly in Singapore, follow by Thailand, Malaysia and the least in the Philippines. 1% increase in the tax will increase on growth in Singapore, Thailand, Malaysia and the least in the Philippines respectively, by 27%, 22%, 9% and 3%. The lagged coefficients of tax will positively affect growth in the second and third year in Malaysia, negatively in Indonesia in the first year and positively in Thailand in the first and second year.

In short-run, money supply impact on growth typically in Indonesia and Philippines and the least in Malaysia. 1% increase in the money supply will increase on growth both in Indonesia and Philippines by 11% and Malaysia by 9%. The lagged coefficients of the money supply will negatively affect growth in the first year in Singapore. In short-run, interest rate impact on growth mostly in Singapore, followed by Malaysia, Thailand, Philippines and the least Indonesia. 1% increase in the interest rate will decrease on growth in Malaysia by 0.6%, Thailand by 0.5%, the Philippines by 0.4%, and Indonesia by 0.2%. However, 1% increase in the interest rate will increase on growth Singapore by 0.8%. The lagged coefficients of interest rate will negatively affect growth for the third year in Malaysia.

In Model 5, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and interest rate with debt. The error correction term is negative and significant at 1% level of significant for Malaysia, Thailand, and Singapore while 5% level of significant for Indonesia and Philippines. The speed of adjustment that will correct annually after the shock the quickest in Singapore, follow by Thailand, Indonesia, Malaysia, and slowest in the Philippines

respectively by 51%, 23%, 22%, 18% and 14%. Crisis represented by dummy is significant by 1% level of significance in the short run in Malaysia only. The large proportion of change in growth explained with the interaction of interest rate and debt by 19% in Malaysia, money supply by 22%, 5%, 4% in Singapore, Indonesia, and the Philippines respectively, and debt by 11% in Thailand.

Interaction of interest rate and debt impact on growth mostly in Malaysia follow by Indonesia and the least in Singapore. 1% increase in the interaction of interest rate and debt will increase the growth in the present period in will increase the growth in the current fiscal year in Malaysia, Indonesia, and Singapore respectively, by 19%, 5%, and 2%. The lagged coefficients of the interaction of interest rate and debt will positively affect growth in the first, second and third year in Malaysia, positively in the second year in Indonesia, positively in the first and subsequently to the fourth year but negatively in the fifth year in the Philippines.

Debt impact on growth mostly in Thailand, follow by Philippines, Indonesia and the lowest in Singapore. 1% increase in the debt will increase the growth in the present period in Thailand and Indonesia respectively by 11% and 5%. However, 1% increase in the debt will decrease the growth in the current time in the Philippines by 6% and Singapore by 4%. The lagged coefficients of debt will positively affect growth in the first year, third and fourth year in the Philippines but negatively in the fifth year, negatively in the third year in Thailand, negatively in the second and the third year in Singapore.

In the short run money supply impact on growth mostly in Singapore, Malaysia, Thailand, Indonesia and the lowest in the Philippines. 1% increase in the money supply will increase the growth in the present period in Singapore, Malaysia, Thailand, Indonesia and Philippines by 22%, 13%, 7%, 5% and 4%. The lagged coefficients of the money supply will positively affect growth in the third year of Indonesia. Interest rate impact on growth mostly in Philippines, Thailand, Indonesia, and the lowest in Singapore. 1% increase in the interest rate will decrease the growth in the present period in the Philippines by 0.5%, Thailand by 0.3% and Indonesia by 0.2%. However, 1% increase in the interest rate will increase the growth in the present period in Singapore by 0.1%. The lagged coefficients of interest rate will negatively affect growth for the third year in Malaysia, and negatively in the fifth year in the Philippines.

In Model 6, the negative sign of the ECM term confirms the expected convergence process in the long-run dynamics of growth and interest rate with government expenditure. The error correction term is coming out negative and significant at 1% level of significant for Malaysia, Philippines, Thailand, and Singapore while 5% level of significant for Indonesia. The speed of adjustment that will correct annually after the shock is the quickest in Indonesia, follow by Singapore, Philippines, Malaysia, and the lowest in Thailand respectively, by 54%, 45%, 36%, 23% and 20%. Crisis represented by dummy is significant by 1% level of significance in the short run in Malaysia only. The main proportion of change in growth explained with the interaction of interest rate with government expenditure by 15% in Malaysia, money supply by 21%, 14%, 13% in Singapore, Thailand, and Indonesia, respectively, and government spending by 10% in the Philippines.

Interaction of interest rate and government expenditure impact on growth mostly in Malaysia, follow by Indonesia and the least in Singapore. 1% increase in the interaction of interest rate and government expenditure will increase the growth in the present period in will increase the growth in the current fiscal year in Malaysia, Indonesia, and Singapore respectively, by 15%, 6%, and 3%. The lagged coefficients of the interaction of interest rate and expenditure will positively affect growth in the second and third year in Malaysia, positively in the first, second and fourth year in Indonesia, positively in the first year in the Philippines, positively in the first and the second year in Thailand. Government expenditure impact on growth in the Philippines only. 1% increase in the government spending will increase the growth in the present period in the Philippines by 10%. The lagged coefficients of expenditure will negatively affect growth for the second year in Malaysia.

In the short run money supply impact on growth mostly in Singapore, follow by Thailand, Indonesia and the lowest in Malaysia. 1% increase in the money supply will increase the growth in the present period in Singapore, Thailand, Indonesia and Malaysia respectively, by 21%, 14%, 13% and 12%. The lagged coefficients of the money supply will positively affect growth in the third year and fifth year in Indonesia, however, negatively in the second and third year in the Philippines.

Interest rate impact on growth in Malaysia, Thailand, and Singapore, and the lowest in Indonesia. 1% increase in the interest rate will decrease the growth in the present period in Malaysia, Thailand and Singapore and the lowest in Indonesia by 1%, 1%, 1%, and 0.2%. The lagged coefficients of interest rate will negatively affect growth for the third year in Malaysia, in the second year, fourth year and fifth year in

Indonesia. The lagged coefficients of interest rate also negatively affect growth in the second year and subsequently to the fifth year in the Philippines. However, in Thailand, the lagged coefficients of interest rate will positively affect growth in the first year and second year, and in Singapore in the first year.

4.4.4 Diagnostic Test

The diagnostic checks applied in ASEAN-5 countries for all the six Models in this study. All the Model of equation 1 to 6 passed the diagnostic tests and shown as in below Table 4.8.

Table 4.8
ARDL Diagnostic Test (ASEAN-5)

Model 1	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
A Serial Correlation	1.12	0.83	0.82	0.76	0.68
	(0.29)	(0.78)	(0.37)	(0.48)	(0.41)
B Functional Form	0.02	1.76	3.24	0.23	0.01
	(0.89)	(0.11)	(0.07)	(0.80)	(0.94)
C Normality	5.42	1.25	2.11	1.59	0.81
	(0.07)	(0.54)	(0.35)	(0.45)	(0.67)
D Heteroscedasticity	0.18	0.37	2.55	0.68	2.31
	(0.67)	(0.69)	(0.11)	(0.52)	(0.13)
Model 2	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
A Serial Correlation	2.21	3.18	0.08	0.07	1.30
	(0.14)	(0.11)	(0.78)	(0.80)	(0.25)
B Functional Form	0.27	1.02	0.00	3.46	11.57
	(0.61)	(0.34)	(0.96)	(0.08)	(0.00)
C Normality	24.69	1.98	0.54	1.87	1.46
	(0.00)	(0.37)	(0.76)	(0.39)	(0.48)
D Heteroscedasticity	0.20	2.65	0.77	0.05	2.12
	(0.66)	(0.11)	(0.38)	(0.83)	(0.15)
Model 3	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
A Serial Correlation	0.14	1.67	0.13	0.08	0.02
	(0.71)	(0.23)	(0.72)	(0.78)	(0.88)
B Functional Form	0.23	2.23	1.29	5.30	1.81
	(0.63)	(0.15)	(0.26)	(0.02)	(0.18)
C Normality	2.76	0.90	0.14	1.42	0.05
	(0.25)	(0.64)	(0.93)	(0.49)	(0.97)
D Heteroscedasticity	1.60	0.10	0.71	0.93	0.58
	(0.21)	(0.91)	(0.40)	(0.33)	(0.45)
Model 4	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
A Serial Correlation	0.11	2.75	0.07	0.00	1.70
	(0.74)	(0.08)	(0.79)	(0.97)	(0.20)
B Functional Form	0.33	0.53	0.80	0.36	0.25
	(0.57)	(0.48)	(0.38)	(0.56)	(0.62)
C Normality	1.77	0.36	0.45	0.50	1.97
	(0.22)	(0.85)	(0.80)	(0.78)	(0.37)
D Heteroscedasticity	0.04	0.05	0.68	0.09	0.57
	(0.84)	(0.82)	(0.42)	(0.77)	(0.5)
Model 5	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
A Serial Correlation	0.00	1.91	3.26	0.00	0.21
	(0.98)	(0.18)	(0.10)	(0.95)	(0.65)
B Functional Form	2.46	1.34	1.17	0.29	0.00
	(0.13)	(0.26)	(0.30)	(0.60)	(0.95)
C Normality	4.67	1.73	3.89	0.63	0.43
	(0.10)	(0.42)	(0.14)	(0.73)	(0.81)
D Heteroscedasticity	2.84	2.45	0.02	2.17	1.15
	(0.10)	(0.13)	(0.90)	(0.09)	(0.29)

Note: A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted value
C: Based on a test of skewness and kurtosis of residuals
D: Based on regression of squared residuals on squared fitted values

Table 4.8 …Continue

ARDL Diagnostic Test (ASEAN-5)

Model 6	Malaysia	Indonesia	Philippines	Thailand	Singapore
A Serial Correlation	3.72	2.52	0.21	0.44	0.10
	(0.07)	(0.14)	(0.65)	(0.51)	(0.75)
B Functional Form	0.86	0.52	0.12	0.01	0.07
	(0.37)	(0.48)	(0.92)	(0.92)	(0.80)
C Normality	0.96	0.18	0.34	1.79	1.42
	(0.62)	(0.91)	(0.84)	(0.41)	(0.49)
D Heteroscedasticity	0.23	0.61	0.98	0.17	3.84
	(0.63)	(0.45)	(0.33)	(0.68)	(0.06)

Note: A: Lagrange multiplier test of residual serial correlation
B: Ramsey's RESET test using the square of the fitted value
C: Based on a test of skewness and kurtosis of residuals
D: Based on regression of squared residuals on squared fitted values

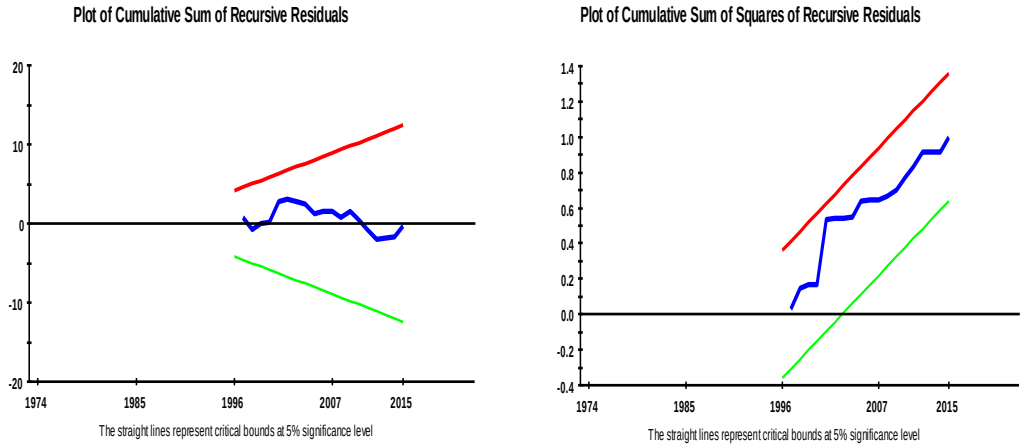
The error correction model indicates that there is no evidence of serial correlation, functional form, normality and heteroscedasticity tests. Here, we cannot reject the null hypothesis at the 95% of confidence level in the Breusch-Godfrey Serial Correlation LM Test, Ramsey Regression Equation Specification Error Test (RESET), Jarque-Bera normality test, and heteroskedasticity test ARCH.

4.4.5 Stability of Parameters

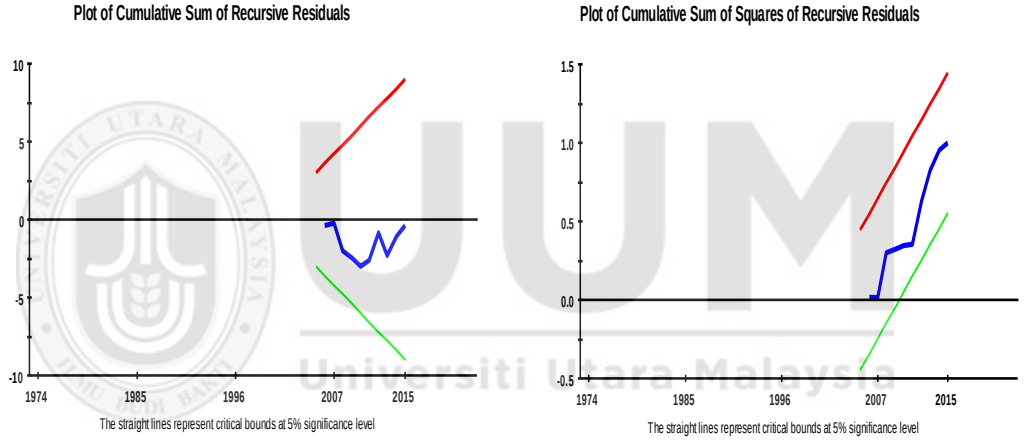
In the final stage, the stability of the long-run coefficients is examined using the CUSUM and CUSUM squares tests. According to Pesaran & Pesaran (1997), the stability of the estimated coefficients of the error correction model should be empirically investigated. Figure 4.1 is the graphical representation of CUSUM and CUSUMQ statistics. Following Bahmani-Oskooee (2011), the null hypothesis cannot be rejected if the plot of these statistics remains within the critical bound on the 5% significance level. In short, proving the regression equation specified correctly. The graphical presentation of these tests for Model 1 to Model 6 is in Figure 4.1 below.

Model 1

Indonesia



Malaysia



Philippines

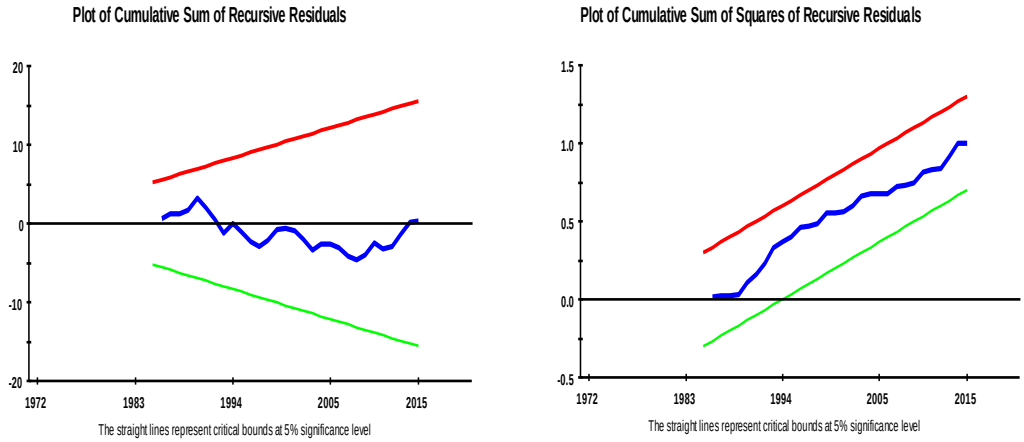
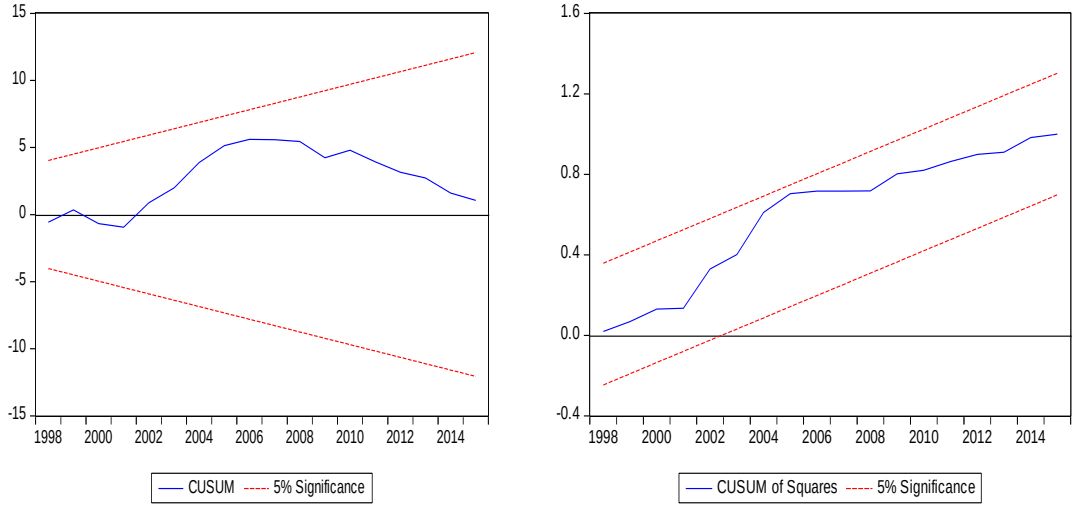
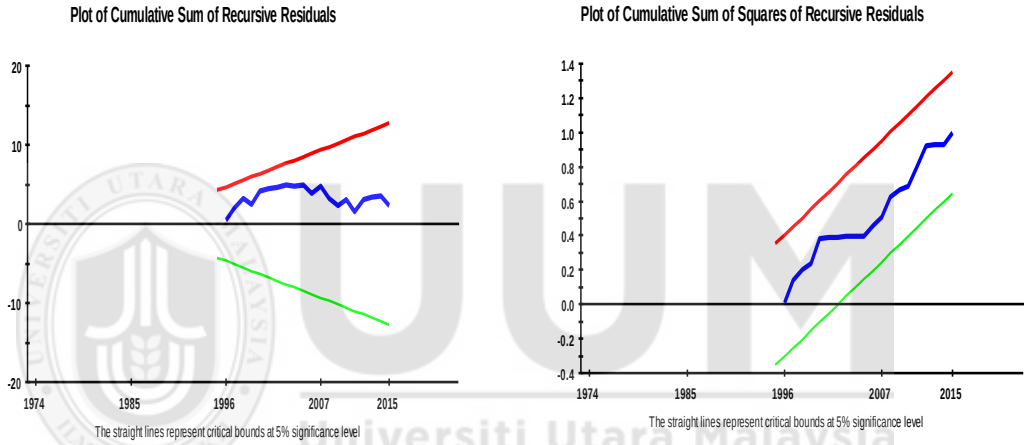


Figure 4.1
Plots of CUSUM and CUSUMQ statistics for coefficient stability tests

Singapore



Thailand



Model 2

Indonesia

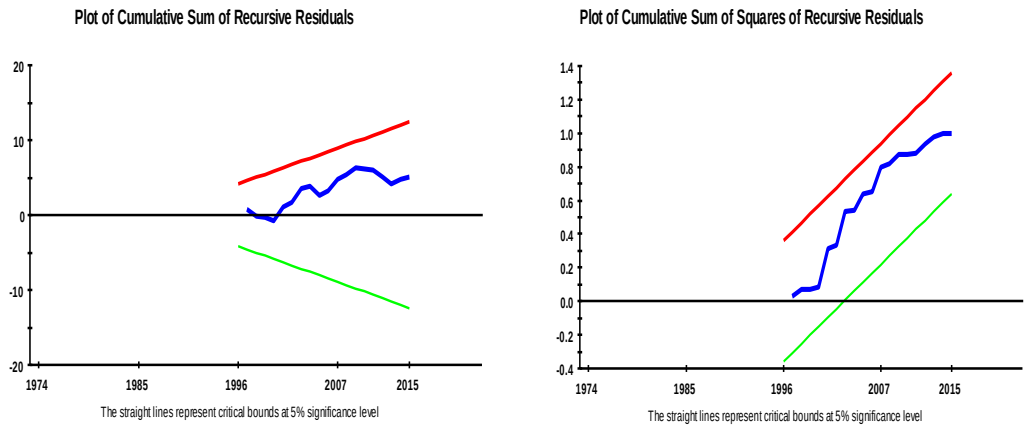
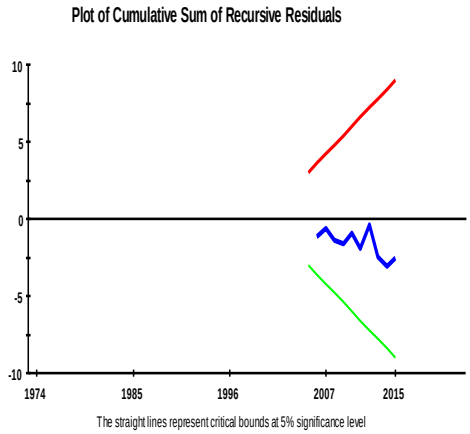
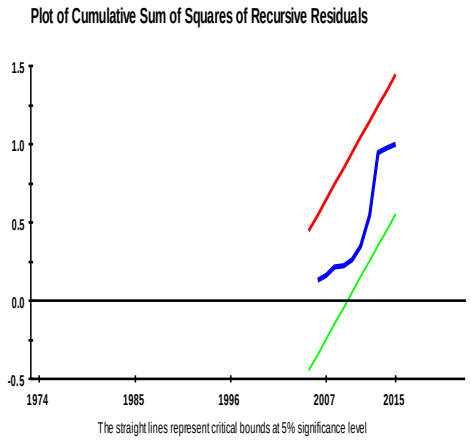


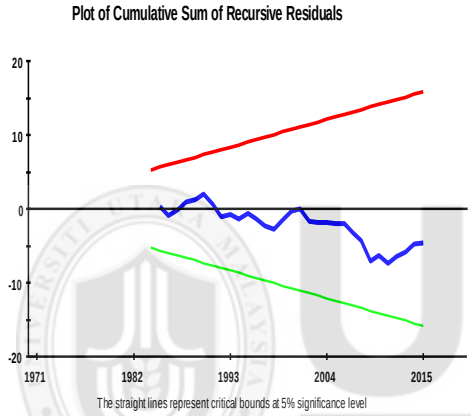
Figure 4. 1: …Continue

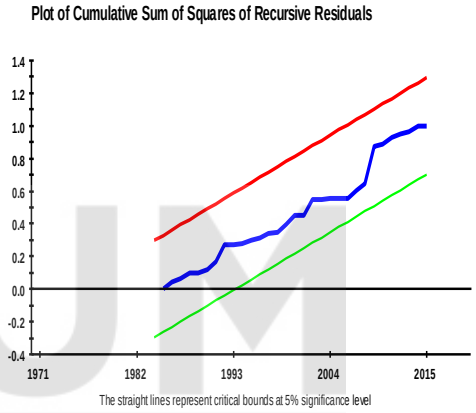
Malaysia



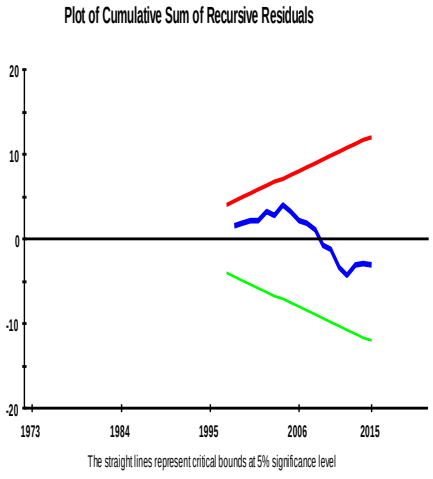


Philippines





Singapore



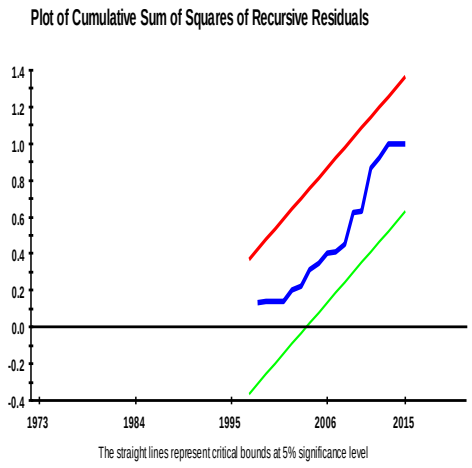
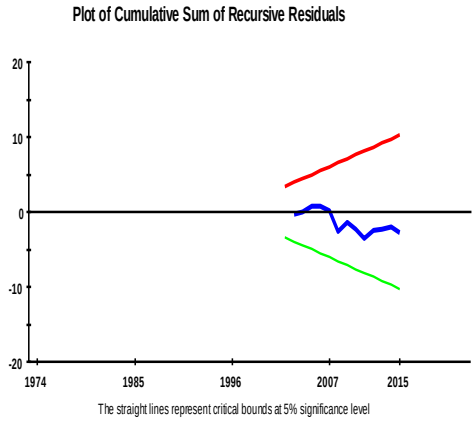
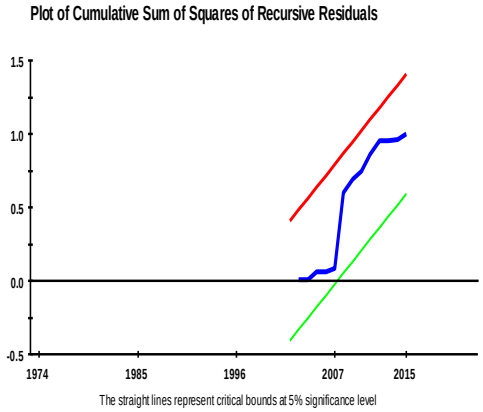


Figure 4. 1: …Continue

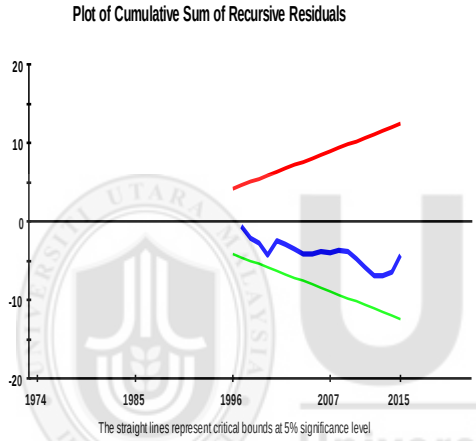
Thailand

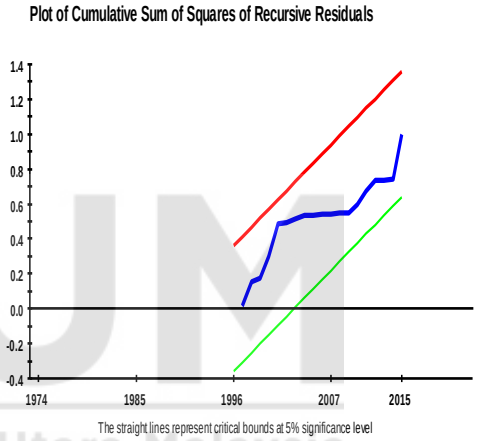




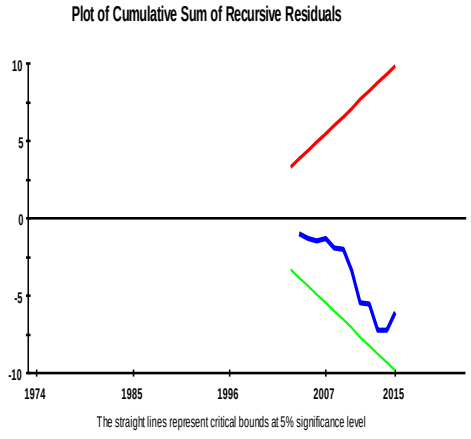
Model 3

Indonesia





Malaysia



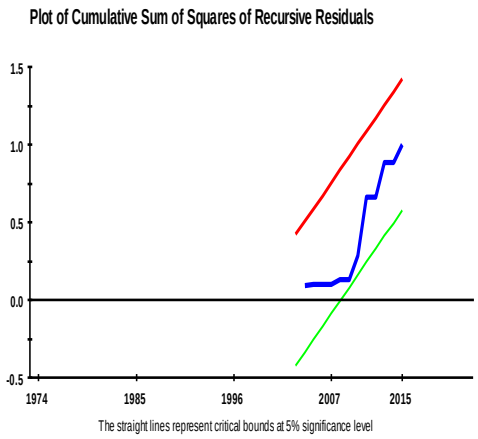
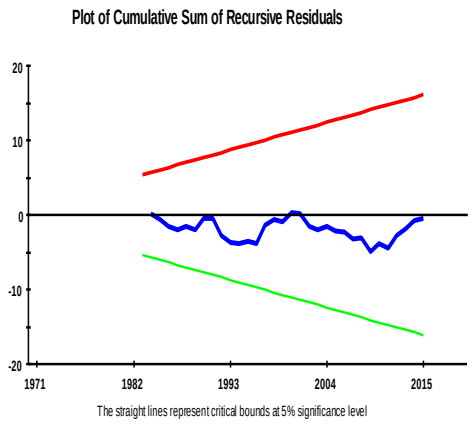
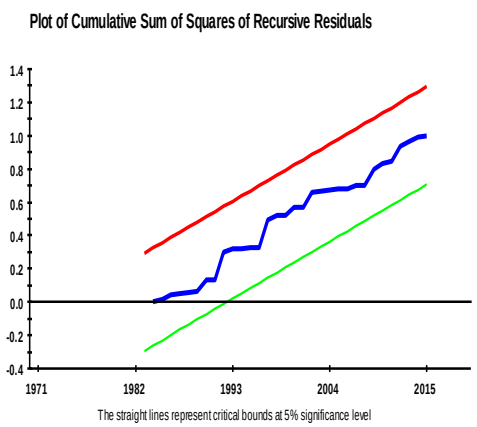


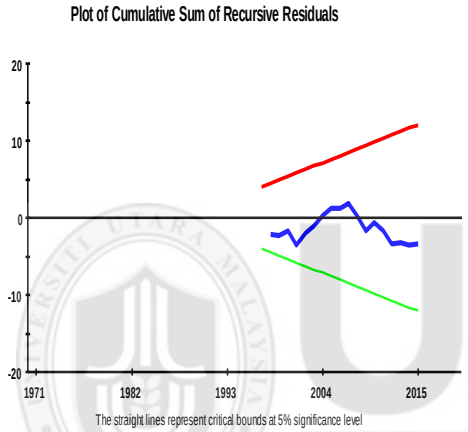
Figure 4. 1: …Continue

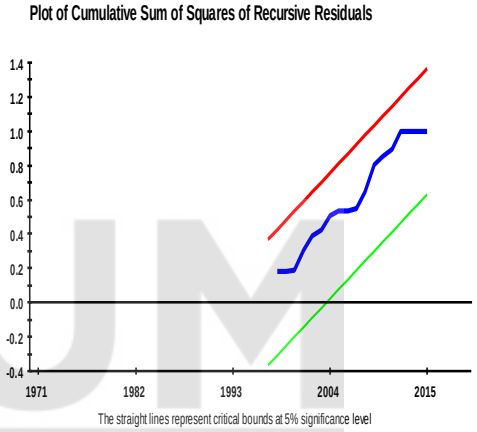
Philippines



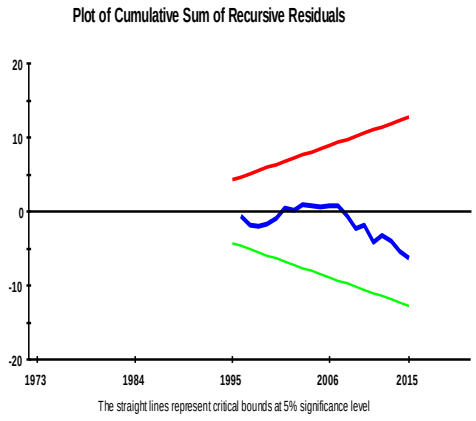


Singapore





Thailand



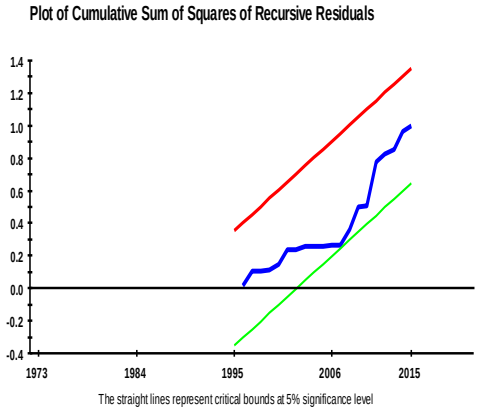
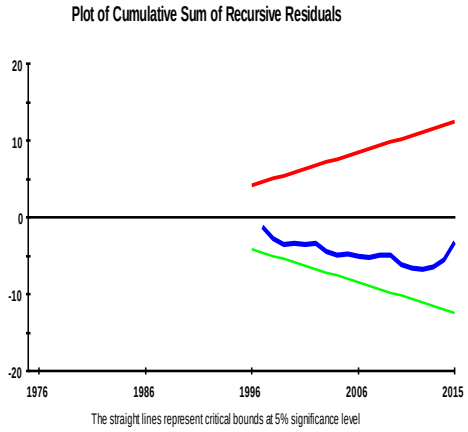
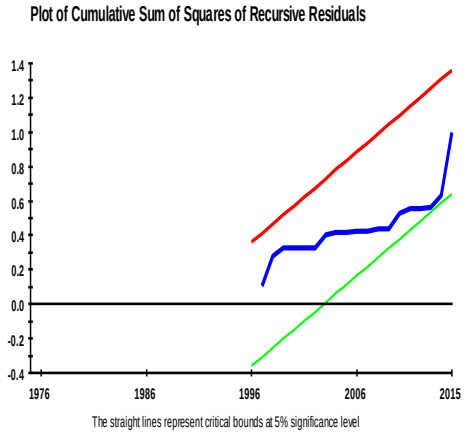


Figure 4. 1: …Continue

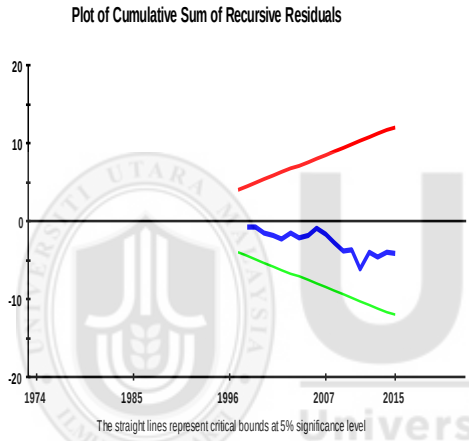
Model 4

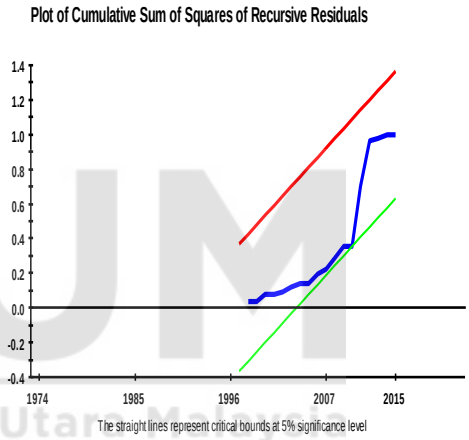
Indonesia



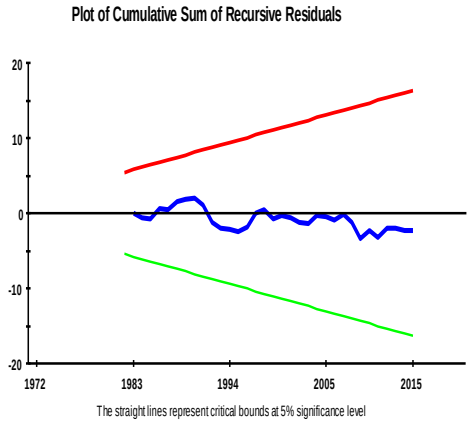


Malaysia





Philippines



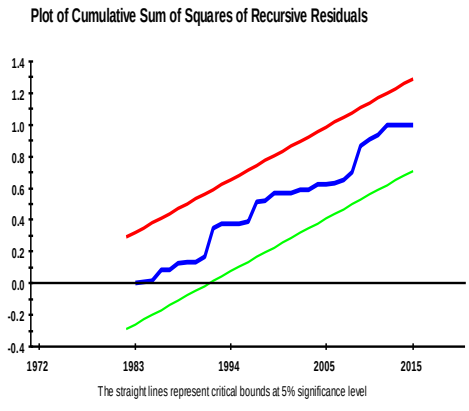
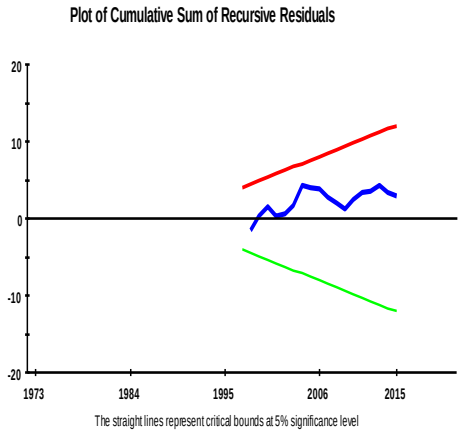
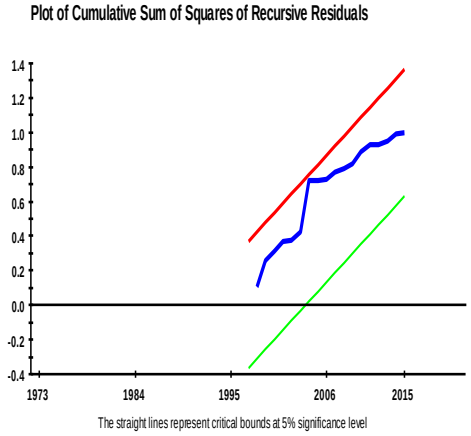


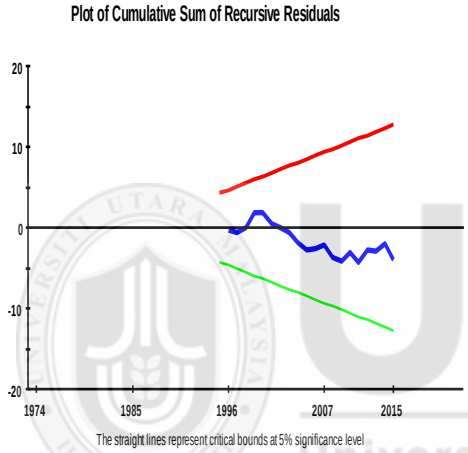
Figure 4. 1: …Continue

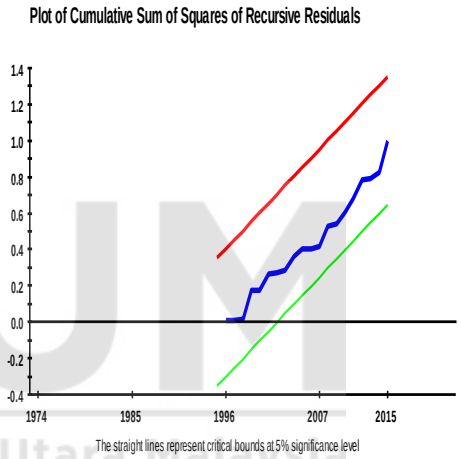
Singapore





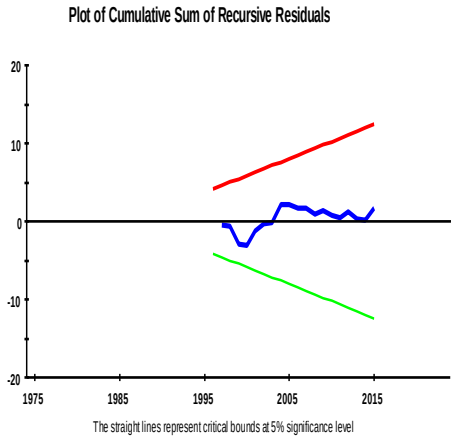
Thailand





Model 5

Indonesia



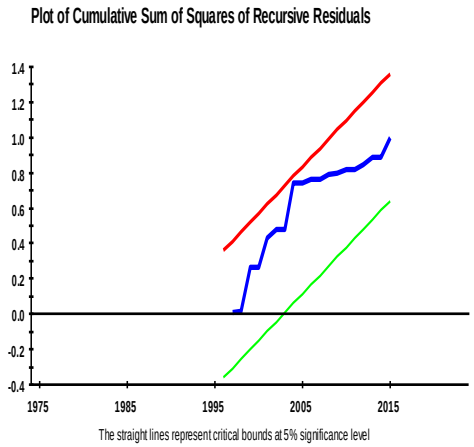
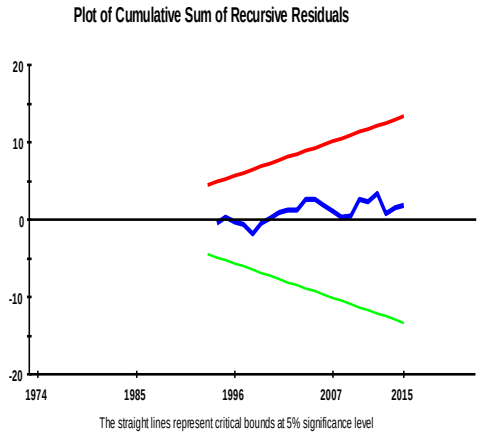
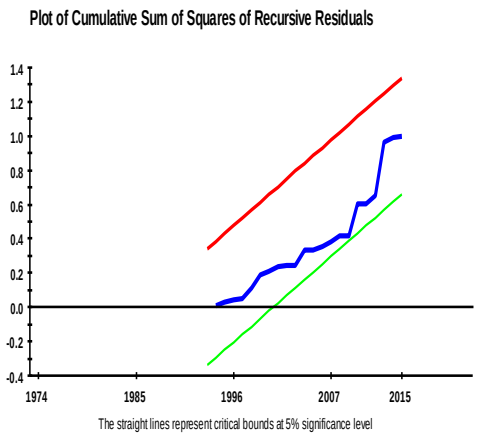


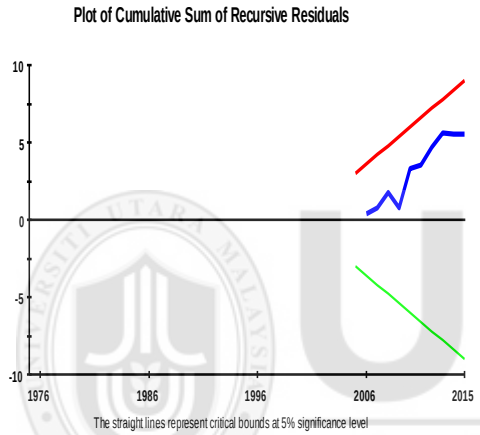
Figure 4. 1: …Continue

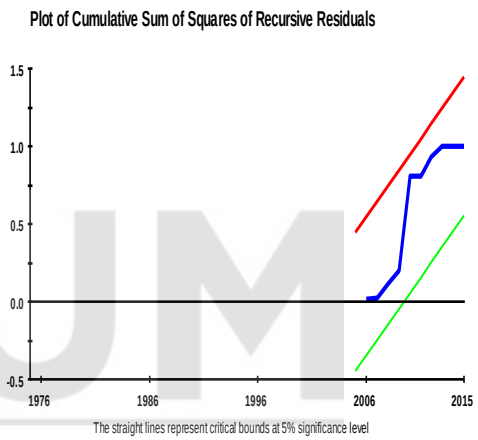
Malaysia



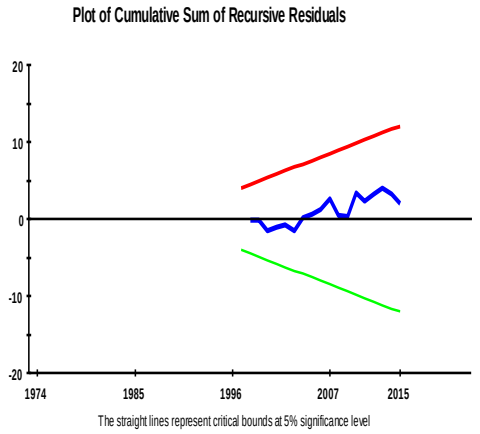


Philippines





Singapore



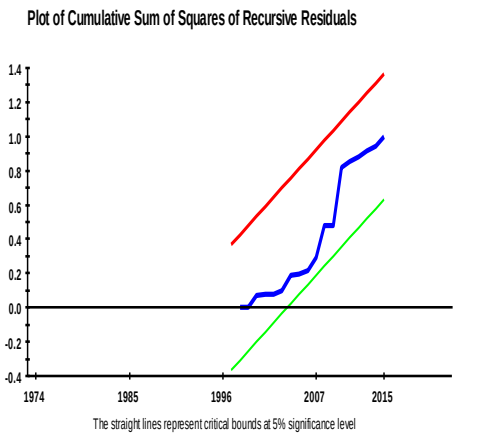
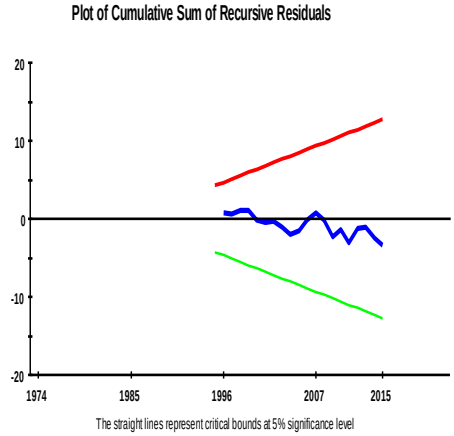
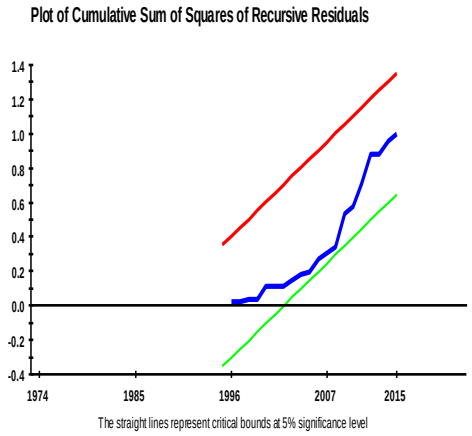


Figure 4. 1: …Continue

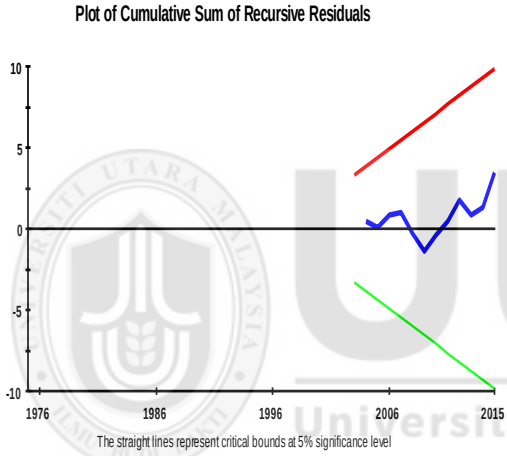
Thailand

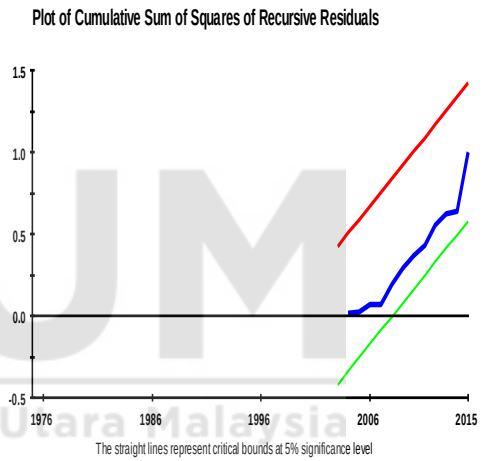




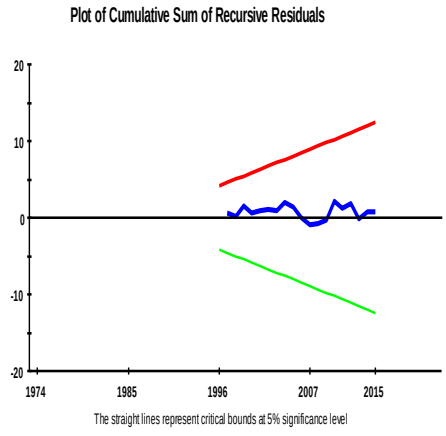
Model 6

Indonesia





Malaysia



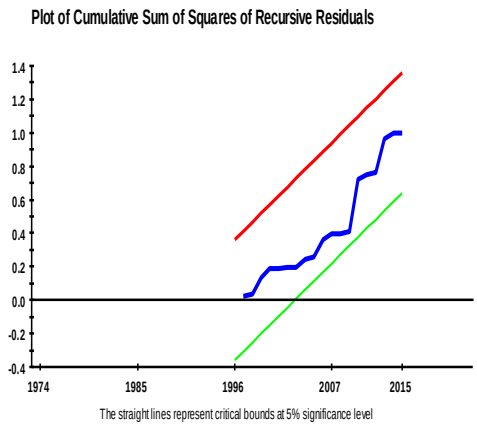
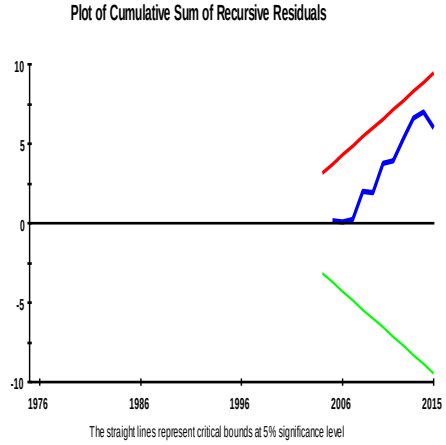
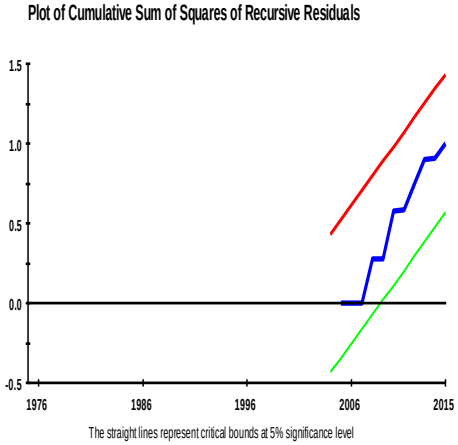


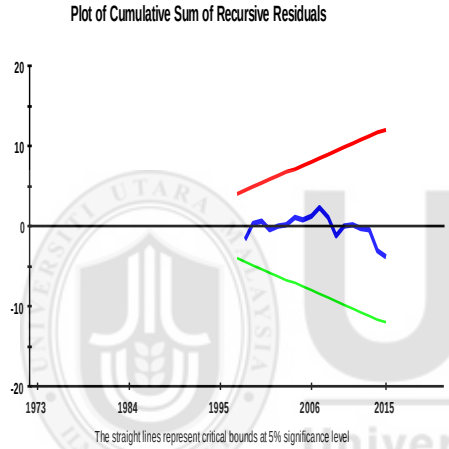
Figure 4. 1: …Continue

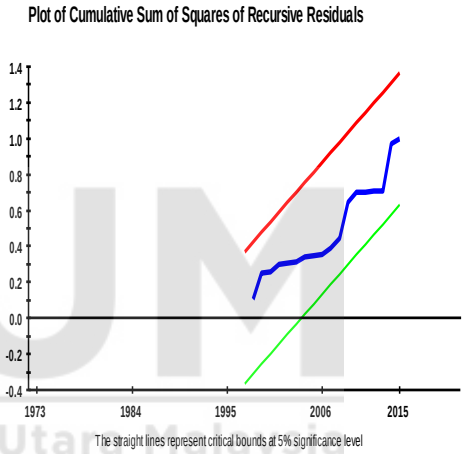
Philippines



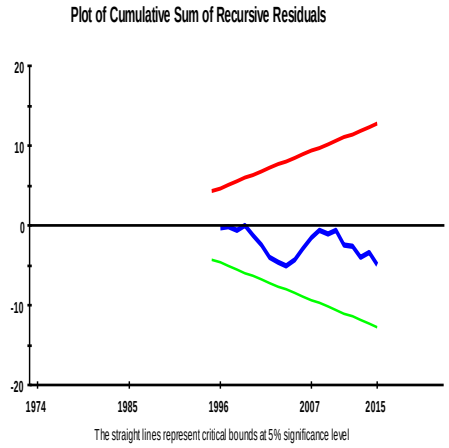


Singapore





Thailand



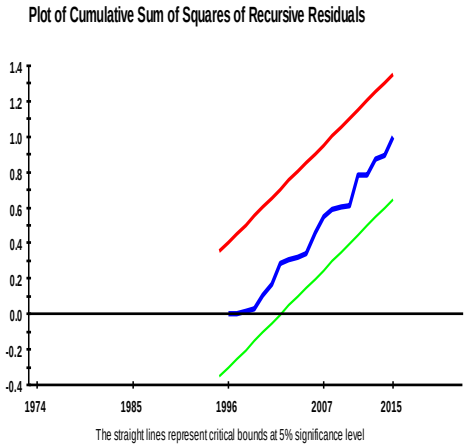


Figure 4. 1: …Continue

Since the plots of cumulative sum (CUSUM) and the cumulative sum of squares (CUSUM-Q) statistic are within the critical lines at the 5% significance level, the

growth functions for fiscal and monetary policies are stable. Hence, these statistics confirm the stability of the long-run coefficients of the growth function in Model 1 to Model 6. The plotted CUSUM and CUSUM-Q statistics lines stay within the critical bounds limits represented by a pair of extreme bounds straight lines, thus confirming the stability of Model 1 to 6 for ASEAN-5 countries respectively.

4.5 Estimation of Toda-Yamamoto Causality

The fourth objective is to investigate causality among the fundamentals of growth determination using dynamic Toda-Yamamoto with asymmetric causality in Table 4.9.

Table 4.9.i
Fiscal Policy Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
Series	**Model 1**					**Model 2**				
	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$GDPC \rightarrow TE$	2.97*	0.08	1.44	0.01	0.52	4.51**	0.03	5.24	0.02	0.27
	(0.09)	(0.77)	(0.23)	(0.92)	(0.92)	(0.03)	(0.86)	(0.16)	(0.88)	(0.97)
$GDPC \rightarrow T$	4.42**	0.01	0.33	1.69	1.54	2.84*	0.05	9.34**	1.15	3.51
	(0.04)	(0.92)	(0.57)	(0.19)	(0.67)	(0.09)	(0.83)	(0.03)	(0.28)	(0.32)
$GDPC \rightarrow NT$	-	-	-	-	-	1.41	0.48	8.82**	0.05	2.55
						(0.24)	(0.49)	(0.03)	(0.83)	(0.47)
$GDPC \rightarrow TD$	1.04	0.28	0.09	0.53	6.29	4.11**	0.12	2.85	0.00	7.39*
	(0.31)	(0.60)	(0.77)	(0.47)	(0.10)	(0.04)	(0.73)	(0.42)	(0.95)	(0.06)
$GDPC \rightarrow HC$	1.05	0.04	0.05	1.19	3.15	0.01	0.03	4.45	0.84	3.80
	(0.31)	(0.84)	(0.82)	(0.28)	(0.37)	(0.95)	(0.86)	(0.22)	(0.36)	(0.28)
$GDPC \rightarrow FDI$	0.88	0.70	2.57	1.04	0.37	0.44	0.84	6.63*	0.67	0.27
	(0.35)	(0.40)	(0.11)	(0.31)	(0.95)	(0.51)	(0.36)	(0.08)	(0.41)	(0.97)
$TE \rightarrow GDPC$	0.01	2.29	1.97	0.74	2.38	0.05	1.68	3.64	0.28	2.98
	(0.91)	(0.13)	(0.16)	(0.39)	(0.50)	(0.83)	(0.20)	(0.30)	(0.60)	(0.40)
$TE \rightarrow T$	5.99**	0.08	9.39***	0.50	1.40	1.85	0.03	0.89	0.34	1.42
	(0.01)	(0.78)	(0.00)	(0.48)	(0.71)	(0.17)	(0.87)	(0.83)	(0.56)	(0.70)
$TE \rightarrow NT$	-	-	-	-	-	0.00	0.19	0.51	4.80**	7.84*
						(0.95)	(0.66)	(0.92)	(0.03)	(0.05)
$TE \rightarrow TD$	0.58	0.72	0.17	0.21	7.60*	0.17	0.52	1.69	0.61	14.02***
	(0.45)	(0.40)	(0.68)	(0.65)	(0.06)	(0.68)	(0.47)	(0.64)	(0.43)	(0.00)
$TE \rightarrow HC$	0.99	0.71	0.00	0.25	16.52***	0.12	0.57	3.89	1.75	25.64***
	(0.32)	(0.40)	(0.96)	(0.62)	(0.00)	(0.73)	(0.45)	(0.27)	(0.19)	(0.00)
$TE \rightarrow FDI$	0.42	1.84	0.52	0.23	6.30	1.66	1.29	2.92	0.71	5.60
	(0.52)	(0.18)	(0.47)	(0.63)	(0.10)	(0.20)	(0.26)	(0.41)	(0.40)	(0.13)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.i…Continue

Fiscal Policy Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
Series	**Model 1**					**Model 2**				
	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$T \rightarrow GDPC$	0.80	0.60	0.18	0.11	5.47	2.09	0.68	2.64	0.08	3.83
	(0.37)	(0.44)	(0.67)	(0.74)	(0.14)	(0.15)	(0.41)	(0.45)	(0.77)	(0.28)
$T \rightarrow TE$	5.43**	2.09	0.06	0.20	3.28	1.11	2.11	1.04	0.21	2.10
	(0.02)	(0.15)	(0.81)	(0.66)	(0.35)	(0.29)	(0.15)	(0.79)	(0.64)	(0.55)
$T \rightarrow NT$	-	-	-	-	-	1.42	0.26	2.89	0.02	2.83
						(0.23)	(0.61)	(0.41)	(0.90)	(0.42)
$T \rightarrow TD$	0.33	0.01	2.80*	2.89*	7.02*	0.20	0.05	6.89*	2.03	7.25*
	(0.57)	(0.91)	(0.09)	(0.09)	(0.07)	(0.66)	(0.83)	(0.08)	(0.16)	(0.06)
$T \rightarrow HC$	2.04	0.14	0.79	0.14	2.33	1.26	0.10	5.82	0.08	2.86
	(0.15)	(0.71)	(0.37)	(0.71)	(0.51)	(0.26)	(0.75)	(0.12)	(0.78)	(0.41)
$T \rightarrow FDI$	0.34	0.01	7.32**	3.66*	2.26	0.10	0.06	7.20*	3.14*	1.44
	(0.56)	(0.91)	(0.01)	(0.06)	(0.52)	(0.75)	(0.81)	(0.07)	(0.08)	(0.70)
$NT \rightarrow GDPC$	-	-	-	-	-	0.00	0.01	9.93**	2.35	2.62
						(0.99)	(0.92)	(0.02)	(0.13)	(0.45)
$NT \rightarrow TE$	-	-	-	-	-	2.68	1.49	0.90	3.65*	3.23
						(0.10)	(0.22)	(0.83)	(0.06)	(0.36)
$NT \rightarrow T$	-	-	-	-	-	0.16	0.17	22.73***	4.13**	1.99
						(0.69)	(0.68)	(0.00)	(0.04)	(0.57)
$NT \rightarrow TD$	-	-	-	-	-	0.31	7.67**	0.40	0.04	9.62**
						(0.58)	(0.01)	(0.94)	(0.84)	(0.02)
$NT \rightarrow HC$	-	-	-	-	-	0.20	1.46	6.70*	10.86***	6.13
						(0.65)	(0.23)	(0.08)	(0.00)	(0.11)
$NT \rightarrow FDI$	-	-	-	-	-	2.57	0.02	0.53	0.08	2.16
						(0.11)	(0.90)	(0.91)	(0.78)	(0.54)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.i…Continue

Fiscal Policy Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
Series	**Model 1**					**Model 2**				
	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$TD \rightarrow GDPC$	0.21	0.62	1.40	3.05*	0.04	0.44	0.97	0.08	5.11**	1.14
	(0.65)	(0.43)	(0.24)	(0.08)	(0.99)	(0.51)	(0.33)	(0.99)	(0.02)	(0.77)
$TD \rightarrow TE$	0.79	0.02	1.43	0.20	2.25	0.03	0.02	5.64	0.23	8.78**
	(0.37)	(0.88)	(0.23)	(0.66)	(0.52)	(0.85)	(0.99)	(0.13)	(0.63)	(0.03)
$TD \rightarrow T$	0.00	1.28	0.00	2.27	2.20	0.61	1.41	0.88	1.74	4.75
	(0.99)	(0.26)	(0.99)	(0.13)	(0.53)	(0.44)	(0.24)	(0.83)	(0.19)	(0.19)
$TD \rightarrow NT$	-	-	-	-	-	2.13	0.00	1.50	6.28**	11.59**
						(0.14)	(0.95)	(0.68)	(0.01)	(0.01)
$TD \rightarrow HC$	1.85	0.03	0.72	0.59	1.33	2.68	0.01	1.92	2.99*	4.74
	(0.17)	(0.86)	(0.40)	(0.44)	(0.72)	(0.10)	(0.93)	(0.59)	(0.08)	(0.19)
$TD \rightarrow FDI$	0.01	0.19	1.73	0.14	3.43	0.29	0.32	0.22	0.48	6.40*
	(0.91)	(0.66)	(0.19)	(0.71)	(0.33)	(0.59)	(0.57)	(0.97)	(0.49)	(0.09)
$HC \rightarrow GDPC$	1.77	2.04	0.90	0.40	0.61	2.04	1.45	2.13	0.40	1.14
	(0.18)	(0.15)	(0.34)	(0.53)	(0.90)	(0.15)	(0.23)	(0.55)	(0.53)	(0.77)
$HC \rightarrow TE$	1.22	0.14	0.00	0.23	6.56*	0.05	0.01	0.83	0.12	12.03**
	(0.27)	(0.71)	(0.98)	(0.64)	(0.09)	(0.83)	(0.93)	(0.84)	(0.73)	(0.01)
$HC \rightarrow T$	0.26	0.13	1.67	1.65	2.06	0.02	0.04	1.45	1.58	1.18
	(0.61)	(0.72)	(0.20)	(0.20)	(0.56)	(0.88)	(0.84)	(0.69)	(0.21)	(0.76)
$HC \rightarrow NT$	-	-	-	-	-	1.14	0.43	1.64	0.05	6.65*
						(0.29)	(0.51)	(0.65)	(0.83)	(0.08)
$HC \rightarrow TD$	0.62	0.74	0.03	0.72	3.13	0.93	0.94	1.21	0.67	8.78**
	(0.43)	(0.39)	(0.87)	(0.40)	(0.37)	(0.33)	(0.33)	(0.75)	(0.41)	(0.03)
$HC \rightarrow FDI$	0.25	0.82	0.01	0.29	1.76	0.03	0.47	0.09	0.29	1.27
	(0.62)	(0.37)	(0.92)	(0.59)	(0.62)	(0.87)	(0.49)	(0.99)	(0.59)	(0.74)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.i…Continue

Fiscal Policy Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
Series	**Model 1**					**Model 2**				
	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$FDI \rightarrow GDPC$	0.37	0.43	1.56	0.15	10.55**	0.74	0.03	2.90	0.20	7.83*
	(0.54)	(0.51)	(0.21)	(0.70)	(0.02)	(0.39)	(0.87)	(0.41)	(0.65)	(0.05)
$FDI \rightarrow TE$	0.09	3.98*	0.42	0.01	7.56*	0.01	4.18**	2.86	0.02	6.23
	(0.77)	(0.05)	(0.52)	(0.93)	(0.06)	(0.91)	(0.04)	(0.41)	(0.89)	(0.10)
$FDI \rightarrow T$	2.55	0.89	2.55	0.00	13.87***	1.44	1.57	14.64***	0.02	8.89**
	(0.11)	(0.35)	(0.11)	(0.99)	(0.00)	(0.23)	(0.21)	(0.00)	(0.88)	(0.03)
$FDI \rightarrow NT$	-	-	-	-	-	0.97	0.25	5.27	0.08	1.72
						(0.32)	(0.61)	(0.15)	(0.77)	(0.63)
$FDI \rightarrow TD$	4.09**	0.00	0.31	0.23	0.21	8.06**	0.02	1.33	0.00	0.22
	(0.04)	(0.99)	(0.58)	(0.64)	(0.98)	(0.01)	(0.90)	(0.72)	(0.96)	(0.97)
$FDI \rightarrow HC$	1.61	0.02	2.06	0.93	3.75	5.24**	0.45	4.73	0.57	4.17
	(0.21)	(0.89)	(0.15)	(0.34)	(0.29)	(0.02)	(0.50)	(0.19)	(0.45)	(0.24)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.ii

Monetary Policy and Relative Effectiveness Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
	Model 3						**Model 4**				
Series	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Series**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$GDPC \rightarrow MS$	0.30	0.00	9.75***	3.11	0.12	$GDPC \rightarrow TE$	16.65***	0.00	0.36	0.10	0.32
	(0.59)	(0.98)	(0.00)	(0.21)	(0.73)		(0.00)	(0.97)	(0.55)	(0.95)	(0.96)
$GDPC \rightarrow IR$	10.28***	0.06	2.46	0.19	1.41	$GDPC \rightarrow T$	11.70***	0.00	3.36*	0.37	6.57*
	(0.00)	(0.81)	(0.12)	(0.91)	(0.24)		(0.00)	(0.96)	(0.07)	(0.83)	(0.09)
$GDPC \rightarrow ER$	0.64	0.16	16.98***	1.12	0.00	$GDPC \rightarrow MS$	2.32	0.00	1.71	4.08	1.41
	(0.42)	(0.69)	(0.00)	(0.57)	(0.99)		(0.31)	(0.98)	(0.19)	(0.13)	(0.70)
$GDPC \rightarrow CPI$	1.92	0.27	1.99	0.87	3.08*	$GDPC \rightarrow IR$	6.89**	0.05	12.97***	1.46	15.50***
	(0.17)	(0.61)	(0.16)	(0.65)	(0.08)		(0.03)	(0.83)	(0.00)	(0.48)	(0.00)
$GDPC \rightarrow HC$	3.18*	0.34	0.64	0.05	0.10	$TE \rightarrow GDPC$	3.70	0.95	3.40*	4.15	2.46
	(0.08)	(0.56)	(0.42)	(0.97)	(0.76)		(0.16)	(0.33)	(0.07)	(0.13)	(0.48)
$GDPC \rightarrow FDI$	0.00	0.05	7.99**	1.50	0.47	$TE \rightarrow T$	9.41**	0.05	13.85***	0.06	8.99**
	(0.96)	(0.82)	(0.01)	(0.47)	(0.49)		(0.01)	(0.83)	(0.00)	(0.97)	(0.03)
$MS \rightarrow GDPC$	1.39	2.17	1.96	0.95	0.32	$TE \rightarrow MS$	8.57**	0.02	1.55	0.23	5.61
	(0.24)	(0.14)	(0.16)	(0.62)	(0.57)		(0.01)	(0.88)	(0.21)	(0.89)	(0.13)
$MS \rightarrow IR$	7.32**	0.00	0.63	1.53	0.12	$TE \rightarrow IR$	0.21	0.32	10.53***	2.12	12.24**
	(0.01)	(0.99)	(0.43)	(0.47)	(0.73)		(0.90)	(0.57)	(0.00)	(0.35)	(0.01)
$MS \rightarrow ER$	2.53	3.12*	2.57	3.48	0.62	$T \rightarrow GDPC$	3.45	1.50	1.05	4.55	10.45**
	(0.11)	(0.08)	(0.11)	(0.18)	(0.43)		(0.18)	(0.22)	(0.31)	(0.10)	(0.02)
$MS \rightarrow CPI$	7.94**	0.00	0.39	2.11	0.05	$T \rightarrow TE$	14.05***	1.33	2.48	0.36	1.83
	(0.01)	(0.96)	(0.53)	(0.35)	(0.82)		(0.00)	(0.25)	(0.12)	(0.84)	(0.61)
$MS \rightarrow HC$	2.16	0.01	0.04	0.26	0.15	$T \rightarrow MS$	4.70	0.06	0.00	10.89***	2.16
	(0.14)	(0.94)	(0.84)	(0.88)	(0.70)		(0.10)	(0.80)	(0.98)	(0.00)	(0.54)
$MS \rightarrow FDI$	0.01	0.27	1.95	0.15	0.11	$T \rightarrow IR$	0.48	0.58	0.85	1.10	12.98**
	(0.93)	(0.61)	(0.16)	(0.93)	(0.74)		(0.79)	(0.45)	(0.36)	(0.58)	(0.01)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.ii…Continue

Monetary Policy and Relative Effectiveness Toda-Yamamoto Causality

	χ^2 statistic (p-value)										
	Model 3					**Model 4**					
Series	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Series**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$IR \rightarrow GDPC$	5.86**	3.82*	0.55	2.13	2.04	$MS \rightarrow GDPC$	1.52	0.81	0.11	0.91	11.64**
	(0.02)	(0.05)	(0.46)	(0.35)	(0.15)		(0.47)	(0.37)	(0.74)	(0.64)	(0.01)
$IR \rightarrow MS$	0.21	0.99	12.25***	0.25	3.07*	$MS \rightarrow TE$	24.78***	0.01	0.08	7.13**	1.43
	(0.65)	(0.32	(0.00)	(0.88)	(0.08)		(0.00)	(0.95)	(0.77)	(0.03)	(0.70)
$IR \rightarrow ER$	0.04	0.99	9.97***	1.05	0.48	$MS \rightarrow T$	9.82**	0.82	2.63	1.97	1.80
	(0.84)	(0.32)	(0.00)	(0.59)	(0.49)		(0.01)	(0.37)	(0.11)	(0.37)	(0.62)
$IR \rightarrow CPI$	6.36**	0.82	2.57	1.86	0.02	$MS \rightarrow IR$	0.10	0.30	0.00	0.02	7.88*
	(0.01)	(0.37)	(0.11)	(0.40)	(0.89)		(0.95)	(0.58)	(0.99)	(0.99)	(0.05)
$IR \rightarrow HC$	1.47	0.18	0.07	0.19	0.00	$IR \rightarrow GDPC$	6.43**	3.45*	1.48	1.55	1.46
	(0.23)	(0.67)	(0.79)	(0.91)	(0.96)		(0.04)	(0.06)	(0.22)	(0.46)	(0.69)
$IR \rightarrow FDI$	0.03	0.47	0.14	0.27	1.12	$IR \rightarrow TE$	15.54***	0.09	0.54	0.63	0.80
	(0.86)	(0.49)	(0.71)	(0.87)	(0.29)		(0.00)	(0.77)	(0.46)	(0.73)	(0.85)
$ER \rightarrow GDPC$	2.22	4.34**	2.40	1.40	0.64	$IR \rightarrow T$	16.13***	1.41	3.08*	0.17	0.99
	(0.14)	(0.04)	(0.12)	(0.50)	(0.42)		(0.00)	(0.23)	(0.08)	(0.92)	(0.80)
$ER \rightarrow MS$	0.42	0.20	2.08	0.94	0.53	$IR \rightarrow MS$	0.43	0.97	6.01**	1.71	2.23
	(0.52)	(0.66)	(0.15)	(0.63)	(0.47)		(0.81)	(0.33)	(0.01)	(0.43)	(0.53)
$ER \rightarrow IR$	9.54***	2.91*	0.10	0.86	0.95						
	(0.00)	(0.09)	(0.75)	(0.65)	(0.33)						
$ER \rightarrow CPI$	9.53***	1.78	0.04	1.38	0.17						
	(0.00)	(0.18)	(0.84)	(0.50)	(0.68)						
$ER \rightarrow HC$	1.49	0.05	0.01	0.99	1.31						
	(0.22)	(0.82)	(0.93)	(0.61)	(0.25)						
$ER \rightarrow FDI$	0.09	1.46	2.47	0.55	0.00						
	(0.77)	(0.23)	(0.12)	(0.76)	(0.95)						

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.ii…Continue

Monetary Policy and Relative Effectiveness Toda-Yamamoto Causality

	χ^2 statistic (p-value)										
Series	**Model 3**										
	Indonesia	**Malaysia**	**Philippines**	**Singapore**	**Thailand**		**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$CPI \rightarrow GDPC$	1.63	1.04	0.01	4.35	0.04	$FDI \rightarrow GDPC$	0.82	0.09	0.93	1.13	0.98
	(0.20)	(0.31)	(0.92)	(0.11)	(0.84)		(0.37)	(0.76)	(0.33)	(0.57)	(0.32)
$CPI \rightarrow MS$	0.12	0.06	7.86**	2.22	0.72	$FDI \rightarrow MS$	0.05	0.00	3.48*	9.73**	0.81
	(0.73)	(0.80)	(0.01)	(0.33)	(0.40)		(0.82)	(0.98)	(0.06)	(0.01)	(0.37)
$CPI \rightarrow IR$	9.14***	0.02	2.09	8.52**	0.26	$FDI \rightarrow IR$	3.36*	0.25	0.00	4.90*	0.01
	(0.00)	(0.90)	(0.15)	(0.01)	(0.61)		(0.07)	(0.62)	(0.96)	(0.09)	(0.92)
$CPI \rightarrow ER$	0.14	0.73	10.37***	1.28	0.29	$FDI \rightarrow ER$	0.66	0.10	1.36	0.70	0.72
	(0.71)	(0.39)	(0.00)	(0.53)	(0.59)		(0.42)	(0.75)	(0.24)	(0.70)	(0.40)
$CPI \rightarrow HC$	0.07	3.02*	0.07	1.55	0.40	$FDI \rightarrow CPI$	2.36	0.55	0.47	7.59**	0.00
	(0.80)	(0.08)	(0.79)	(0.46)	(0.53)		(0.13)	(0.46)	(0.49)	(0.02)	(0.96)
$CPI \rightarrow FDI$	0.06	0.35	0.90	0.00	0.00	$FDI \rightarrow HC$	0.08	0.07	1.81	1.46	2.01
	(0.80)	(0.56)	(0.34)	(0.99)	(0.98)		(0.78)	(0.79)	(0.18)	(0.48)	(0.16)
$HC \rightarrow GDPC$	5.47**	1.32	1.34	2.88	1.69						
	(0.02)	(0.25)	(0.25)	(0.24)	(0.19)						
$HC \rightarrow MS$	0.46	1.12	2.18	4.68	1.47						
	(0.50)	(0.29)	(0.14)	(0.10)	(0.23)						
$HC \rightarrow IR$	2.14	1.77	0.22	2.03	4.18**						
	(0.14)	(0.18)	(0.64)	(0.36)	(0.04)						
$HC \rightarrow ER$	0.69	1.39	2.02	1.29	0.69						
	(0.41)	(0.24)	(0.16)	(0.53)	(0.41)						
$HC \rightarrow CPI$	0.47	3.54*	1.80	2.79	0.15						
	(0.49)	(0.06)	(0.18)	(0.25)	(0.70)						
$HC \rightarrow FDI$	0.67	0.05	0.00	7.82**	0.40						
	(0.41)	(0.82)	(0.95)	(0.02)	(0.53)						

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.iii

Interaction of Monetary Policy with Fiscal Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
	Model 5					**Model 6**				
Series	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Series**	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**
$GDPC \rightarrow MS$	0.24	0.17	0.17	3.73	2.16	$GDPC \rightarrow MS$	3.36*	0.00	0.01	7.33**	0.63
	(0.62)	(0.68)	(0.68)	(0.16)	(0.34)		(0.07)	(0.97)	(0.93)	(0.03)	(0.43)
$GDPC \rightarrow IR$	3.42*	0.00	1.64	3.41	2.10	$GDPC \rightarrow IR$	6.11**	0.04	3.52*	3.53	2.85*
	(0.07)	(0.99)	(0.20)	(0.18)	(0.35)		(0.01)	(0.85)	(0.06)	(0.17)	(0.09)
$GDPC \rightarrow ITD$	1.12	0.00	3.96*	1.99	3.73	$GDPC \rightarrow TEI$	0.13	0.04	4.39**	2.49	0.79
	(0.29)	(0.96)	(0.05)	(0.37)	(0.16)		(0.72)	(0.85)	(0.04)	(0.29)	(0.37)
$GDPC \rightarrow TD$	1.57	0.36	0.12	0.11	14.81***	$GDPC \rightarrow TE$	6.28**	0.00	0.12	0.16	1.21
	(0.21)	(0.55)	(0.73)	(0.95)	(0.00)		(0.01)	(0.97)	(0.73)	(0.92)	(0.27)
$MS \rightarrow GDPC$	0.02	0.11	0.18	4.85*	2.01	$MS \rightarrow GDPC$	0.52	0.01	0.32	2.57	2.02
	(0.90)	(0.74)	(0.67)	(0.09)	(0.37)		(0.47)	(0.92)	(0.57)	(0.28)	(0.16)
$MS \rightarrow IR$	0.03	0.01	0.02	0.13	1.14	$MS \rightarrow IR$	0.23	0.00	0.15	0.45	0.86
	(0.87)	(0.93)	(0.88)	(0.94)	(0.57)		(0.63)	(0.99)	(0.70)	(0.80)	(0.35)
$MS \rightarrow ITD$	3.26*	1.53	0.86	0.45	1.77	$MS \rightarrow TEI$	0.87	1.64	1.50	0.28	0.00
	(0.07)	(0.22)	(0.35)	(0.80)	(0.41)		(0.35)	(0.20)	(0.22)	(0.87)	(0.99)
$MS \rightarrow TD$	0.11	1.76	2.52	4.45	2.78	$MS \rightarrow TE$	6.11**	0.43	0.31	3.22	0.68
	(0.75)	(0.18)	(0.11)	(0.11)	(0.25)		(0.01)	(0.51)	(0.58)	(0.20)	(0.41)
$IR \rightarrow GDPC$	2.06	6.34**	0.30	1.29	1.38	$IR \rightarrow GDPC$	3.62*	6.16**	0.03	3.37	0.21
	(0.15)	(0.01)	(0.59)	(0.52)	(0.50)		(0.06)	(0.01)	(0.86)	(0.19)	(0.65)
$IR \rightarrow MS$	0.04	0.12	1.57	0.91	5.62*	$IR \rightarrow MS$	0.59	0.68	4.48**	0.95	4.25**
	(0.84)	(0.73)	(0.21)	(0.64)	(0.06)		(0.44)	(0.41)	(0.03)	(0.62)	(0.04)
$IR \rightarrow ITD$	4.21**	0.20	0.04	0.06	0.66	$IR \rightarrow TEI$	1.44	0.05	1.08	0.11	0.01
	(0.04)	(0.65)	(0.83)	(0.97)	(0.72)		(0.23)	(0.82)	(0.30)	(0.95)	(0.92)
$IR \rightarrow TD$	0.02	0.09	0.00	0.91	0.13	$IR \rightarrow TE$	1.41	0.13	2.29	0.77	0.01
	(0.89)	(0.77)	(0.98)	(0.64)	(0.94)		(0.24)	(0.72)	(0.13)	(0.68)	(0.93)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Table 4.9.iii..Continue

Interaction of Monetary Policy with Fiscal Toda-Yamamoto Causality

	χ^2 statistic (p-value)									
	Model 5					**Model 6**					
Series	**Indonesia**	**Malaysia**	**Philippines**	**Singapore**	**Thailand**	**Series**	**Malaysia**	**Indonesia**	**Philippines**	**Thailand**	**Singapore**
$ITD \rightarrow GDPC$	0.00	0.80	1.33	1.38	5.21*	$TEI \rightarrow GDPC$	2.68	0.10	1.16	4.80**	2.93
	(0.98)	(0.37)	(0.25)	(0.50)	(0.07)		(0.11)	(0.76)	(0.28)	(0.03)	(0.23)
$ITD \rightarrow MS$	1.44	0.00	0.34	2.21	2.40	$TEI \rightarrow MS$	0.25	0.67	0.00	0.47	1.35
	(0.23)	(0.96)	(0.56)	(0.33)	(0.30)		(0.62)	(0.41)	(0.99)	(0.49)	(0.51)
$ITD \rightarrow IR$	0.04	0.03	2.34	7.32**	0.61	$TEI \rightarrow IR$	1.53	0.21	1.96	1.42	4.17
	(0.85)	(0.86)	(0.13)	(0.03)	(0.74)		(0.22)	(0.65)	(0.16)	(0.23)	(0.12)
$ITD \rightarrow TD$	0.40	1.27	0.19	1.72	2.71	$TEI \rightarrow TD$	5.94**	6.10**	0.02	0.13	0.82
	(0.53)	(0.26)	(0.67)	(0.42)	(0.26)		(0.02)	(0.01)	(0.89)	(0.72)	(0.66)
$TD \rightarrow GDPC$	0.47	0.12	0.05	0.34	0.41	$TE \rightarrow GDPC$	2.10	1.53	5.07**	0.17	4.58
	(0.49)	(0.73)	(0.82)	(0.84)	(0.82)		(0.15)	(0.22)	(0.02)	(0.68)	(0.10)
$TD \rightarrow MS$	2.05	2.84*	2.08	1.94	0.57	$TE \rightarrow MS$	0.12	6.72**	1.78	0.22	0.18
	(0.15)	(0.09)	(0.15)	(0.38)	(0.75)		(0.73)	(0.01)	(0.18)	(0.64)	(0.91)
$TD \rightarrow IR$	0.06	0.67	1.02	1.68	8.89**	$TE \rightarrow IR$	0.29	0.76	2.97*	0.21	1.77
	(0.80)	(0.41)	(0.31)	(0.43)	(0.01)		(0.59)	(0.38)	(0.09)	(0.65)	(0.41)
$TD \rightarrow ITD$	0.42	0.10	0.87	0.14	9.89**	$TE \rightarrow ITD$	1.33	0.48	2.36	1.74	0.23
	(0.52)	(0.75)	(0.35)	(0.93)	(0.01)		(0.25)	(0.49)	(0.13)	(0.19)	(0.89)

Notes: Toda & Yamamoto tests are χ^2 distribution with two degrees of freedom as they are the joint test of the loading factors and the cointegration parameter. Figures in parentheses are the p-values.

Growth caused government expenditure in Indonesia is in line with Sudarsono (2015) and Ismal (2011), that says in the Wagnerian law of economic development, economic growth is the driving factor of the government expenditures. There is a bidirectional causality between growth and tax in Thailand. Growth caused tax in Indonesia and the Philippines. There is a bidirectional causality between growth and non-tax in the Philippines. Growth caused debt in Indonesia and Thailand. This study is in line with Wibowo (2017) in Indonesia. On the other hand, there is a causality between debt and growth in Singapore. There is a bidirectional causality between growth and human capital in Indonesia. This study is in line with the theory that says human capital is responsible, generates and stimulates growth (Lucas, 1988 & Romer,1990). Also, in support of growth could lead to human capital accumulation (Mincer, 1996).

Growth caused money supply in the Philippines. There is a bidirectional causality between growth and interest rate in Indonesia. Growth caused interest rate in Thailand and the Philippines. Growth caused exchange rate in the Philippines. Growth caused inflation in Thailand. Growth caused interaction of interest rate with debt in the Philippines. Growth interaction of interest rate with expenditure in the Philippines. Growth caused foreign direct investment in the Philippines is in line with the growth drive FDI hypothesis. The theory stresses that a country should have a developing market size and cultivate human capital and infrastructures to attract FDI into a country (Zhang & Song, 2002).

On the other hand, government expenditure caused tax in Indonesia, Thailand, and the Philippines. Thailand should reduce its government expenditure as it will lead to increase of debt and jeopardize the economy. This study is line with the spend-and-

tax hypothesis that says increases in expenditure necessitate increases in revenue as a tolerable level of taxation exist which sets a constraint on government expenditure (Peacock & Wiseman, 1967). Also, government expenditure caused non-tax in Thailand. There is a bidirectional causality between expenditure and non-tax in Singapore. Government expenditure caused growth in the Philippines. Expenditure caused debt in Thailand. Also, expenditure caused human capital in Thailand. Government expenditure also caused interest rate in the Philippines and Thailand.

Tax caused government expenditure in Indonesia. This study is in line with the tax-and-spend theory that says changes in revenue cause changes in expenditure. This study also in line with Sriyana (2009) and Kurniawan (2012) that says causality relationship, exist from tax revenue to spending in Indonesia. Tax caused debt in the Philippines, Thailand, and Singapore. Tax caused money supply in Indonesia and Singapore. Also, tax caused interest rate in Thailand.

Tax caused foreign direct investment in Singapore is in line with the Neoclassical Theory that explains international capital flows with various rates of return across countries lead to capital arbitrage, with capital seeking the highest return. This result is logical as Singapore is known as exchange rate regime and their economy that greater than the rest of the poorer countries. There is a bidirectional causality of tax caused foreign direct investment in the Philippines. Also, foreign direct investment caused tax in Thailand. Tax caused FDI in Philippines and Singapore. This study is in line with Romero-Avila and Strauch (2008) that says direct taxation has affected the physical accumulation of capital.

This study also found non-tax caused tax in the Philippines and Singapore. Also, non-tax caused debt in Malaysia. Besides, non-tax caused human capital in the Philippines and Singapore. There is bidirectional causality between debt and non-tax in Thailand. Debt caused non-tax in Singapore. Debt caused government expenditure and foreign direct investment in Thailand. Debt caused human capital in Singapore. Debt caused money supply in Malaysia. The debt caused interest rate in Thailand. Also, debt caused interaction of interest rate and debt in Thailand.

Money supply caused growth in Thailand. Money supply caused government expenditure in Singapore. There is a bidirectional causality between money supply and expense in Indonesia. Money supply caused tax in Indonesia. Money supply caused growth in Thailand and Singapore. Money supply caused inflation and interest rate in Indonesia. This study also in line with Hossain (2005), which says causality exists between money supply with inflation. Money is causal to the price level in Indonesia in line with the Classical and Keynesians, where money is neutral after the prices adjust back to general equilibrium, and therefore it has no effect on real variables except for the price level. Money supply caused interest rate in Thailand. Money supply caused exchange rate in Malaysia. Money granger caused interaction of interest rate with debt in Indonesia. This study is in line with the Post Keynesian theory of endogenous money.

Interest rate caused money supply in Philippines and Thailand in this study. Interest rate caused inflation in Indonesia. Interest rate caused exchange rate in the Philippines. This study is in line with the economic theory that says interest rate will caused the changes in exchange rate movement as an active alteration in interest at domestic level

thus induce the currency to be appreciated and vice versa (Abdoh, Yusof, Zulkifli. Bulot, & Ibrahim (2016). Interest rate caused growth in Indonesia and Malaysia. Interest rate caused government expenditure in Indonesia. Also, interest rate cause tax in Indonesia and the Philippines. Philippines interest rate found to Granger caused exchange rate in line with Elekdag and Han (2015), where higher interest rates could bring about an appreciation of the exchange rate, leading to tightening monetary conditions. Consequently, putting downward pressure on the demand for credit. Interest rate caused interaction of interest rate with debt in Indonesia. The interaction of interest rate with debt caused growth in Thailand. The interaction of interest rate with debt caused interest rate in Singapore. Interaction of interest rate with expenditure granger caused growth in Thailand.

Inflation caused interest rate in Malaysia and Singapore. Inflation caused exchange rate in the Philippines. This study is in line with the Philippines vulnerability to the external economic shocks such as commodity price volatility in the world market cause the exchange rate to fluctuate quickly. Inflation caused human capital in Malaysia and money supply in the Philippines. The exchange rate caused interest rate in Malaysia and Indonesia. The volatility of the currency could stir the interest rate with the direct causation effect from exchange rate to interest rate in these countries. The exchange rate also caused growth in Malaysia. The fluctuations in exchange rates may hurt the Malaysia economy as it facilitates the international trade and the transfer of funds between countries. Human capital caused government expenditure, non-tax, debt, and interest rate in Thailand. Human capital caused money supply and foreign direct investment in Singapore.

Foreign direct investment caused growth in Thailand, and this study is in line with the hypothesis of FDI-led growth. The FDI is affecting growth directly by contributing to the gross fixed capital formation. Foreign direct investment also caused government expenditure in Malaysia and Thailand. Foreign direct investment caused debt in Indonesia. Hence, reliance on external resources to complement capital structure in the domestic economy will cause debt to increase. Foreign direct investment caused human capital in Indonesia. Foreign direct investment caused inflation in Singapore and interest rate in Indonesia and Singapore. The inflow of FDI will cause interest rate which is the return on investment. As interest rate is good measure and important variable of FDI inflows (Singhania & Gupta, 2011). Foreign direct investment caused money supply in the Philippines and Singapore.

4.6 Summary of the Chapter

The results of the analysis reveal that ARDL bounds testing approach are appropriate for time series data in this study. As the variables are in the mixture of the I(0) and I(1) order of integration, and none of the variables is I(2) irrespective with the conventional ADF unit root test nor with the inclusion of structural break in LS unit root test. The diagnostic tests indicate that there is no autocorrelation and conditional heteroskedasticity. The error is in a normal distribution and evidently, shows that the relationship between variables is confirmed.

Follow on; this study employs the cointegration and error correction framework in analysing objective one to three. Furthermore, this study also contributes to the existing research in the interaction of monetary policies on government debt and expenditure. This study also utilises Toda-Yamamoto causality in determining the

direction of causality of the variables due to its simplicity and its ability in overcoming the shortcoming of the alternative econometric procedures.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATION

5.1 Introduction

In this chapter, the results conclusion is delivered based on the objective of the study in Section 5.2 followed by policy implication in Section 5.3. Also, this chapter discusses suggestions for future research in Section 5.4 and the limitations in Section 5.5.

5.2 Conclusion

This study complements the existing evidence in several ways. First, rather than focusing on the development of the government spending, tax components that matter in the supportive role was included in the fiscal policy analysis. In examining the impact of fiscal policy on growth in Model 1, government spending is negative in Malaysia and Singapore but positive in the Philippines over the long haul. On the other hand, there is a positive relationship between tax and growth in Thailand and Singapore in the long run.

Also, debt increase growth in Indonesia while debt decreased growth and Singapore. Singapore debt found to have an adverse effect not only in the long run and also in the short run. Following the conventional view of public debt, the positive effect of debt on growth in the short run indicate that output is demand determined in Indonesia, Philippines, and Thailand. There is a positive relationship between human capital and

growth in Singapore. There are a cointegration and positive relationship between foreign direct investment and growth in Indonesia, Thailand, and Singapore.

This study also contributes to theory by, Malaysia and Singapore are following Neoclassical theory with negative expenditure impact to growth while the Philippines is following Keynesian theory with positive expenditure impact to growth. Malaysia and Singapore government expenditure are endogenous implying it is a consequence, rather than a cause while the Philippines government expenditure is exogenous. Thailand and Singapore are following Keynesian theory with positive tax to growth. Indonesia is following Keynesian theory with positive debt impact to growth while Singapore is following Neoclassical theory with negative debt impact to growth. In the long run, Singapore human capital and growth are positive implying over education and growth. Foreign direct investment and growth have a positive relationship over the long haul in Indonesia, Thailand, and Singapore suggesting economic development in these countries exceeds a threshold level.

In examining the impact of fiscal policy with the inclusion of non-tax on growth in Model 2, in the long run, government expenditure decreased growth in Singapore, but increased growth in Malaysia, Philippines, and Thailand. Tax decrease growth in the Philippines and Thailand but vice versa in Singapore. On the other hand, non-tax increase growth in the Philippines, Thailand, and Singapore. There is a positive relationship between debt and growth in Indonesia and Thailand in the long run. Human capital and growth and are positive in Malaysia and Singapore but negative in Thailand in the long term. Capital and growth have a positive relationship over the long haul in Thailand.

These study findings contribute differently to the hypothesis with the inclusion of non-tax, where the Philippines and Thailand are following Endogenous theory with negative tax to growth. The Philippines, Thailand, and Singapore are following Endogenous theory with the positive non-tax impact to growth. Also, following the inclusion of non-tax, impact of Malaysia expenditure, Thailand expenditure, tax, non-tax, debt, human capital, Philippines tax and non-tax, Singapore tax, non-tax, debt, and foreign direct investment to growth have altered. With the implementation of non-tax as a source of revenue, Malaysia and Thailand will be benefited as the expenditure from negative to positive in Malaysia, while from not significant in Thailand to positive spending impact to growth. Tax from not crucial in the Philippines to positive tax impact on growth. Thailand tax from positive change to adverse consequences on growth, implying this study in line with the Endogenous theory.

The Philippines and Thailand are retrieving positive impact of non-tax to growth. Singapore is the only country that is extracting both positive results from tax and non-tax. Thailand is benefiting s debt is giving a positive influence on growth, while Singapore debt from negative turn to not significant to growth. Furthermore, Singapore is known for its old debt and currently the highest in ASEAN-5 countries. Thailand negative human capital impact to growth leads to undereducation in Thailand. On the other hand, capital in Singapore from positive to not significant impact on growth with the inclusion of non-tax.

On the contrary, the addition of non-tax does not change expenditure, tax, human capital in Singapore, and the Philippines government spending, Indonesia debt, and Thailand foreign direct investment. Government spending in Singapore still following

Neoclassical theory, implies Singapore is on the right track for its government spending, and it remains the second lowest among the rest of the ASEAN-5 countries. Continuing the same with or without the inclusion of non-tax are the Philippines government expenses and Singapore tax. The Philippines spending impact remains positive impact on growth. Singapore remains the same with the positive impact of the tax on growth. Indonesia debt remains the same with its positive impact on debt on growth. Staying the same is Singapore with its positive impact on human capital on growth. Foreign direct investment remains the same with its positive impact on growth implying economic development exceeds the threshold level in Thailand.

In the short-run of the Model 1, the proportion of change in growth is explained with tax by 22% and 20% in Malaysia and Thailand, respectively, debt by 18% and 11% in the Philippines and Indonesia, respectively, and human capital by 13% in Singapore. The speed of adjustment that will correct annually after the shock the quickest is Malaysia, followed by Indonesia, Philippines, Thailand, and the slowest in Singapore respectively by 80%, 36%, 34%, 23% and 17%. In the short-run of Model 2, the proportion of change in growth explained with human capital by 57% and 29% in Singapore and Malaysia, respectively, government expenditure by 18% and 11% in Thailand and Philippines, respectively, and with tax by 11% in Indonesia. The speed of adjustment that will correct aftershock annually the quickest in Thailand, followed by Malaysia, Philippines, Singapore, and the slowest in Indonesia, respectively by 97%, 44%, 38%, 35% and 31%.

In addition, this study also assesses the role of monetary policy that taking in the financial sector risk-taking, where capital flows and the long-term interest rates are

often overlooked. Examining the impact of monetary policy on growth in Model 3, money supply is positive in ASEAN-5 except in the Philippines, while the interest rate is negative in Malaysia, the Philippines, and Thailand in the long term. The inflation is negative both in Indonesia and Thailand. The exchange rate is positive in Malaysia and Indonesia in the long-run. Over the long run, human capital is negative in Malaysia, and foreign direct investment is positive in Malaysia and Thailand.

In the short-run of Model 3, the proportion of change in growth explained with exchange rate by 31% and 14% in Thailand and Malaysia, respectively, inflation by 14% and 12% in Indonesia and the Philippines respectively, and foreign direct investment by 4% in Singapore. The speed of adjustment that will correct annually after the shock is quickest in Malaysia, Thailand, Indonesia, Singapore, and slowest in the Philippines respectively by 67%, 44%, 35%, 27% and 14%.

Second, this study addresses an important shortcoming in existing research on the relative effectiveness of fiscal and monetary policies in ASEAN-5. Examining the relative effectiveness of fiscal and monetary policies on growth in Model 4, in the long-run, we found that Malaysia fiscal policy is more effective in comparison to the fiscal policy. On the other hand, monetary policy is more effective than fiscal policy in stimulating growth in Indonesia. The Philippines indicates monetary policy dominance regime while both fiscal and monetary and policies play a role in stimulating growth in Singapore and Thailand.

Furthermore, with the inclusion of interest rate and tax in Model 4, a significant proportion of change in growth explained with the interaction of interest rate and debt

by 19% in Malaysia in the short run. Money supply by 22%, 5%, 4% in Singapore, Indonesia, and the Philippines respectively, and debt by 11% in Thailand. The speed of adjustment that will correct annually after the shock is quickest in Indonesia, followed by Singapore, Thailand and slowest in Malaysia and Philippines respectively, by 37%, 30%, 20%, 9% and 9%.

Third, increase in the development of debt may have been encouraging by the integrated financial market, thus this study present cross-country evidence on the build-up debt imbalances with the monetary sector in ASEAN-5 countries. In Model 5, examining the interaction of monetary policy on debt on growth, in the long-run, the interaction of interest rate with debt on growth is negative in Malaysia and Philippines but positive in Singapore.

In the short-run, a significant proportion of change in growth explained with the interaction of interest rate and debt by 19% in Malaysia. The speed of adjustment that will correct annually after the shock is the quickest in Indonesia, followed by Singapore, Philippines, Malaysia, and the lowest in Thailand respectively, by 54%, 45%, 36%, 23% and 20%. In Model 6, in the long-run, the interaction of interest rate with public spending is negative in the Philippines. The speed of adjustment that will correct annually after the shock is the quickest in Indonesia, followed by Singapore, Philippines, Malaysia, and the lowest in Thailand respectively, by 54%, 45%, 36%, 23% and 20%.

The fourth objective deals with the causal relationship between the fiscal and monetary policies on economic growth. Growth caused government expenditure in Indonesia and line with the Wagnerian law of economic development, economic growth as the

driving factor of the government spending. There is a bidirectional causality between growth and tax in Thailand. Growth caused tax in Indonesia and the Philippines. There is a bidirectional causality between growth and non-tax in the Philippines.

Growth caused debt in Indonesia and Thailand. On the other hand, there is a causality between debt and growth in Singapore. Debt is found to cause growth only in Singapore, growth cause debt in Indonesia and Thailand. Evidently, this study shows that there is a bidirectional causality between growth and human capital in Indonesia and in line with Setiawan (2017) and the theory that human capital is responsible, generates and stimulates growth. Thus, conclusively suggesting Indonesia utilize its labour market in the future.

Growth caused money supply in the Philippines. Growth causes interest rate in Indonesia, Philippines and Thailand. Growth caused exchange rate in the Philippines. Growth caused inflation in Thailand. Growth caused interaction of interest rate with debt in the Philippines. Growth caused interaction of interest rate with expenditure in the Philippines. Growth caused foreign direct investment in the Philippines is in line with the growth drive FDI hypothesis that stresses that a country should have a developing market size and improving conditions in human capital and infrastructures to attract FDI.

On the other hand, government expenditure caused tax in Indonesia, Thailand, and the Philippines and in line with the spend-and-tax hypothesis that says increases in expenditure necessitate increases in revenue as a tolerable level of taxation exist which sets a constraint on government expenditure. Also, expenditure cause non-tax in

Thailand. There is a bidirectional causality between expenditure and non-tax in Singapore. Government expenditure causes growth in the Philippines but debt in Thailand. Also, expenditure caused human capital in Thailand and interest rate in the Philippines and Thailand.

Tax caused expenditure in Indonesia and in line with the tax-and-spend theory that says changes in revenue cause changes in spending in Indonesia. Tax caused debt in the Philippines, Thailand, and Singapore. Tax caused money supply in Indonesia and Singapore. Also, tax caused interest rate in Thailand. Tax caused foreign direct investment in Singapore and in line with the Neoclassical Theory that explains international capital flows with differentiated rates of return across countries lead to capital arbitrage, with capital seeking the highest return. This result is logical as Singapore is known as exchange rate regime and their economy that greater than the rest of the poorer countries.

There is a bidirectional causality of tax caused foreign direct investment in the Philippines. Also, foreign direct investment causes tax in Thailand. This study also found non-tax caused tax in the Philippines and Singapore. Also, non-tax caused debt in Malaysia. Besides, non-tax caused human capital in the Philippines and Singapore. This study contributes towards finding public spending can be financed by direct taxes in Indonesia, Philippines, and Thailand and financed by indirect taxes in Singapore and Thailand.

There is bidirectional causality between debt and non-tax in Thailand. Debt caused non-tax in Singapore. Debt caused expenditure and capital in Thailand. Debt caused

labour in Singapore. Debt caused money supply in Malaysia but caused interest rate in Thailand. Thus, implies that Thailand following the Non-Ricardian theory that says changes in fiscal deficit lead to changes in interest rate. Also, debt causes interaction of interest rate and debt in Thailand.

Money supply caused expenditure in Singapore. There is a bidirectional causality between money supply and spending in Indonesia. Money supply caused tax in Indonesia. Money supply caused growth in Thailand which is relevant to the theory, that is, money is a lead output indicator. Money supply caused price in Indonesia. Thus, this study finds that the monetary aggregates were targeting framework still effective in influencing price level in Indonesia. Money supply caused interest rate in Indonesia. Money supply caused interest rate in Thailand. Money supply found to caused exchange rate in Malaysia. Money supply also granger cause interaction of interest rate with debt in Indonesia. This study is in line with the Post Keynesian theory of endogenous money.

Interest rate caused money supply in Philippines and Thailand in this study. Interest rate to caused inflation in Indonesia. Evidently, monetary policy in the Philippines could affect credit growth in the country through the flexibility of the exchange rate as interest rate found to Granger caused exchange rate in the Philippines. This study is in line with the economic theory that says interest rate will cause the changes in exchange rate movement as an active alteration in interest at domestic level will induce the currency to be appreciated and can be vice versa. Interest rate caused growth in Indonesia and Malaysia, implying that interest rate channel is another essential

intermediate target in complementing with monetary targets. Thus, suggesting bank lending plays a trivial role in Indonesia and Malaysia.

These findings are in line with the classical theory that interest rate sensitively adjusts to allocate all available funds for investment purpose. Interest rate causes expenditure in Indonesia. Also, interest rate caused tax in Indonesia and the Philippines. Interest rate caused interaction of interest rate with debt in Indonesia. The interaction of interest rate with debt cause growth in Thailand. The interaction of interest rate with debt causes interest rate in Singapore. Interaction of interest rate with expenditure caused growth in Thailand.

Inflation caused interest rate in Malaysia and Singapore. Inflation caused exchange rate in the Philippines. Thus, the Philippines need to be heedful of the inflation as vulnerability to the external economic shocks such as commodity price volatility in the world market will cause the exchange rate to fluctuate quickly. Inflation caused human capital in Malaysia and money supply in the Philippines. The exchange rate caused interest rate in Malaysia and Indonesia. Consequently, Malaysia and Indonesia need to manage the exchange rate prudently as the volatility of the currency could stir the interest rate. The exchange rate also caused growth in Malaysia. Malaysia shall be cautious on the fluctuations in exchange rates as it may hurt the Malaysia economy as it facilitates the international trade and the transfer of funds between countries.

Human capital caused government expenditure, non-tax, debt, and interest rate in Thailand. Human capital caused money supply and foreign direct investment in Singapore. Foreign direct investment cause growth in Thailand and this study is in line

with the hypothesis of FDI-led growth. The FDI is affecting growth directly by contributing to the gross fixed capital formation. Foreign direct investment also caused expenditure in Malaysia and Thailand. Foreign direct investment caused debt in Indonesia. Indonesia reliance on external resources to complement capital structure in the domestic economy will cause debt to increase. Foreign direct investment caused human capital in Indonesia. Foreign direct investment caused inflation in Singapore and interest rate in Indonesia and Singapore. The inflow of FDI in Indonesia and Singapore will cause interest rate which is the return on investment. Foreign direct investment caused money supply in the Philippines and Singapore.

FDI become a highly pursued item in the economic agenda of the developing countries generally due to the inadequate human and physical capital. This study not only contribute to a more informed exploration of FDI growth relationship. FDI -growth holds only in Thailand, and human capital emerges as an absorptive capacity variable in Indonesia. FDI -expenditure causality hold only in Malaysia and Thailand. FDI -tax causality hold only in Philippines and Thailand. FDI -debt causality hold only in Indonesia. Lastly, FDI -interest rates hold in Indonesia and Singapore, FDI -inflation hold in Singapore, and FDI -money supply hold in Philippines and Singapore.

5.3 Policy Implication

Economic growth, not redistribution, is the single utmost powerful mechanism for generating long-haul economic growth. A well-specified function of fiscal and monetary policies is an essential tool for stimulating growth. Examining the impact of fiscal policy with and without the inclusion of non-tax in growth, Malaysia will have benefited with the implementation of non-tax, as human capital is showing sign of

overeducation likewise with Singapore. Thus, implies Malaysia and Singapore could spend less in expenditure for education and spend it on a more productive sector. Malaysia has to revise its non-tax as a source of revenue in its policy implication of increasing growth.

Singapore is recommended to reduce its present debt as the adverse effect of the debt could be much more significant mainly if high public debt increases lead to expectations of future confiscation and financial repression in the future. Although there is no evidence of the debt on growth in Malaysia or causality from debt on growth, it does not imply that debt does not matter to growth. The finding of this study note that higher levels of the upper expenditure will have full growth benefits only in Singapore as the expenditure financed by increases in indirect taxes. However, higher expenditure allocation in Thailand is not suggested as distortionary taxation depresses growth in the long run, though expenditure funded by indirect taxes.

Thailand negative human capital impact to growth leads to undereducation in Thailand; this implies Thailand shall spend more on the education sector. With the inclusion of non-tax, this study also found that human capital is increasingly essential to Philippines revenue. Since foreign direct investment causes growth in Thailand, policymakers could enhance the liberty of capital into the country to encourage the growth of the economy. Foreign direct investment also caused interest rate in Indonesia and Singapore. Indonesia and Singapore shall be heedful of the inflow of foreign direct investment so that it will not influence the management of interest rate.

This study differs from other studies as we incorporated human capital and foreign direct investment when examining monetary policy role on growth. This study contributes towards finding that money is neutral in the relatively short and long run and following the Classical view in the Philippines. Malaysia, Philippines, Thailand in line with the money view that emphasis on changes in the monetary aggregate affected the output with interest rate channel. Indonesia and Malaysia show that interest rate causal to growth implying that interest rate channel is yet another critical intermediate target in complementing with monetary targets. Consequently, policymakers from both countries need to be cautious on its hiking interest rate as presently it is the third highest and the highest in ASEAN-5 countries, respectively.

Policymakers could influence the sustainable output growth with money supply stimulus in Thailand due to the causality nexus between money and growth. Causality of interest rate to exchange rate in the Philippines is in line with the economic theory that says interest rate will cause the changes in exchange rate movement. Also, inflation Granger caused exchange rate in the Philippines. Therefore, Philippines need to be cautious of its change in interest rate as its third highest in ASEAN-5 countries up to date and capability in the management of its inflation though its government is in practice of inflation targeting since 2002.

Policy makers in Indonesia and Thailand may need to trim down the inflation as it adversely affects the growth of the economy over the long haul, though money is a complement to capital. Also, Indonesia shall try to reduce its inflation with its negative impact on growth and the country that remain having the highest inflation in ASEAN-5. Indonesia government shall be caution of its exchange rate depreciation though it is

said to make a country competitive as it has causation on the country inflation. The Philippines shall utilize its exchange rate flexibility to reduces the role of external factors in affecting its domestic credit dynamics.

The exchange rate is favourable for growth in Malaysia and Indonesia in the long run. This study also found exchange rate caused interest rate in Malaysia and Indonesia. Thus, Malaysia and Indonesia need to manage the exchange rate prudently as the volatility of the currency could stir the interest rate. Also, exchange rate also caused growth in Malaysia. Malaysia shall be cautious on the fluctuations in exchange rates as it may hurt the Malaysia economy as it facilitates the international trade and the transfer of funds between countries. This study recommends that Malaysia shall be heedful on the fluctuation of the exchange rate due to an economy that highly dependent on commodities like petroleum and palm oil have led to the vulnerabilities of the economy.

There is a lack of studies conducted in developing countries particularly when examining the relative effectiveness of fiscal and monetary policies function with growth. We are incorporating not only government expenditure and money supply like the previous studies in the develop countries. We are including tax, interest rate, as the independent variables in estimating relative effectiveness function to provide better insight into the behaviour of the policies. This study also concluded fiscal policy effectiveness relative to monetary policy in Malaysia, and vice versa in Indonesia, Thailand, and Singapore while the Philippines is a monetary dominated county. The government of Philippines as the dominant monetary regime must guarantee fiscal

solvency at any time particularly when the country under an inflation targeting system or otherwise the conduct of monetary policy will be counterproductive.

In ASEAN-5 countries, fiscal policies still face the critical challenge in debt. The debt ratios in ASEAN -5 are still relatively high by emerging market standards. Likewise even emerging economies with relatively low debt levels remain vulnerable to shocks given their narrow and volatile tax bases and risks of spillovers from advanced economies. State utilisation during economic stimulation in ceasing the downward spiral in the growth during the crisis is depicted mainly in their government expenditure and debt.

This study incorporates the interaction of interest rate with debt as independent variables to provide better insight into the behaviour of the monetary policy. The contribution of this study includes finding of causality in the interaction of interest rate with debt in Indonesia imply agreement of Post Keynesian theory of endogenous money. Policy makers in Indonesia shall be cautious on the hiking interest rate as it can interact with debt. Also, interest rate and debt are the highest and second highest among ASEAN-5 countries in 2015. This study likewise contributes towards the finding of the interaction interest rate with debt decrease growth in Malaysia and Philippines but vice versa in Singapore in the long run.

The Philippines shall be caution on their interest rate that currently the third highest in Asean-5 countries since 2015. Also, causality in fiscal deficit leads to changes in interest rate implying Thailand following Non-Ricardian theory, while the other ASEAN-5 countries are following Ricardian theory. Thus, suggestings Thailand to

manage its debt with precautionary with its current third highest debt in ASEAN-5 countries.

Causality between interest rate and inflation in Singapore in this study suggest interest rate might be an efficient instrument for the central bank to prevent inflation as inflation is subject to the unexpected changes in the interest rate. The result of the inflow of capital to the interest rate in Indonesia and Singapore imply that the government shall be thoughtful over the inflow of capital that might bring about an accumulation of financial imbalances in these countries. Thailand policy makers might need to caution of its debt-financed government expenditure condition as it might crowd in or crowd out the investment and subsequently growth in the country.

Changes in the supply of currency were found to have a significant impact on the exchange rates in Malaysia. Consequently, suggesting that policymakers might control the supply of currency as a lever for exchange rate management. The finding of causality between interest rate and exchange rate in the Philippines implies that government might need to be subtle in the increase (decrease) of the interest rate as it might cause currency depreciation (appreciation) that consequently lead to the decline in economic growth.

FDI -debt holds only in Indonesia, implying Indonesia government shall reduce infrastructure investment as it causes an increment in debt but not increment in tax. This suggests Indonesia might have crowding out condition. Policymakers in Thailand should aim to improve domestic conditions to attract an inflow of the FDI, as this study evidently shows FDI -growth causality hold. FDI -interest rate holds in Indonesia and

Singapore inferring the policy makers shall manage inflows of capital wisely as it might build up financial imbalances in the country.

5.4 Suggestions for Future Research

Even though this study tries to address some issues emphasised in the literature that hampered appropriate policy making, the study does not completely resolve all the shortcomings. The sustainability of macroeconomic stability in a country depends on the regulating authority. Thus, call for the designation and implementation of the right policies to achieve credible fiscal behaviour. Usually, developing countries are prone to face the macroeconomic problem that is traceable to the economic phenomenon. Thus, this study recommends that further studies may be conducted to other ASEAN countries as well those that also have rising debt and confronted with the small fiscal multiplier.

Also, due to the lower fiscal multiplier in ASEAN-5, revenue shall be sourced not only from direct tax but also from non-tax revenue. Policy implementation shall also expand the source of non-tax revenue in the future due to previous high investment in education and product of increase of productivity level in labour. These are feasible in support of higher revenue in curtailing excess government expenditure and growing population in developing country.

The future study on the impact of the monetary policy should be complemented with other variables apart from the monetary variables considered in the norm. Variables like capital and labour especially in developing economies that sensitive to the inflow

of capital and on the labour as developing countries usually highly dependent on labour for their economic growth.

Furthermore, the future work on the relative effectiveness of fiscal and monetary policies on growth could include debt particularly in high indebtedness country and inflation in a country that highly contagious to inflation. On the other hand, the future study may disaggregate the components of debt and government expenditure to have a better understanding of the future policy implication on the aspect of the interaction of fiscal and monetary policies.

5.5 Limitations of the Study

This study is not free from limitations despite the efforts made at obtaining robust and reasonable findings. This study acknowledged the unavailability of more extended sample statistics, say statistics of self-governing beforehand and good quality data that could have to give room for further disaggregation of some variables into different components and their inclusion in the models. However, while attempting to overcome this limitation, it is believed that this current study can provide useful information to the understanding of the role, relative effectiveness and the interaction of fiscal and monetary policies in increasing growth.

The study covers only five countries (Indonesia, Malaysia, Philippines, Singapore, and Thailand) out of the many economies in the ASEAN region. These are the countries that earliest established on 8 August 1967 with the similar aim to facilitate economic integration amongst its members in accelerating the growth of the economy. Another limitation of the study is the inability to in explaining the importance of each of the

explanatory variables contribution and how individual variables respond to shocks from other variables. Although this is outside the scope of this study, it would have tested the applicability or otherwise of another hypothesis in the ASEAN countries.

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