EVALUATING THE EFFECTIVENESS OF MONETARY VERSUS FISCAL POLICIES IN MALAYSIA USING MACROECONOMETRIC APPROACHES

SITI FATIMAH BINTI ISMAIL

UNIVERSITI SAINS MALAYSIA

2022

EVALUATING THE EFFECTIVENESS OF MONETARY VERSUS FISCAL POLICIES IN MALAYSIA USING MACROECONOMETRIC APPROACHES

by

SITI FATIMAH BINTI ISMAIL

Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy

September 2022

ACKNOWLEDGEMENT

Alhamdulillah. All praise and gratitude to Allah. I was able to complete this thesis because of His boundless grace, knowledge, truth and wisdom. This thesis concludes my journey to obtain my PhD, which began in September 2016. In pursuing this study, I owe intellectual as well as personal debts to several people. It would have been impossible to complete this thesis without their invaluable support and assistance. I would like to express my deepest gratitude to my supervisor, Associate Professor Dr Sek Siok Kun for her advice, guidance and encouragement throughout my studies. I would also like to express my utmost gratitude to Associate Professor Dr Sek Siok Kun for being a tremendous mentor for me and her patience throughout the preparation of my thesis proved to me that she is a care and concern supervisor. My journey in completing this thesis will not be completed without undivided support from my husband, Bakhtiar Jamilee bin Haji Abdul. I would also wish to thank Sayed Kushairi Sayed Nordin for his assistance and support. My special thanks to Associate Professor Dr Mohd Tahir bin Ismail for his good advice and sometimes giving me the aspiration to motivate me. School of Mathematical Sciences, Universiti Sains Malaysia (USM) is my second home where most of the staff directly or indirectly have supported me, I wish to convey my fullest thank to them. These notes of thanks will not be completed without acknowledging my parents Ismail bin Mat and Saminah binti Samah for tirelessly supporting me and all the support they have provided with total confidence and their prayers for me to complete my study. My siblings and their families have always been positive and looking forward to me completing my study. Last but not least, I owe my loving thanks to my dearest sons Bakhtiar Zafri and Bakhtiar Iman.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

LIST OF NOTATIONS

$se(\hat{\alpha})$	Standard error of coefficient
$\hat{\alpha}$	The estimated value of α
ΔY_t	The first different of endogenous
ΔY_{t-p}	Lagged first differences
DT_t	The slope dummy variable
DT	The slope of the trend function
TB	The break date
μ_t	Error term
γ	Coefficient parameter of dummy slope
ρ	Coefficient parameter of lag endogenous
$\emptyset$	Coefficient parameter of the first different lag endogenous
DU_t	Dummy variable
$\hat{Y}_i$	The estimated values of Y
$\bar{Y}$	The mean value of the sample
k	Total parameters in the model
n	Sample size
σ^2	Variance parameter
x_i	The random variables
Y_t	Actual values of endogenous/ dependent variable
$I(\cdot)$	An indicator functions
q_t	The threshold variable
γ	Threshold value
ε_t	Error term (independent, identically distributed (i.i.d)),
d	Delay parameter

β_i	The slope parameter of inflation (endogenous)
θ_i	The slope parameter of growth (endogenous)
π_i	The slope parameter of exogenous variables
Y_{t-d}	The threshold variable
s_t	The transition variable
$1_j(\cdot)$	Indicator for a regime
c	Threshold points or value
δ_j	The regression parameters
α_i	The coefficients of exogenous variables
γ	A threshold slope parameter
Z	Variables (lag GDP and lag INF)
F	Transition function
$(1 - \theta)$	The coefficient for lagged dependent variable
φ_k	Unknown parameter
$(y - y^*)_t$	Output gap
$(i_t - \pi_{t+1})$	Real interest rate
g_t	Government spending/expenditure
e_t	Real effective exchange rate
y_t^f	Foreign output
t_t	Total taxation
m_t	Money supply
$(m - p)_t$	Real money demand
y_t	Gross domestic product (GDP)
i_t	Interest rate/policy rate
D_t	Dummy variables
$E(e_{t+1/t}) - e_t$	Exchange rate deviation

$(i_t^* - i_t)$	Different of money market rate (US) and policy rate
π_t	Inflation
$(\pi - \pi^*)_t$	Inflation gap
p_t^f	World inflation, consumer prices
i_t^*	Money market rate

LIST OF ABBREVIATIONS

AD	Aggregate demand
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criteria
AR	Autoregressive
ARDL	Autoregressive distributed lag
AS	Aggregate supply
BH	Batini-Haldane
BI-SQM	Bank Indonesia - Small Quarterly Macromodel
BoJ	Bank of Japan
BM	Broad money
BNM	Bank Negara Malaysia
CAB	Current account balances
COVID-19	Coronavirus disease 2019
DBT	Government debt
ΔCAB	Differenced of log current account balance
ΔDBT	Differenced of log government debt
DE	Exchange rate deviation (UIP)
ΔEXP	Differenced of log government expenditure
DI	Interest differential
DLGDP	Differenced of log gross domestic product
DLMS	Differenced of log money supply
ΔLREER	Differenced of log real effective exchange rate
DOSM	Department of Statistics Malaysia
DSGE	Dynamic Stochastic General Equilibrium
ESTAR	Exponential Smooth Transition Autoregressive
DUM	Dummy
EXP	Government expenditure
FDI	Foreign direct investment
FI	US 3-Month T-Bill rates
FMOLS	Fully Modified Ordinary Least Squares
FTPL	Fiscal theory of the price level

GMM	Generalized method of moments
GDP	Gross domestic product
GNP	Gross National Product
I	Interest rate
IMF	International Monetary Policy
INF	Inflation rate
INFG	Inflation gap
IS-LM	Investment Saving- liquidity preference
KK	Keynes Klein
KPSS	Kwiatkowski Phillips Schmidt Shin
LCPI	Log of consumer price index
LDC	Least developed country
LFO	Log of foreign output
LGDP	Log of gross domestic product
LGS	Log of government spending
LL	Log Likelihood
LMS	Log of money supply
LREER	Log of real effective exchange rate
LRAS	Long run aggregate supply
LSTAR	Logistic Smooth Transition Autoregressive
LTAX	Log of total taxation
MA	Moving average
MAE	Mean absolute error
MAPE	Mean absolute percent error
MCO	Movement Order Control
MEM	Macroeconometric modelling
MS	Muth-Sargent
NK	New Keynesian Model
OG	Output gap
OLS	Ordinary Least Square
PB	Phillips-Bergstrom
QE	Quantitative Easing
QTM	Quantity theory of money
RBC	Real Business Cycle

RE	Rational Expectation
REER	Real effective exchange rate
RIR	Real interest rate
RM	Ringgit Malaysia
RMD	Real money demand
RMSE	Root-mean-square error
SETAR	Self-Exciting Threshold Autoregressive
SSMM	Small Scale Macroeconometric Model of Indonesia
SRAS	Short run aggregate supply
SSR	Sum of square residuals
STAR	Smooth Transition Autoregressive
STR	Smooth transition regression
SVAR	Structural VAR
SVCEM	Structural vector error correction model
TAR	Threshold Autoregressive
TAX	Taxation
U	Theil's inequality
UIP	Uncovered interest parity
USD	United State Dollar
VAT	Value added tax
VECM	Vector error correction method
WCPI	World inflation, consumer prices
WJ	Walras-Johansen
WL	Walras-Leontief
ZA	Zivot and Andrews

LIST OF APPENDICES

MENILAI KEBERKESANAN DASAR KEWANGAN BERBANDING DASAR FISKAL DI MALAYSIA DENGAN MENGGUNAKAN PENDEKATAN MAKROEKONOMETRIK

ABSTRAK

Tesis ini adalah bertujuan untuk mengkaji keberkesanan dasar kewangan dan dasar fiskal dalam mencapai matlamat asas makroekonomi Malaysia iaitu kestabilan harga dan pertumbuhan ekonomi jangka panjang. Tesis telah dibahagikan kepada dua bahagian utama. Bahagian pertama melibatkan aplikasi pendekatan pemodelan tidak linear untuk mengkaji kesan tidak linear dasar terhadap pertumbuhan dalam negara kasar (KDNK) dan kadar inflasi dengan menggunakan data Malaysia bertarikh 1980Q1 hingga 2018Q1. Keputusan daripada model STAR dan TAR mendedahkan wujudnya hubungan tidak linear. Keputusan menunjukkan bahawa tiada satu dasar yang boleh mencapai matlamat pertumbuhan KDNK yang memberangsangkan dan inflasi yang rendah secara serentak. Kedua-dua pendekatan STAR dan TAR membuktikan bahawa dasar fiskal melalui perbelanjaan kerajaan, baki akaun semasa dan hutang telah menggugat pertumbuhan ekonomi tetapi kesannya terhadap inflasi adalah terhad. Melalui dasar kewangan, didapati bahawa kadar bunga adalah kurang efektif dalam merangsang pertumbuhan ekonomi tetapi ia berjaya mengawal atau mengurangkan kadar inflasi. Sementara itu, kadar pertukaran matawang telah menggalakan kadar pertumbuhan ekonomi (KDNK) namun ia tidak mempengaruhi paras harga. Model STAR dipilih kerana ia dapat mengesan pengubahsuaian ambang dalam pembolehubah ekonomi secara perlahan-lahan. Manakala, dalam bahagian kedua analisis, model makroekonometrik telah dibangunkan bertujuan untuk menilai prestasi relatif dasar kewangan dan dasar fiskal Malaysia, serta membuat ramalan bagi

pelbagai scenario ekonomi melalui simulasi berangka. Sistem ekonomi terdiri daripada tujuh persamaan tingkah laku dan parameter yang dianggarkan menggunakan data Malaysia bertarikh 1982Q1 hingga 2018Q1. Secara keseluruhan, lapan senario telah dibina melibatkan setiap satu pembolehubah polisi serta gabungan kedua-dua pembolehubah dasar fiskal dan dasar kewangan dalam meramal keputusan ekonomi. Penemuan analisis senario mendedahkan bahawa dasar fiskal mempunyai kesan yang lebih besar terhadap pembolehubah makroekonomi utama berbanding dasar kewangan. Di samping itu, keputusan menunjukkan bahawa gabungan ketiga-tiga pembolehubah polisi adalah lebih effektif dan mempunyai kesan berganda yang lebih besar dalam mempengaruhi pergerakan ekonomi berbanding dengan satu atau gabungan dua pembolehubah polisi. Secara keseluruhannya, keputusan daripada kedua-dua analisis menunjukkan bahawa satu pembolehubah polisi tidak menunjukan keputusan seperti yang dijangka, tetapi melalui gabungan pembolehubah fiskal dan kewangan ia menunjukkan hasil/keputusan yang lebih baik.

EVALUATING THE EFFECTIVENESS OF MONETARY VERSUS FISCAL POLICIES IN MALAYSIA USING MACROECONOMETRIC APPROACHES

ABSTRACT

The purpose of this thesis is to examine the roles of monetary and fiscal policies in achieving Malaysia's basic macroeconomic goals of price stability and long-term growth. This thesis is divided into two main parts. The first part employs nonlinear modelling techniques to investigate the nonlinear effect of policy stances on GDP growth and inflation using Malaysian data from 1980Q1 to 2018Q1. The results of the STAR and TAR approaches reveal the existence of a nonlinear relationship. The results show that no single policy tool can lead to the policy objectives of high GDP growth and low inflation at once. Both STAR and TAR results evident that the fiscal tools of government expenditure, current account balance and debt are harmful to the economic growth and the impact on inflation is either negative or not significant. In terms of monetary policy, the policy rate is a less effective tool to stimulate GDP growth but is a better option to control or reduce inflation. Meanwhile, real effective exchange rate encourages GDP growth but it does not influence price level significantly. The STAR model is a preferred model in capturing the gradual threshold adjustment in economic variables. In the second part of the analysis, a macroeconometric model is developed to evaluate the performance of Malaysia's monetary and fiscal policies as well as to project different economic outcomes and scenarios through numerical simulations. The economic system consists of seven behavioural equations and the parameters are estimated using the data of Malaysia dated 1982Q1 to 2018Q1. Eight scenarios are set up through adjustment in each single

policy tool as well as the combination of both policy tools in projecting economic outcomes. The findings of scenario analysis reveal that fiscal policy has a much greater impact on key macroeconomic variables than monetary policy. In addition, the results reveal that a combination of three policy tools is more accommodating and has a large double effect in affecting economic movement as compared to a single or combination of two policy tools. To sum up the findings from both parts of the analyses, the results reveal that there is no single tool that may lead all economic variables to the desired outcome, but the combination of fiscal and monetary policy tools leads to better outcomes.

CHAPTER 1

INTRODUCTION

1.1 Overview

The effectiveness and interaction of monetary and fiscal policies are complicated topics because each policy has a different impact on the economy (Afonso et al., 2019). As a result, the nature of the relationship between the two policies is crucial in determining how these policies will affect inflation and economic growth. Since the early 1980s, the debate over the role of central banks and governments, as well as the effectiveness of monetary and fiscal policies have gained more relevance and important issues [(Afonso (2019) and Arestis and Sawyer (2004). Wyplosz (1999) claimed that, although central banks were concerned with inflation, while governments were concerned about economic cycles and the level of public debt, both variables were controlled via policy coordination, in which monetary and fiscal policies are interdependent.

However, this coordination does not necessarily result in the best outcomes, which were reliant on the role that each policy plays. Sargent and Wallace (1981) claimed that both approaches had 'influential' value in which case monetary policy is superior to the fiscal policy. The monetary authority had complete control over inflation because it can set the money base level at any time and keep inflation at the desired level (Sargent and Wallace, 1981). However, if fiscal policy is prioritised over monetary policy, monetary policy loses some of its ability to control inflation. This means that a well-coordinated monetary and fiscal policy is essential for the government. Maintaining macroeconomic stability and fostering economic growth are two of the government's mandated responsibilities (Ojeyinka, 2020). Several

macroeconomic policy instruments had developed in economic theory to assist governments in accomplishing their goals (Ojeyinka, 2020). Scholars had long recognised the importance of both policies in the growth and development process. Monetary policy had played an important role in economic analysis since the turn of the twentieth century (Marzieh, 2015). However, it became less important as an economic policy tool after the Great Depression of the 1930s (Marzieh, 2015). The role of fiscal policy became more important instead (Vaish, 2005). Therefore, according to Gordon (1981), economists in the 1940s and 1950s claimed that monetary policy was ineffective.

Monetary and fiscal policy can be used alone or in conjunction to accomplish economic goals. Fiscal and monetary policy effectiveness had been thoroughly studied. According to Ali et al. (2008), several studies such as Friedman and Meiselman (1963), Chowdhury (1986, 1988), Shapiro and Watson (1988), Chari et al. (1991), Ansari (1996), Blanchard and Perroti (1996), Christiano et al. (1996), Chari and Kehoe (1998), Reynolds (2001), Schmitt and Uribe (2001) had all examined the effect of fiscal and monetary policies on various economic aggregates. However, the majority of theoretical and empirical research on the impact of fiscal and monetary policy on economic performance has yet to be completed (Ali et al. (2008). Some scholars argued that monetary policy had a stronger impact on economic growth than fiscal policy and that monetary policy outperformed fiscal policy in terms of investment and growth (Ali et al., 2008). Other researchers, such as Friedman and Meiselman (1963), Elliot (1975), and Batten and Hafer (1983), had maintained that fiscal stimuli were necessary for economic growth, whereas Chowdhury (1986) and Olaloye and Ikhide (1995) had argued that they were not. Furthermore,

macroeconomic performance was significantly influenced by other factors (Cardia, 1991).

The classic economic theories proposed that the exchange rate, interest rate and money supply had influenced the key outcomes of monetary policy, such as inflation and output (Egilsson, 2020). In the short run, for example, a rise in the real interest rate reduces demand, inflation and output (Egilson, 2020). On the other side, growth in the money supply may affect interest rates, private expenditure and aggregate demand [Gafa (2013) and Andreas et al. (2014)]. Other factors explored include monetary policy shocks, structural breaks and real-economy uncertainty. Furthermore, the outcome of monetary policy may change over time depending on the structure of fiscal policy whether active or passive. Fiscal policy is active when the authority sets its expenditures independently of the government's intertemporal budget constraints (Leeper, 1991). A balanced budget was an active fiscal policy in which the authority adjusts tax receipts (Leeper, 1991). Therefore, this thesis emphasizes the effectiveness of policy stances and economic shocks (for instance, the 1997/98 Asian financial crisis) in influencing inflation, growth and other economic performance.

Despite the widespread usage of linear models in empirical studies, there are still several unanswered questions in economics (Ismail and Sek, 2020). This is related to the observation that many economic time series experience episodes in which the series' behaviour changes dramatically due to financial crises/ shocks or sudden changes in government policy (Ismail et al., 2011). The effects of monetary and fiscal policies on economic performance are not just linear but also non-linear (Ismail and Sek, 2020). The shift in economic aggregates is caused by a change in the behaviour of numerous economic variables, which rarely occurs at the same time for all of the variables involved (Shangodoyin et al., 2009). When considering aggregate economic

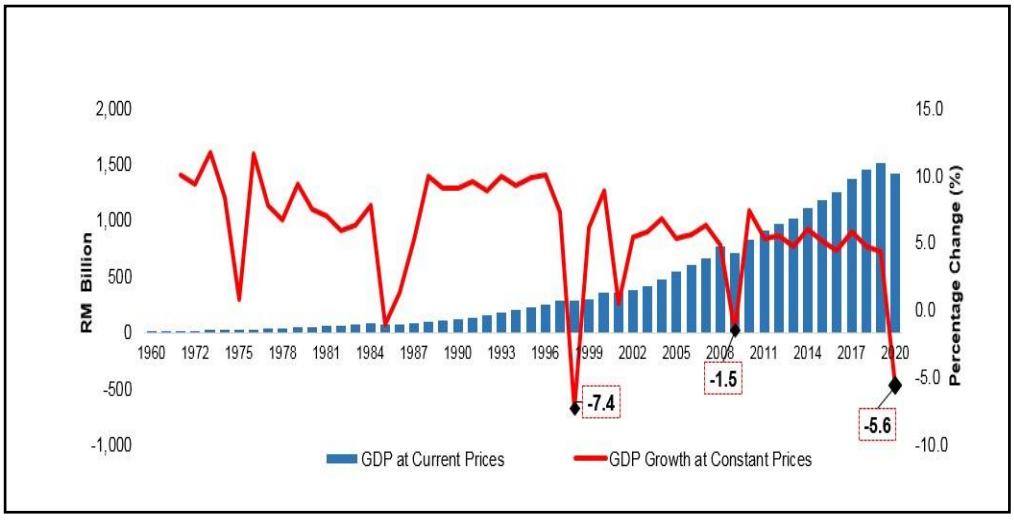
series, the temporal path of any structural shift is more likely to be reflected by a model which undergoes smooth transformation rather than immediate (Aslanidis et al., 2002). For many years, the nonlinearity of the business cycle has been investigated. A two-regime threshold autoregressive model (TAR) was employed by Tiao and Tsay (1994) after they rejected the linearity versus a threshold autoregressive model. The smooth transition autoregressive (STAR) model is therefore preferred because it allows the business cycle indicator to switch between two distinct regimes gently rather than abruptly (Terasvirta and Anderson, 1992). This thesis also seeks to examine the behaviour of economic growth and inflation, in reacting to its threshold movement.

Malaysia experienced major policy advancements throughout the previous decade due to the changes in the economic and financial environment which forced the authority to make some adjustments to the effectiveness of monetary and fiscal policy structures (Athukorala, 2010). In the six decades since it gained independence, Malaysia has had three significant economic crises, and each of these crises had different factors and impacts (Athukorala, 2010). Therefore, over the previous six decades, the country had seen several stages of growth. The three most significant economic shocks were the Commodities shock of 1985/86, the Asian Financial Crisis of 1997/98, and the Global Financial Crisis of 2008/09 (Athukorala, 2010). Besides these crises, Malaysia is facing its biggest challenges in political instability since 2014, which affected the foreign direct investment (FDI), withdrawal of existing investors and resulted in the retrenchment and unemployment as well as consumer price index tremendously affected by high inflation (Arif and Abu Bakar, 1999). Besides macroeconomic variables, structural breaks or external factors are other indicators to be investigated and evaluated if they have an impact on economic activities. Understanding how the policy affects the economy would be useful knowledge for

policymakers in developing better policies. This thesis applies macroeconometric modelling to assess the efficacy of government policies if one of the policy tools is changed or adjusted. The goal of macroeconometric modelling is to describe the empirical behaviour of a real-world economic system. In addition, the model is used to evaluate policies and estimate future outcomes based on a variety of scenarios and exercises.

1.2 The Economy of Malaysia

Malaysia was classified as a middle-income country by the World Bank, with a GDP growth rate of 4.3% in 2019 and a GDP per capita of 11,414.2 USD in 2019. However, the COVID-19 pandemic had affected the entire world, including Malaysia, wherein in 2020 there were 113,010 positive cases and 471 deaths. Therefore, the effect of this crisis had slowed down the economic growth. The COVID-19 pandemic necessitated the imposition of a Movement Control Order (MCO) on March 18, 2020, which prompted the closure of several industries and the reduction in work hours. Economic growth in 2020 was 5.6% lower than it was in 2019 (Figure 2.6).



Source: Department of Statistic Malaysia (DOSM, 2021)

Figure 1.1: National GDP, 1960-2020

It was also reported that all sectors were declined where the services sector lost about 5.5% (2019: 6.2%), manufacturing fell 2.6% (2019: 3.8%) and agriculture fell 2.2% (2019: 2.0 %). There were also double-digit declines in construction, mining and quarrying, which both dropped by more than 20% (2019: 0.4%) in the same period. Since the 1980s, the average consumer price index had been used to calculate the real GDP growth rate and inflation rate. Malaysia had experienced four periods of negative growth during this time: in the mid-to-late 1980s, the 1990s, 2001, and 2020. The failure of the import substitution strategy, which focused on heavy industry, contributed to the recession in the mid-1980s, which was impacted by the global recession. These economic collapses were primarily caused by global economic shifts rather than domestic factors, such as the Asian Financial Crisis (1997/98), the dot-com disaster in 2001, and the 2009 global financial crisis. In 2020, Malaysia has experienced the greatest economic slump in history as well as other developed countries which experienced significant downturns due to the COVID-19 outbreak and MCO. From the mid-1980s until 1996, the inflation rate remained stable within the 2-4 percent range before rising to 5.3 percent in 1997/98 due to the Asian Financial Crisis, and then again to 5.4 percent in 2008/09 due to the global financial crisis (Figure 2.7). It returned to its normal rate in 2012 and fluctuated until 2019, before reaching its lowest point in 2020. Therefore, coordination of both monetary and fiscal policies were crucial in ensuring the stability of the economy.

Source: International Monetary Fund, (2021)

Figure 1.2: Real GDP growth and inflation rate (%)

In order to achieve a balance between growth, stability, and equity, Malaysian macroeconomic policy was devised. Moreover, both fiscal and monetary policy was important for stability and growth, but in Malaysia, fiscal policy was more influenced by ethnic and political considerations. Even though the Ministry of Finance (MOF) was frequently identified as the major physical headquarters for both formulation and implementation, the Prime Minister's Office possessed real power over fiscal policy. With the implementation of the New Economic Policy (NEP) and the 'Look East policy, the government had the opportunity to favour Bumiputera enterprises with strong government tied and developed partnerships with foreign money (Narayanan, 1996). Except for the early 1990s, fiscal deficits were the norm, and they continued to grow until 2009. This unsustainable trend forced Malaysia's government to adjust its fiscal policy orientation and advocate for reducing Bumiputera entrepreneurs' "dependency syndrome" (Ahmad, 2009). Tax reform and fiscal consolidation proposals may help alleviate the current fiscal imbalance, but their effectiveness and

direction were unknown given political influence and policy discretion. While fiscal reform was still in the works, the BNM had used its relative autonomy to institutionalise and modernise Malaysia's monetary policy. In contrast, the Central Bank had rarely abandoned a balanced-risk approach to balancing growth and inflation (Xiaoye, 2014). Ensuring a new interest rate framework and improving monetary transmission mechanisms may complement efforts to deepen conventional and Islamic financial markets, as well as gradually liberalising the foreign exchange market. Nonetheless, political factors continued to have an impact, especially during crises, and an informal commitment to exchange rate stability may cause policy dilemmas in the future.

1.3 Problem Statement

Monetary and fiscal policies play an important role in directly stimulating domestic economic activity and stabilizing price levels at desirable rates especially when crises occur (Mundell, 1971). The traditional view is based on Taylor's principle, which claimed that central banks may control inflation by raising nominal interest rates (Afonso, 2019). According to this theory, taxes and spending are always adjusted by the government to preserve fiscal stability [Elmendorf and Mankiw (1999); Wickens (2008) and Afonso (2019)]. Monetary policy, on the other hand, may no longer be able to determine inflation if the necessary fiscal adjustments are not guaranteed, as may occur during the fiscal crisis (Dharmadasa, 2015). Under this alternative view, the functions of fiscal and monetary policy are inverted, with fiscal policy controlling the price level and monetary policy acting to stabilise the debt (Levy, 2001). Because these two policy regimes implied different policy recommendations, identifying the dominant regime is critical for understanding the macroeconomy and making better policy decisions (Sargent and Wallace, 1981).

According to Heyzer and Mochida (2009), the majority of countries' reactions to the crisis were to cut nominal interest rates and increase financial sector stimulus. As a result, every country can't apply such policies, as it was decided by monetary policy (Tomsik, 2012). Malaysia, like other countries, is unable to avoid this situation, which needs policymakers adopting an adequate structure, plan, and action that serves as a reference point for the economy under scrutiny. Malaysia has experienced three major economic episodes since 1985/86, 1997/98, and 2007/08 which involves different policy regimes and targets including exchange rate targeting and monetary targeting. The best way to avoid a crisis is to improve the country's understanding and anticipation of the government's response to unforeseen circumstances.

The efficiency of these policies in achieving their desired goals have been debated over the last decades as economists have different views on the effectiveness of monetary versus fiscal policies (Marzeih, 2015). Monetarists and Keynesians, for example, held different views, with Monetarists claiming that monetary tools were the most important factor in stimulating economic growth whilst Keynesians claimed that fiscal tools were the most important factor in boosting economic growth (Tan et al., 2020). Apart from the theoretical debates, the results from empirical studies also showed inconclusive findings due to several reasons. The possible reasons include both fiscal and monetary policies applying different tools, with each tool may have different effectiveness impact and the impact might differ across countries (Mahmood and Sial, 2018). Furthermore, the majority of prior research has focused on either monetary policy or fiscal policy alone, rather than the combination or interaction of both policies (Chai et.al, 2020). A study conducted by Kabanda (2013) revealed that the impact of monetary and fiscal policy transmission channels on a country's economy

is mixed. The magnitude of these impacts, as well as the pathways via which they function, remain uncertain.

Furthermore, several studies conducted by Bernanke and Gertler (1995), Kim and Roubini (2000) and Christiano et al. (2005) on the efficiency of monetary and fiscal policies have concentrated on developed countries. The findings from the developed countries might not apply to the situation in developing countries as both groups of countries have different economic structures. Besides the heterogeneous results due to different samples of dates, countries and policy tools, the results might also differ using different modelling approaches. One of the main limitations is that previous research mainly applied linear regression to study the impacts of monetary versus fiscal policies on economic indicators [Bernanke and Gertler (1995), Kim and Roubini (2000) and Christiano et al. (2005)]. The application of linear regression in the presence of a nonlinear relationship might lead to inaccurate results, yet leads to a misleading conclusion (Tong, 1983). In the real economic world, the relationship between two indicators might be nonlinear as the relationship might vary over time induced by shocks/ crises and structure changes [(Tong, 1983); Chan and Tong (1986) and Tong (1990)]. The economic structure might change due to changes in a policy decision, market trends/ preferences, technological progress etc [(Tong, 1983); Chan and Tong (1986) and Tong (1990)]. As the above discussion indicates there is extensive evidence of the nonlinearity effect of both policies on growth, but the studies are not yet clear whether the nonlinearity is associated with phases of the business cycle, with regimes in the monetary and fiscal variables, or both. Apart from that, previous studies mainly compare how good the economic performance is as a whole, which results are general and not specified. Malaysia has experienced several policy regimes shifts and the need for policy transformation and adjustment (Athukorala,

2010). There is a need for an effective framework to address policy issues relating to the current economic difficulties. It is critical to assess the impact of policy variables (policy adjustment) on the economy. According to Matlanyane (2005) and Mustafa (2013), there is no appropriate answer as to the optimal monetary or fiscal policies on policy goals. Understanding the interrelationships between policy instruments and economic performance is also important in determining the best policy variables to achieve various goals. Policy considerations (policy adjustment) can also have a significant impact on economic performance. Therefore, the purpose of this thesis is to overcome the constraints of prior research by evaluating the movements of macroeconomic variables in response to monetary and fiscal policy in the Malaysian setting using econometric methodologies.

In line with the research problem above, this thesis raises the following research questions:

1. Which policy tool is most effective in influencing the economic indicators (GDP and inflation)?
2. What are the nonlinear effects of fiscal and monetary policy tools on GDP and inflation across regimes?
3. How does each economic indicator behave over time?
4. What are the responses of economic indicators or policy outcomes observed under various policy scenarios (changing various policy tools)?
5. Does the implementation of a single fiscal or monetary policy or the co-implementation of both policies is more effective?

1.4 Objectives of The Study

The objectives of this thesis are identified to answer the above research questions:

1. To determine the most impactful policy tool in determining the economic indicators (GDP and inflation).
2. To apply the smooth transition regression to examine the nonlinearity effects of different policy tools in determining the economic indicators (GDP and inflation) across regimes.
3. To capture the change in economic structure and the behaviour of each economic agent over time under the macroeconometric model.
4. To apply a macroeconometric model to simulate/ forecast the responses of economic indicators or policy outcomes observed under various policy scenarios
5. To compare the performances of different types of policies (monetary/ fiscal and combination of both) through expansionary and contractionary actions.

1.5 Scope and Research Methodology

The purpose of this thesis is to evaluate the effectiveness of monetary and fiscal policies on economic performance in Malaysia. The analysis of this thesis is divided into two main parts. The first part is focused on econometric modelling based on nonlinear regressions while the second part is emphasized on macroeconometric model focusing on scenario simulations. The first part of the analysis is related to empirical estimation mainly to fill the limitation of previous studies that did not consider non-linearity relationships in examining the topic addressed. It aims to answer objectives 1 and 2. While the second part is mainly based on forecasting and scenario simulation

analysis, which aims to extend to cover different economic conditions/ phenomena which is not able to perform under econometric estimation. It helps to answer objectives 3 to 5.

In the first part, two endogenous variables are employed to measure the economic performance, namely; inflation and GDP growth. The explanatory variables tested are various fiscal and monetary policy tools. The thesis covered the period from 1980 quarter1 to 2018 quarter1. The estimations employ the discrete threshold autoregressive (TAR) and smooth transition autoregressive (STAR) models. The details of these models are discussed in Chapter 3.

The second part of the analysis applies the macroeconometric model that is adapted from several sources, including the Small Scale Macroeconometric Model of Indonesia (SSMM), the Bank Indonesia - Small Quarterly Macromodel (BI-SQM), the Batini-Haldane (BH), and the Smoothing Taylor. This model consists of seven behavioural equations that work together to build a system that represents the economy of Malaysia. The analysis involves the application of static (in-sample) and dynamic (out-of-sample) simulations, with the error terms specified as deterministic or stochastic. Meanwhile, the scenario analysis mainly covers the changes in different fiscal and monetary policy tools. The details of this method will be discussed in Chapter 4.

1.6 Contribution of the Study

This thesis contributes to the existing literature in policy analysis in several ways. First, in terms of empirical findings, previous studies mainly focused on the advanced economies while the studies focused on the developing countries are limited. This thesis focuses the analysis on the small and developing countries of Malaysia.

Previous studies also provided limited evaluations in examining the performance of fiscal versus monetary policies as evaluations are based on a single policy tool to generalize the fiscal and monetary policies and the examination of the interaction of both policies is limited. This thesis provides evaluations on several different policy tools and evaluations on the combination of both policy tools, hence enabling a deeper analysis of the policy effectiveness. The results obtained might be useful for the policymaker of Malaysia to future policy plan and decision making.

The second contribution is in terms of the estimation approach. This thesis takes into consideration the existence of the nonlinearity relationship in modelling the policy influences. The thesis benefits the features of smooth transition regression which provides estimates on the policy influences between low versus high regimes, i.e. to capture the change in the relationship between two regimes based on exponential and logistic transition functions. This approach provides more accurate estimates and extra information on the change in the behaviour of economic indicators in response to various policy tools. This fills the gaps in previous studies that mainly focused on linear regression which did not consider structural breaks and change of economic structure; hence results might be misleading.

The third contribution is the application of macroeconometric model that enables various scenarios projection/ forecasting. Empirical estimation approaches that apply data to the econometric models for estimation are not able to perform scenario/ projection on the economic outcomes under different scenarios, as estimations are based on historical data/ information which only provides the examination of what has happened. But the policymaker might wish to consider different scenarios in examining the outcome of the policy decision in optimizing the policy output. Here the macroeconometric model plays into the role as it is constructed

by several behavioural equations of each economic agent to form an economic system of a country (Malaysia). All behavioural equations are linked so that a change in a variable will affect the other variables/ agents. The macroeconometric model enables scenario analysis through simulations. This thesis benefits from the macroeconometric model to capture how each economic agent reacts to various policy tools under different scenarios. Hence, evaluations on the performances of different policy tools, and the interaction between fiscal and monetary policies can be examined. Finally, this thesis reveals the economic model and performance as well as the effectiveness of various policy tools. The findings provide policy recommendations and implications based on the economic condition and policy performances of Malaysia.

1.7 Outline of Thesis

This thesis is organised into seven chapters. The first chapter is an introduction chapter that discusses the background of the thesis, the problem statement, research questions and objectives, the scope and research methodology, and the contribution of the thesis. The second chapter begins with a review of theoretical and empirical relationships between monetary and fiscal policies and evaluates the findings of previous empirical studies as well as the background of Malaysia's economy. This is followed by Chapter 3 which discusses data source and variable descriptions, a summary of descriptive statistics, and the non-linear method, while Chapter 4 explains the macroeconometric modelling approach. Next, Chapter 5 discusses in detail the empirical findings of the non-linear effects of monetary versus fiscal policies on economic performance. The sixth chapter discusses the simulation results of a macroeconometric model, scenario analysis as well as policy implications. Finally,

Chapter 7 concludes the thesis by summarising the findings, proposes policy implications, recommendations, and suggestions for further research.

CHAPTER 2

BACKGROUND OF STUDY AND LITERATURE REVIEW

2.1 Overview

This chapter provides the conceptual, theoretical and empirical literature as well as background study in evaluating the effectiveness of the monetary and fiscal policies on economic performance. The theoretical review explained the numerous economic theories that underpin both policies' roles in an economy, whilst the empirical review provides the findings of relevant empirical studies from various nations.

The review of the literature is divided into eight sections. The first section presents an overview of chapter 2. The second section discusses the debates of macroeconomic policy. The third segment concentrates on conceptual frameworks of monetary and fiscal policy while the fourth section provides the theoretical developments related to this thesis and the fifth section focuses on the theoretical review of macroeconometric modelling. Meanwhile, section six reveals the empirical evidence or findings of the previous studies. Section seven demonstrates the economy of Malaysia and the final section explains the conclusions drawn from the conceptual, theoretical and empirical literature.

2.2 Debates on Macroeconomic Policy

John Maynard Keynes has started work on monetary and fiscal policy which to describe the effects of the depression on economic activity after the Great Depression in the 1930s (Marzieh, 2015). The dramatic collapse of the economy puts pressure on policymakers to reach solid conclusions about monetary and fiscal policy

choices. As a result, they focused on the best policy choice that produces low inflation and output that is close to full employment. (Marzieh, 2015). In the remark underlined by Dharmadasa (2015), it was clearly emphasised and singled out that Friedman's theories in 1948, which supported and focused on long-term economic growth and harmonisation had an impact in the 1950s. This resulted in the Monetarists believing that to avoid any economic slowdown or negative growth, it was critical to vigorously stimulate business transactions through monetary means or instruments. At that time, monetary policy was widely accepted as a means of reducing inflation, increasing output, and ensuring economic stability. Finally, in the 1960s, policymakers believed that long-term inflation and unemployment levels were in balance, so they switched to short-term fiscal policy. Besides that, monetary policy was tightened during the 1960s which enable fiscal policy to become a good instrument to boost the economy (Dharmadasa, 2015).

However, the accountability of fiscal policy was also doubtful and the effectiveness of the policy is provisional and started to disappear in the 1970s due to dramatically increase in international oil and food prices. At this time, taking action neither to raise the government spending nor cut taxes will help reduce the rate of inflation and unemployment. During the 1970s, there was greater attention given to a monetary policy which most of the policy makers switched from active fiscal policy to passive fiscal policy and focused on debt sustainability (Marzieh, 2015). The main factors in focusing on the monetary policy included the ability of the policy to stabilize the output gap, the issue of lags in the design and the implementation of monetary policy was highly accommodative as compared to fiscal policy (Blanchard et al., 2010). In addition, Ricardian Equivalence stated that certain instruments of fiscal policy may not affect the economy (Marzieh, 2015). It is also proven by Cochrane

(1999) and Christiano and Fitzgerald (2000) that fiscal policy was less effective to combat the sluggish growth. Lucas (1972) established a key theory for economic fluctuation models in which money was the primary element determining short-run real production movement. The aforementioned situation led to the rise of several models since the 1980s and 1990s such as Real Business Cycle (RBC) developed by Kydland and Prescott (1982), Dynamic Stochastic General Equilibrium (DSGE), New Keynesian (NK) Model and Rational Expectation (RE). In addition, technological advancements and educational resource developments in the 1980s and 1990s led to a more prosperous global economy. Therefore, the effectiveness of fiscal policy as the best tool had been debated among economists because it widened the fiscal deficit in most developed and developing countries. Therefore, monetarists believed that fiscal policy was the political agenda amongst leaders and does not benefit society. Thus, in the twentieth century, there was a greater change in policy management which most of the policymakers switched from fiscal policy to monetary policy.

The uncertain choices and decisions of monetary and fiscal policy have substantially led to a controversial debate among two philosophical opposed groups of economists. Monetarists believed that monetary policy has a greater impact and importance on economic activity than fiscal policy (Kretzmer, 1992). The monetarist school of thought holds that the money supply is crucial in controlling inflation and determining economic growth. Since the money supply directly affects aggregate demand, it has a direct impact on GDP. In addition, more empirical evidence showed that changes in the money supply and interest rate had a greater impact on prices, employment and output growth than fiscal variables did (Kretzmer, 1992). On the other hand, Keynesians believed that fiscal policy was essential for economic

stabilisation. They claimed that there is an error or invalidated methodologies to Friedman and Meiselman's conclusions of their studies in 1965.

The weaknesses of Friedman and Meiselman's studies include the choice of sample period which they included the Word War II years, do not take into account the lags and focus more on contemporaneous relationships which Keynes believed it was important to account for lags in the impact of policy changes. Moreover, the most serious criticism was Friedman - Meiselman's failure to respond to the measures of fiscal and monetary policy. For example, Friedman and Meiselman used autonomous expenditures such as the fiscal deficit, which move in the opposite direction with economic growth (Kretzmer, 1992). In particular, if the government increase autonomous expenditure to increase economic activity, it is supposed to reduce the deficit by generating tax revenue. However, even if the initial increase in government spending had a significant effect on output, the relationship between economic growth and autonomous spending would appear weak.

However, until the twentieth century, there is no consensus among economists regarding the most effective policy options in determining economic performance. Additionally, there is still inconclusive evidence on the effectiveness of policy stances on economic growth and price stability. Due to this scenario, the Keynesian theory became popular among policymakers because it demonstrated the ineffectiveness of certain monetary policy implementation through currency and financial crisis. During the global financial crisis 2007-2008, the monetary policy failed to play its role in reducing inflation, price level and unemployment (Dharmadasa, 2015). After the Great Depression, the financial crisis brought remarkable effects and damages on the financial system and to the world economy compared to other economic crises. Hence, it was highly supported that the Keynesian theory of laissez-fair policies was suitable

to implement through government expenditure. In other words, the government can boost the aggregate demand (AD) through its spending and stimulus is essential to fight against the depression.

Apart from that, the liquidity trap is another issue that forced people to save money due to unexpected events such as the war of deflation. The liquidity trap occurred because of the insufficient aggregate demand (Dharmadasa, 2015). In other words, if the supply of money increases, the interest rate does not fall. It is in line with Keynesians theory which monetary policy promotes the economy by lowering the interest rate. Keynesians believed if a liquidity trap occurs even there are further increments of money supply in the market, the interest rate will not be lowered, and hence economic expansion will be stifled (Dharmadasa, 2015). However, some neo-classical claimed that even if a liquidity trap exists, the money supply can still boost the economy by raising money stock, resulting in an increase in aggregate demand. This method has been implemented through Quantitative Easing (QE) by the several banks in Japan, US, UK and Eurozone implemented during the 2008-2009 financial crisis.

According to Keynesians, QE is quite inflationary and brings greater impact to the economy which output can only increase through fiscal expansion and does not affect the interest rate and crowding-out effects as well (Dharmadasa, 2015). The goal of Quantitative Easing is to entice banks to provide more loans in order to purchase government assets and replace those that they've sold to the central bank. It substantially led to a better environment for investors which this process helps in increasing the stock price and lowering the interest rate. Hence, it eventually boosts the investor's confidence to get involved in economic activity and stimulate growth. For example, the Japanese government has implemented this method during a great

recession following the 2008 financial crisis, in which the sales tax was increased to 8% in 2014, forcing the Japanese government to release US$ 660 billion to create an inflationary atmosphere (Dharmadasa, 2015). The Japanese government failed to achieve its inflation target of 2%, but the approach was effective and successful.

Nevertheless, Friedman (1956) and Friedman and Schwartz (1963) asserted that monetarist criticizes the Keynesian approach, stating that money is fundamental to the economy and that money interacts with other macroeconomic indicators. They believed that the demand for money from the public was stable and may not be affected by the fluctuations in interest rates. Therefore, a rise in aggregate demand as a result of monetary growth could have a positive impact on nominal GDP. In addition, it would apply for the short term. Conversely, if the economy reaches full employment in the long run, the output does not affect by monetary expansion but creates inflation. According to Dharmadasa (2015), monetarists argued that the increase of AD through government spending will induce inflation in an economy. As proposed by Friedman (1948), an increase of '*k* percent' in the amount of money in circulation can prevent inflationary pressures. Nevertheless, if the economy achieves stabilization, Monetarists acknowledged the Keynesians theory that stability of the economy can only be achieved through accommodating fiscal policy and government involvement. The Keynesians theory is useful for increasing AD and controlling AD during an inflationary period.

Different theories support differing viewpoints on the effectiveness of monetary and fiscal policy as economic policy instruments, which encompass the above situations. This creates a policy dilemma among policymakers which led to the bulks of questions about how to stimulate the economy, stabilize prices, achieve full employment and enhance output while promoting and preventing cannot be done at

the same time. Therefore, to achieve macroeconomic goals, economists recommend using both policy approaches. Mundell (1971) proposed that monetary and fiscal policy should be employed together where monetary policy is used to control prices while fiscal policy used to increase the total supply (AS) of goods and services in the economy. A policy mix was discussed as an option to provide economic development and price stability since neither can be achieved by a single policy. On the contrary, unorthodox economists argued that monetary policy should be utilised to achieve economic growth while fiscal policy is appropriate for price stabilisation (Dharmadasa, 2015). Policy mix approaches, according to Brunner and Meltzer (1997) highlighted the importance of saving, private investment, and FDI to boost economic growth. The coordination of monetary and fiscal policy was a very important aspect because harmonization of policies eliminates the conflict of high-interest rates and budget deficit. It has also resulted in cost reduction and price stability. In addition, policy mix contributed to financial system stability, hence it decreases government criticism of the central bank operation (Sargent and Wallace, 1981).

2.3 The Conceptual Framework

This section is divided into two sections. The first section presents the conceptual related to monetary policy. This section covers both conventional and unconventional monetary policy while the second section discusses the concepts related to fiscal policy.

2.3.1 The Conceptual Related to Monetary Policy

Monetary policy is a policy instrument that determines the amount and growth rate of money supply in the market (Mishkin, 1995). It is a crucial tool for controlling

macroeconomic variables such as inflation, unemployment and exchange rate. Monetary policy is divided into conventional and unconventional policies [Cúrdia and Woodford (2010); Marzieh (2015); and Inouey and Rossi (2019)]. Figure 2.1 depicts the classification of monetary policy.

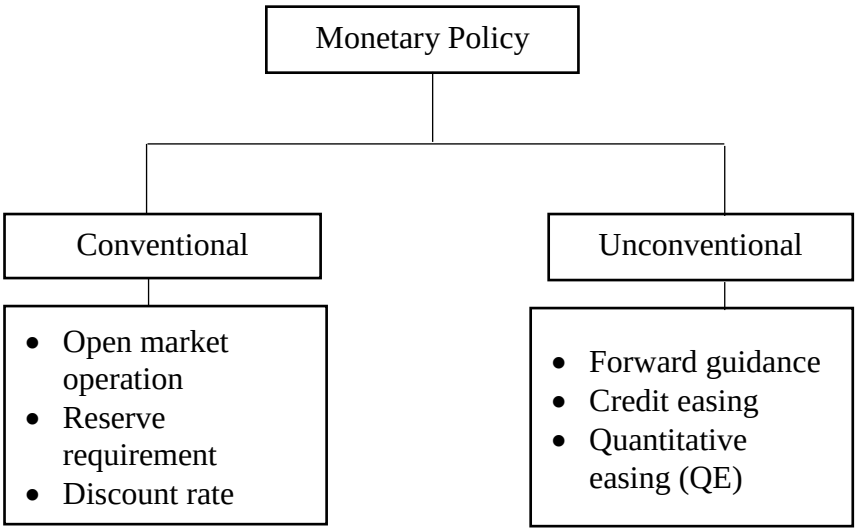


Figure 2.1: Classification of Monetary Policy

Central banks use both conventional and unconventional monetary policies to foster economic growth, interest rates, and the amount of money [Marzieh (2015); Inouey and Rossi (2019); Simon and Frank (2019) and Sheedy (2017)]. First, the three most common monetary policies utilised by central banks will be discussed in detail. Central banks have since adopted three unorthodox monetary policies, but they aren't as traditional as the most recent one, which was implemented in 2008. The unconventional monetary policies that will be discussed are the ones that are the most used since they are effective.

Conventional and unconventional monetary policies are determined by the economic situation of a country. It is critical to understand whether tightening