EXAMINE STABILITY OF DEMAND FOR MONEY IN MALAYSIA: USING AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL

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EXAMINE STABILITY OF DEMAND FOR MONEY IN MALAYSIA: USING AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL.

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By

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ABSTRACT

The main purpose of this research is to examine the stability of demand for money (M2 and M3) from year in Malaysia using quarterly data over the period 1982:1 to 2009:4 using the Autoregressive Distributed Lag. The macroeconomic variables that I used in this thesis are GDP, interest rate, exchange rate, and stock price. The estimated results of GDP, interest rate, exchange rate and stock price (KLCI) with respect to monetary aggregate can be used to determine the stability of money demand. The cointegration, error correction model (ECM), Autoregressive Distributed Lag (ARDL) and CUSUM and CUSUM of squared test has been applied for empirical analysis. In this thesis, I used bound test to test long run relationship. The test results reveal that, there exist a long run and short run relationship among the variables. The long run demand for money for M2 and M3 are specified and estimate by using ARDL approach. The calculated error term from the long run monetary aggregate M2 and M3 are then used in the error correction model (ECM) of M2 and M3 respectively. The result shows that only GDP and KLCI have relationship with monetary aggregate (M2) in long run and short run. Meanwhile for monetary aggregate of M3 just Treasury bill rate and stock price (KLCI) have relationship in short run and long run. Finally, the results of the CUSUM and CUSUM of square test suggest that the estimated demand functions are stable. In a policy context, this finding actually to bring knowledge to policy maker that stability of money demand is very important to know how much money to be hold and to control our economy.

Based on the result in the long run and short determinants of monetary aggregate can be used when drawing a policy.

ABSTRAK

Tujuan utama kertas penyelidikan ini adalah untuk menguji kestabilan permintaan wang (M2 dan M3) di Malaysia dengan menggunakan data sukuan tahunan merangkumi tempoh 1982:1 hingga 2009:4 menggunakan "Autoregressive Distributed Lag Model". Pembolehubah ekonomi yang digunakan dalam penyelidikan ini ialah pendapatan benar (GDP), kadar bunga, nilai tukaran dan harga saham (KLCI) yang mempengaruhi permintaan wang boleh digunakan untuk menentukan kestabilan permintaan wang. Ujian "cointegration", "error correction model", "Autoreggressive Distributed Lag Model", dan ujian "CUSUM and CUSUM of squared" telah digunakan untuk keputusan empirik. Dalam penyelidikan ini juga menggunakan ujian sempadan untuk menguji hubungan jangka panjang. Keputusan ujian menunjukkan wujud hubungan jangka pendek dan jangka panjang antara pembolehubah. Ujian jangka pendek dan jangka panjang ditentukan dengan menggunkan model "Autoregressive Distributed Lag". "Error Correction Model" digunakan untuk menguji "error term" dalam jangka panjang bagi aggregate kewangan M2 dan M3. Keputusan kajian menunjukkan bahawa pendapatan benar (GDP) dan harga saham (KLCI) mempunyai hubungan dengan aggregate kewangan M2 dalam jangka pendek dan jangka panjang. Kemudian bagi aggregate kewangan M3 hanya kadar bunga dan harga saham(KLCI) mempunyai hubungan dengan jangka pendek dan jangka panjang. Akhirnya, ujian "CUSUM" dan "CUSUM of squared" telah dijalankan dan keputusan ujian menunjukkan aggregate kewangan M2 dan M3 adalah stabil. Dalam konteks polisi penyelidikan ini adalah untuk memberi

pengetahuan kepada penggubal polisi dimana kestabilan permintaan wang adalah sangat penting untuk mengetahui berapa banyak wang yang dipegang dalam ekonomi. Berdasarkan keputusan penyelidikan jangka pendek dan jangka panjang penentukan aggregate kewangan boleh digunakan dalam merancang polisi.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The money demand is under the monetary policy maker because the combination of supply and demand determines interest rates and therefore affects the final goals of monetary policy (Nguyen, H.D & Pfau,W.D 2009). Money demand is the key position in macroeconomics in general and monetary economics. The knowledge of the factors affect the demand for money is very important to make monetary policy and for choosing the instruments and intermediate target of monetary policy. So the stability of money demand is a precondition for an effective monetary policy especially for countries persuing a monetary target framework (Qayyum, 2005).[1]The main important to determine quantity for money demand are referring to the macroeconomics variable that effect demand for money such as interest rate, exchange rate, real income, unit trust, stock price, saving, import, export and other variable that effect money demand. Furthermore, money demand is very important to

[1] Sriram (2002) said that about the demand for money plays a major role in macroeconomics analysis.

encourage a wide range of economist to empirically study its determinants and stability.

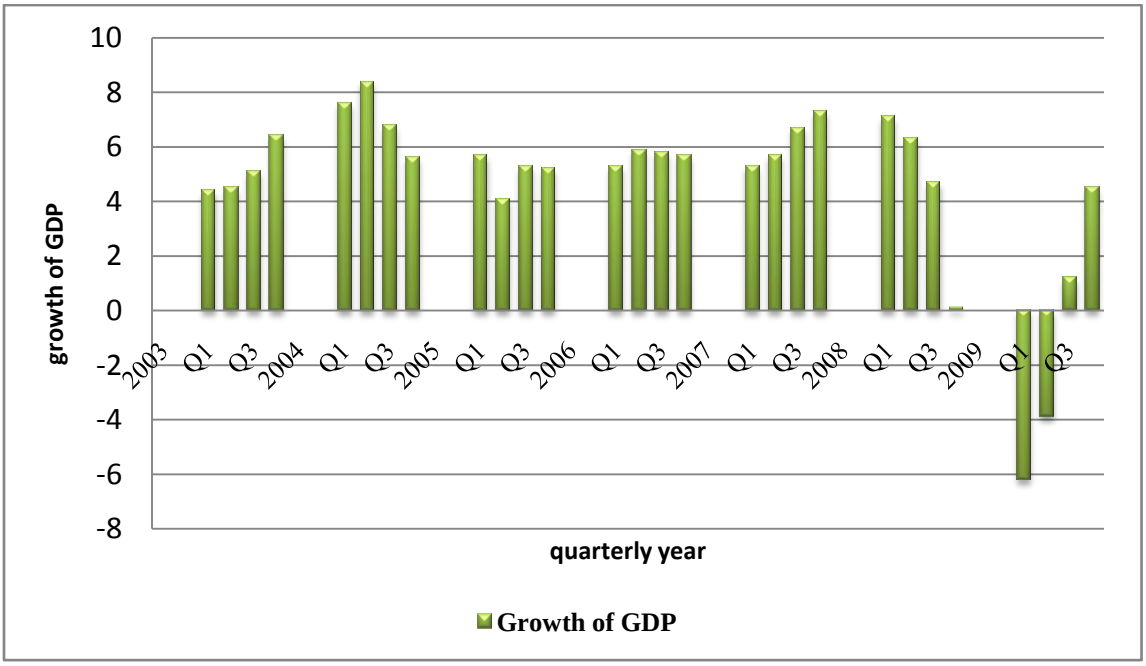
In Malaysia, the Central Bank of Malaysia controls the monetary policy. So if something happened to our economy like Global Crisis that effect the monetary policy, the Central Bank of Malaysia will take action become to normal. In mid 2007, there was a problem occurred in the United State financial system which lead to the major global financial crisis in 2008. Malaysia also faced the effect of Global Recession. Due to Global Recession, there is a decline in the regional equity, bond market, unit trust was crash and inflation was increased. So, the Central Bank of Malaysia must take over to conduct the monetary policy back to the normal. Furthermore, it will make questionnaire to determinants and stability of money demand and need strong relationship with macroeconomic variable. (Annual Report, 2009)

The objective of Central Bank of Malaysia is actually to maintain the economic growth and price stability. Then it should make analysis on the demand for money to provide policy maker with best information. Ahmad Zubaidi Baharumshah et al (2009) stated that monetary stability, a stock and its determinants is a prerequisite for monitoring and targeting of monetary policy.

Stability of money demand function is essential for smooth economic growth with stability. Several empirical studies examining the money demand function across economies are found in literature. Some of studies are, Qayyum (2005), Akinlo (2006), Sriram(2002), Samreth(2008), Hosein(2007), Satan & Billy (2008), Ahmad Zubaidi, Siti Hamizah & A.Mansur (2009), Bahmani-Oskooee & Wang (2007) and many more. They have contributed on determinants and stability of money demand function.

1.1.1 GDP Trend in Malaysia

Figure 1.1: GDP in Malaysia

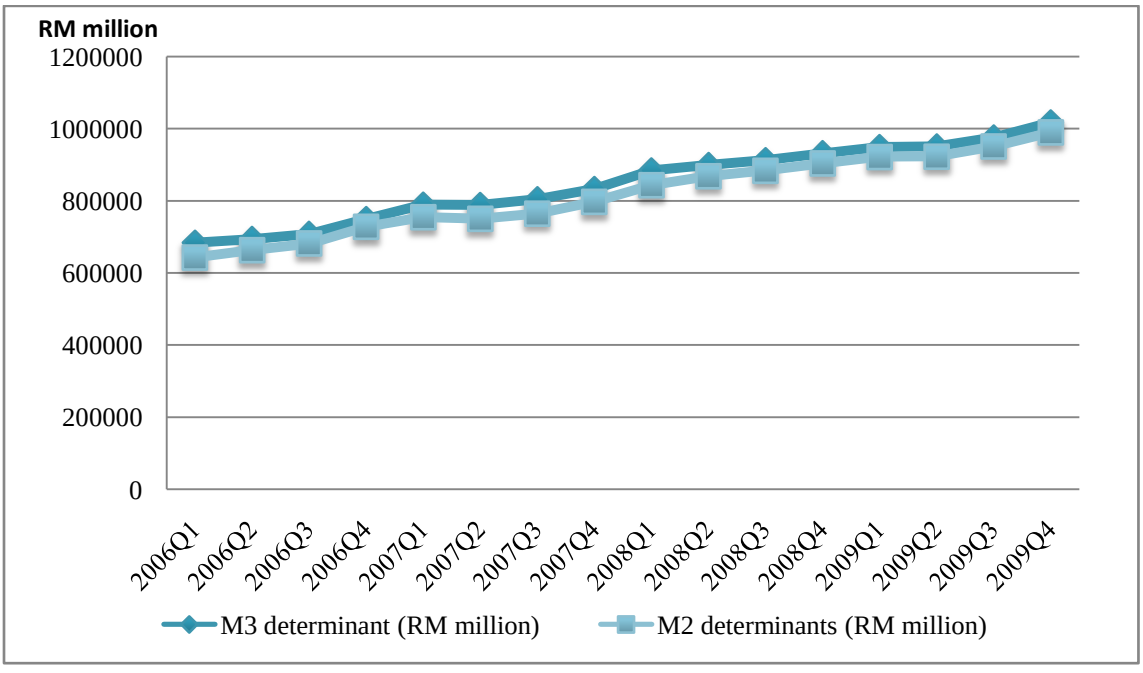


Sources: Central Bank of Malaysia

Trend of GDP in Figure 1.1 show that GDP have strong growth every year from the year 2003 to year 2008 but in 2009, GDP was down in quarterly 1 and quarterly 2. The increasing in GDP was supported by the increasing in domestic and external demand and the other indicators including industrial production, financial trends, external trade and conditions in the labor market. The outcomes of policy implemented in concert were seen in second half of 2009 as clear signs emerged that the impact of the crisis was contain.

1.1.2 Trend of M2 and M3 in Malaysia

Figure 1.2: Trend M2 and M3

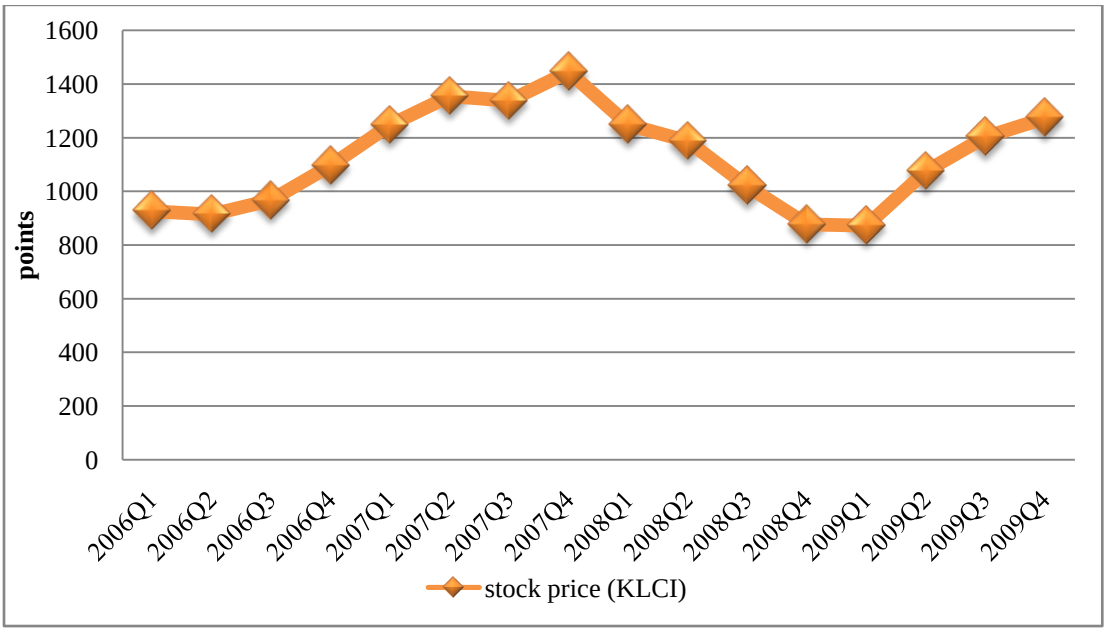


Sources: International Financial Statistic

In prospect of monetary, M3 grew faster than M2. Both of M2 and M3 record that the highest note of each year. According to Central Bank of Malaysia, the year 2009 showed the increasing in broad money which reflects mainly higher credit extension by the banking system to the private sector. The increasing in M3 was supported by higher government expenditure. It will represented by Figure 1.2.

1.1.3 Trend of Stock Price (KLCI) in Malaysia

Figure 1.3: Trend of Stock Price (KLCI)



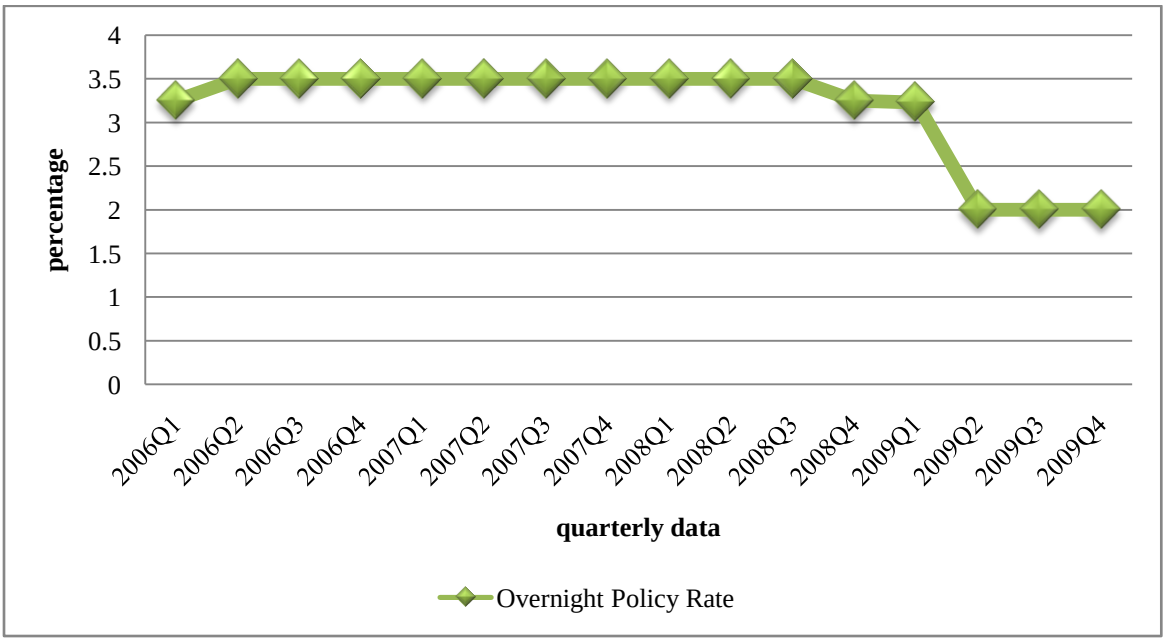
Sources: Central Bank of Malaysia

According to the Central Bank of Malaysia, in the fourth quarter of the year 2007, KLCI become negative caused of US sub-prime market. The KLCI was recording

higher at 1447 on 28 December 2007 due to strong performance of the plantations sector response to stronger crude palm oil prices and also positive of corporate earning. The information about the trend of KLCI will be represented in Figure 1.3.

1.1.4 Overnight Policy Rate (OPR)

Figure 1.4: Overnight Policy Rate



Sources: Central Bank of Malaysia

Overnight Policy Rate is overnight interest rate set by Central Bank of Malaysia used for monetary policy direction. It is the target rate for the day to day liquidity operation of Central Bank of Malaysia (Central Bank of Malaysia, 2007). In the Figure 1.4

Overnight Policy Rate encounters the fluctuation. Overnight Policy Rate was left unchanged from quarterly 2 year 2006 to quarterly 1 year 2009. Then, Overnight Policy Rate was down in quarterly 2 year 2009. The magnitude of the reduction in OPR was aimed at providing highly accommodative monetary environment to prevent a fundamental economic downturn.

1.2 Problem Statement

In year 2009, Malaysia actually faced with crisis which was in the year 2008. The OPR was left unchanged at 2%. Then the liquidity, interest rate, real income and other instrument were having some problems at that time. So the government played important role through the Central Bank of Malaysia to settle that crisis. From this crisis, the money demand analysis must be undertaken to provide policy maker with best information. This issue becomes interesting to research area to researcher to know the factor that affects money demand in Malaysia

Malaysia experienced the full impact of global in the first quarterly of the year 2009, the effect from this crisis in the advanced economies intensified the decline in global demand and economic activities. With stabilization of the global financial markets and subsequent recovery in the economies of the advanced countries, the rapid policy responses on the fiscal and monetary had an important role to protect domestic

demand. However, the question of what determines is level is still unclear and remains as a crucial research and policy agenda.

From the empirical study such as Husin, Jamal and Hylmee (2010), Sriram (2002) and Muzafar are using cointegration and error correction technique to examine the stability of money demand. There are examining the factor that effect money demand. Therefore, this thesis attempt to identify empirically, the key factors that effect of money demand. The broad issues in this study focus to identify whether the selected variables, which are real income (GDP), interest rate, exchange rate and stock price have a significant variable to monetary aggregate. According to previous study by Cameron (1979), the stability of demand for money becomes most critical features for central bank policy. If Central Bank relies on control of monetary aggregate as its policy instrument, it must believe in a known and reliable connection between changes in aggregate and argument of the money demand function. This is for its policy to have predictable effects on those arguments. Then if instability of the demand for money occurred could make required reserve change. However the stability of money demand was ignored in these studies, there has been no judgment about the appropriateness of the current money targeting framework.

Furthermore, the effectiveness and success of a monetary actually depends on a stable money demand. The stable money demand ensures that the money supply would have predictable impacts on economic variable such as inflation, interest rates, national

income, private investing and other variable. (Ferda & Mehmet, 2005) So, the stability issues in money demand function becomes an interesting research area for researchers to test the effectiveness of a given programmed.

Furthermore, non stationarity of time series data, an important characteristics of time series has been taken care of by the theory of cointegration whereas the question as to whether the estimated model is valid for policy analysis or not. So in this thesis, I used ARDL approach to avoid the spurious estimation result which is inconsistent estimates. Other than that I used ARDL because it does not fulfill the precondition of Johansen and Johansen where all variable need to be in first different.

Therefore, this thesis attempt to identify the empirically factors that affect money demand. The broad issue in this thesis focus to identify whether the selected variable, which are GDP, interest rate, exchange rate and stock rice have a significant relationship on the monetary aggregate. Other than that, which factor has the strongest relationship with monetary aggregate?

1.1 Objective of the study

Determined of money demand are referring to the macroeconomics variable are very important to our economy. Therefore understanding the instrument effect the demand for money is an important to exert an influence on economic growth.

1.1.1 General Objective

To examine the stability of demand for money in Malaysia: using ARDL model.

1.1.2 Specification Objective

The specification objectives in this research are:

i. To examine the factors that affect money demand in Malaysia
ii. To estimate the conintegration of the stability of demand for money using monetary M2 and M3 with used ARDL approach
iii. To estimates the error correction model in the stability of money demand
iv. To estimate the stability tests using CUSUM and CUSUMQ test.

1.2 Significant of Study

The purpose of this thesis is to examine the stability of demand for money (M2 and M3) in Malaysia using ARDL model. The macroeconomic variable I used in this thesis is GDP, interest rate, exchange rate and stock price. The estimated results of GDP, interest rate, exchange rate and stock price with respect to monetary aggregate can be used to determine the stability of money demand using ARDL model.

In this thesis, by using recent advances in time series analysis, I can solve the problems that arise as result of the presence of non stationary data. I can solve it by using the cointegration, error correction model (ECM) and Autoregressive Distributed Lag (ARDL) model .Finally, I used CUSUM and CUSUMQ test to test the stability of the long run and short run coefficient.

This thesis will help the researcher better understand factors that effect money demand. It will also help the researchers to determine the most significant independent variable that strongly contributes to the effect monetary demand. Furthermore, this study also provides information on the relationship between independent variable (GDP, stock price, exchange rate and interest rate) and the dependent variable.

After that this thesis will also help student and lecturer to analyze, evaluate and use this study to serve as a reference for future research.

Knowledge of the underlying factors that affect money demand is essential not only for the researcher or student but it also important to policy maker and financial sector. Then this also will be benefit to the policy maker and also to the financial sector .This research might be useful in order to develop a new policy to the country.

1.3 Scope of Study

In this thesis is done to examine the determinants and stability of the demand for money in Malaysia based on time series data for 27 year that is between 1982:Q1 to 2009:Q4. This thesis uses quarterly data on M2, M3, real income (GDP), interest rate, exchange rate, and stock price (KLCI). The data are getting from various sources including Security Commission Malaysia website, Malaysian Treasury's website, Annual Reports of Bank Negara Malaysia, IFS, Economic Planning Unit's website and Reports of the Ministry of Finance Malaysia.

1.4 Structure of Study

In this thesis, is divided in several chapters. Chapter 1 will provide the introduction, chapter 2 will discuss about theoretical and conceptual framework for the empirical analysis on money demand and the empirical literature. In chapter 3 I will discuss about the methodology and data. Chapter 4 will present about the estimation results and discussions on the finding of the analysis will be made. Finally, the main conclusion of this research will be present in chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Stability of demand for money is very important to our economy to maintain the stability and growth in the economy situation. To ensure the stability demand for money attained, the factor that influence the stability demand for money should be analyzed.

Understanding the determinants of monetary aggregate is very important to design policy intervention; the analysis of monetary aggregate has become one of the most important researches in order to help the policy makers to identify the factors associated with monetary aggregate.

In this section, I will focus on the theoretical framework and empirical literature on the determinants of money demand.

2.2 Theoretical Framework

In this section I will review the theoretical literature on determinant of the money demand. The theoretical literature determined the choice of variables to be used in the empirical specification.

2.2.1 The Irving Fisher's Theory

The American economist Irving Fisher (1911) has his own book name The Purchasing of Money. Fisher's explore about the classical approach of money demand. This book actually based on the role of money.

According to Fisher, in his analysis, Fisher just used a simple identity in aggregate economy; the value of sales must be equal to the value of receipts. That mean, the value of the sale must be equal to the number of transactions. Fisher stated that for the aggregate economy, we must follow the condition, which is (1) the value of sales must equal the value of transaction multiplied by the average price at which they take place (2) the value of purchase must be equal to the amount of money in the economy times the average it changes hand. (Laidler, 1991)

The simple equation is where Ms is the quantity of money, V_T is the transaction velocity of circulation, P is price level and T is the volume of transaction. That equation can be writing as follow:-

$$M_s V_T = PT \qquad (2.1)$$

The equation whether the equation of exchange is related or not with the theory of money? From the equation (2.1) if V_T and T are constant, and can say that the equilibrium price level is determined by quantity of money. So the new equation can be written as follow:

$$M_s \overline{V}_T = P\,\overline{T} \qquad (2.2)$$

Where, the bar over V_T and T are constant. We assume that the exogenous variable determined the quantity of money, which means the increasing in money supply, will rise in the equilibrium of price otherwise if decreasing in money supply will fall rise in the equilibrium of price.

Then modify this relationship above, and can write in equilibrium which is the demand for money must be equal with the monetary supply. Then by modify equation (2.2) the new equation money demand in the following way:

$$M_d = M_s \qquad (2.3)$$

Furthermore, modify this relationship by divide the both side with $1/V$

$$M_d = {}^{1}/_{\mathrm{V}}\,\mathrm{PT} \qquad (2.4)$$

After that from the above equation, replacing $1/V$ with k, and then get:

$$M_d = \mathrm{kPT} \qquad (2.5)$$

Then, lastly combine equation (2.3) and (2.5) to yield:

$$M_s\ {}^{1}/_{\mathrm{k}} = M_s\ \mathrm{V_T} = \mathrm{P\ T} \qquad (2.6)$$

2.2.2 The Cambridge Approach

[2]Cambridge economists were conducted by Marshall (1923) and Pigou(1917). Cambridge economist shows the role of wealth and interest rate in determining the demand for money. They did not ask Fisher did, what determines the amount of money an economy needs to carry out a given volume of transaction, but rather what determines the amount of money an individual agents would wish to hold given that the desire to conduct transactions make money holding attractive at all.

Furthermore, the Cambridge approach show the attention to the choice making behavior of individuals where constraints and opportunity costs are the central factors interacting with the agent taste. According to their approach, the main determinant of individual taste for holdings is the fact that it is a convenient asset to have, being universally acceptable in exchange for goods and services. Which means the more people has o undertake, the more they will want to hold. This approach is like Fisher's approach

However, it is impossible to individual hold money that they want. This is because the stock of cash balances cannot exceed total wealth. It is because wealth becomes the constraint on money holding. Stock or bonds are the alternative ways of holding

[2] Refer Sriram (1999) said that Cambridge Approach or cash balance approach is associated with the Cambridge University economist, especially A.C Pigou. Both versions are primarily concerned with money as a means of exchange and hence yield models of the transaction demand for money.

assets that yield an interest income that money does not. Furthermore, individual have a chance of making capital gains or losses by holding stock or bonds. In addition, money holding would involve an opportunity cost. This means the more money held the higher is the opportunity cost of holding money.

Then according to Cambridge approach, if their things being equal, the individual's demand for money in nominal term is proportional to the individual's nominal level of income. Then, the demand for money can be writing as:

$$M_d = \text{kPY} \qquad (2.7)$$

Where k is the fraction of income held in the form of money.

2.2.3 The Keynesian Theory

The General Theory of Employment, Interest and Money (1936) is the famous book; Keynes developed a theory of money demand on the basis of people motives for holding money. Keynes stated that have three motives of money holding namely:

a. Transaction motive
b. Precautionary motive
c. Speculative motive

The transaction motive, Keynes stated that, the level of transaction done by individual who is having positive relationship to the level of income. The higher the level of income, the greater is the amount of cash balances will be held.

Then, the precautionary motive is the second motive on holding money. People should hold their money to fulfill their needs and requirement such as payments of bill and meeting sudden emergencies caused by sickness or accident. From this situation people must hold their money for the unforeseen.

Then the speculative motive is the theory expected that people would hold wealth as either money or bond, but not both at once. Keynes believes that, the money demand for speculative purpose arises due to the fluctuation of the interest and price of bond. Which are changes in the rate of interest thus involves the changes in the price of bonds. When the interest rate rises, the price of bond falls and suffers negative capital gains

The conclusion is that transaction and precautionary demand for money will depends on the real income and therefore the demand for speculative depends on the rate of interest. The functions of money demand for Keynesian's are as follow:

$$M_d/_P = f(Y, r) \qquad (2.8)$$

2.2.4 Friedman's Modern Quantity Theory

Milton Friedman has developed a theory of demand for money. The Quantity Theory of Money: A Restatement, in 1956 is his famous article. Actually his analysis is close to Keynes and Cambridge economist. Friedman's stated that the demand for money must be influence by the demand for any assets.

The theory of asset demand indicates that the demand for money must functionalise of the resources available to individuals which is their wealth and expected returns on other assets relative to the expected return on money.

The Friedman's function for real money balances is

$$M_d/_P = f(Y_p , r_b , r_m , r_e , \pi^e, w, u)$$

Or

$$M_d/_P = f\left(\underset{+}{Y_p}, \underset{-}{r_b - r_m}, \underset{-}{r_e - r_m}, \underset{-}{\pi^e - r_m}\right)$$

Whereas,

$M_d/_P$ =demand for real money balances

Y_p=permanent income Friedman's measure of wealth

r_m=expected return on money

r_b= expected return on bond

r_e= expected return on equity

π^e=expected inflation rate

w=proportion of human wealth and non-human wealth

u=other factors influencing demand for money

The demand for an asset is positively related to wealth; money demand is positively related to Friedman's wealth concept which is permanent income. Permanent income as a determinant of the demand for money is that the demand for money will not fluctuate much with business cycle movements which have three types of assets; bond, equity and goods. The expected return on each of these assets relative to the expected return on money is the incentive for holding these assets rather than money was present. The services provided by banks on deposits and the interest payments o money balances will influence the expected return on money r_m.

In Friedman's money demand function, the $r_b - r_m$ and $r_e - r_m$ mean the expected return on bonds and equity relative to money which is when they rise the relative expected return on money falls and the demand for money will falls. Then, $\pi^e - r_m$ means the expected return on goods relative to money. When it rises, the expected return on goods relative to money rises and the demand for money falls.

2.3 Empirical Literature

Before I discuss the empirical literature on the factors that effect monetary aggregate, first, I view some generals' ideas for macroeconomic variable such as (real income) GDP, exchange rate, interest rate and stock price that effect monetary aggregate. If I expect the increase in real income (GDP) tend to increase in monetary aggregate.

Another important factor that effect monetary aggregate is exchange rate. If I expect depreciation in exchange rate, it will be effect in the further depreciation of the currency and will force individuals to hold money demand but if the exchange rate is uncertain, which could be positive or negative effect on the money demand.

On the other hand, stock price is also the variable that effect monetary aggregate. Actually it's due to the wealth and substitution effect. If wealth effect is larger than the substitution effect, it will increase in stock price means higher money holding and encourage people to hold more money. Therefore, the interest rates were seen as the most important factor that affected money demand.

Since, I have some general ideas on the expected factors that effect monetary aggregate. I will review the empirical literature for monetary aggregate determinants focusing on the factors that had mostly been discussed by researcher.

2.3.1 Real Income (GDP)

The real income stimulating came from the Keynesian theories which explain the connection between monetary aggregate and income where Keynes suggest that the higher the level of income, the amount of cash balance will be held.

Noor Azam Achsani (2010) investigates M2 money demand for Indonesia in the period of 1990:1 to 2008:3. The result show hat real income has positive relationship with real money demand both in long run and short run. He found that the increase of output will be followed by the increase in money demand.

Huisn, Jamal and Hylmee(2010) try to examine the demand for money in ASEAN-5 countries, namely Indonesia, Malaysia, Philippines, Singapore and Thailand using the ARDL approach to cointegration analysis. The empirical results show that there is unique cointegration and stable long run relationship among monetary aggregate and income. They found that the income elasticity is positive. I can say that the results showed the real income affects money demand for monetary aggregate M2 for all ASEAN-5 countries.

Bahmani-Oskoee (2001) employs the ARDL approach combine with CUSUM and CUSUMQ test. The results show that in Japan, M2 monetary aggregate is cointegrated with income. Furthermore, by applying CUSUM and CUSUM of squared test to an error correction model, researcher shows that long run M2 in Japan stable.Satan & Billy (2008) investigate about the stability demand for money in Tonga. They found that the demand for money function in Tonga is temporally stable and well determined. The estimated of income are well determined and their signs and magnitude are constant. The result shows that income elasticity is unity.

Qayum (2005) estimate the dynamic demand for money function in Pakistan that could be used for policy analysis. The model is estimated by using long data set and taking care of time series properties of variables. The cointegration method is applied and the error correction specification is used in the analysis. Moreover, the CUSUM and CUSUM of squared test are carried for testing the stability of the model. The analysis indicates that the measure of money demand M2 seems to have long run relationship with variable like real income.

The entire variable review above as well as those contained in the various literature surveys found this variable to be an important determinant of monetary aggregate. Higher income was associated with higher monetary aggregate.

2.3.2 Interest Rate

Another determinant of monetary demand suggested by Keynes Theory was the interest rate. The major implication of the Keynesian analysis is that mean the interest rate is very low, everyone in the economy will expect if to increase in the future hence, prefers to hold money whatever is supplied. (Sriram, 1999)

Bahmani Oskooee & Chi Wang (2002) examine the long run demand for money of Hong Kong using Autoreggressive Distributed Lag (ARDL) cointegration procedure

on quarterly data over the period 1985:1 to 1994:4. They found that in increase in the foreign interest rate raises the attractive of foreign bonds and encourage domestic residents to substitute foreign bond. This will reduce the demand for domestic money balances.

Wang, Y. (2007) examined money demand in China using quarterly data and employing stability test in conjunction with cointegration analysis and found that M1 but not M2 money demand in China is stable. They found that the interest rate play main role in China's money demand. However, Chinese money market are appears lack significant currency substitution with most the 20 foreign economies examined.

Tang, T.C (2004) found the positive sign interest rate. Even though the sign of some determinants are revised from long-run, however this implies an indirect effect on broad money demand through various transition channels and the monetary authority set interest rate exogenous.

Enzer J. Johnsen and Paulus (1976) explain that the Treasury Bill Rate probably represents free market interest rate satisfactory. The bill rate seems an acceptable representative for all markets rate. The result shows that one factor in the choice of monetary policy instruments is relative stability of the money demand relation compared with relation of real expenditures to interest rate. It is widely accepted that

the more stable the former relationship is relative to the latter, the more likely is a policy target using monetary aggregates to outperform an interest rate instrument in achieving target values for expenditures.

Kovland (1982) aims at supplementing the available empirical evidence of the functional stability and interest rate sensitive of the demand for money. Interest rate elasticity of the demand for money was found to be -0.26. The estimated functional form implies that it fell in absolute value as the level of interest rate decline.

Friedman and Kutner (1992) find positive implication for monetary policy is spread between the Treasury bill rates. It is difficult to imagine that the Federal Reserve System could use this interest rate spread as an intermediate policy target and it is doubtful that the relationship found here would contain to hold if it did. In general, I conclude that the interest rate implies indirect affect on monetary aggregate.

2.3.3 Exchange Rate

The exchange rate is normally included as an open economy to capture the affect for currency substitution in the economy. Its will impacts on the domestic demand for money. However it can be either negative or positive. In particular, if the currency depreciation leads public to anticipate further depreciation, than it exerts a negative

influence on money demand. By contrast, if depreciation is anticipated, then the exchange rate has positive influence on the money demand. Otherwise, if the currency depreciation increases the value of foreign assets held by domestic residents and accordingly, wealth the money demand could has increased. (Arize et al, 1995)

Samreth S. (2008) estimate about money demand function in Cambodia. The researcher accepts money demand model includes exchange rate. Exchange rates here refer to the amount of domestic currency per unit of foreign currency. Hence the increases of exchange will depreciate domestic currency against foreign currency and vice-versa. The coefficient of exchange rate will become positive and negative. Where, if the increase in exchange rate (depreciation) is perceived as the increase in wealth and leads to the rise of domestic money, the coefficient of exchange rate become positive. Otherwise if the exchange rate leads to the decease in domestic money (currency substitution), then the coefficient of exchange rate is negative.

Hosein S.R. (2007) estimates the demand for money in Iran using the autoregressive Distributed Lag (ARDL) approach to cointegrate analysis. The exchange rate coefficient is positive and highly significant; it appears hat a depreciation of Rial in Iran increases the demand for money supporting the wealth effects argument.

M.Khan and M.Zabir (2005) shows that in the long run real effective exchange rate have a significant impact on real money balances in Pakistan then the demand for real balances in Pakistan is stable despite the economic reforms pursued by the government.

I conclude that, from the above literature show exchange rate has positive and negative effect to money demand. If the increase in exchange rate (depreciation) is perceived as the increase in wealth and leads to the rise of domestic money, the coefficient of exchange rate become positive. Otherwise if the exchange rate leads to the decease in domestic money (currency substitution), then the coefficient of exchange rate is negative.

2.3.4 Stock Price

The stock price which is KLCI suggested by Keynes theory was another determinants of monetary aggregate. It depends on substitution effect or wealth effect. If wealth effect is larger than the substitution effect, an increase in the stock price means higher money holding. So, the economy agents would increase their demand for money balances for transaction, precautionary and speculative purposes since hey became wealthier as increase in stock price.

Ahmad Zubaidi, S.Hamizah & A. Mansur (2009) found that stock price have significant positive effects on money demand in China and the importantly, their default can lead to serious misspecification and stability in money demand function. Furthermore, a stable relationship between money, a stock is a prerequisite for monitoring and targeting of monetary aggregates.

Nguyen & Pfau(2010) find evidence for a cointegration relationship between real stock price. More importantly, statistical test show that real money demand in Vietnam is stable. For the result in this paper, show that stock market does impact real money demand and it through wealth rather than through the substitution effect.

Thus, stock price that the researcher researches that stock price (KLCI) have significant with money demand. Instead, if wealth effect is larger than the substitution effect, an increase in the stock price means higher money holding.

CHAPTER 3

METHODOLOGY AND DATA

3.3 Introduction

In this section I will explain about the method and procedure to analyze the determinant of demand for money in Malaysia. The evidence from the determinant is referring to monetary. In this section I will also discuss about the dependent variable which is monetary refer to M2 and M3 and the instrument that effect the monetary demand which is GDP, interest rate, exchange rate and stock price. In section 3.2 I will discuss about the demand function and the empirical specification for our analysis. Furthermore in the section 3.3 I will discuss about the measurement of variable based from section 3.2. After that, in section 3.4 I will discuss about the technique and procedures about the econometrics analysis. Finally, in section 3.5 I will discuss about the sources of data.

3.2 Model Specification

The formulating of demand for money I have started traditional quantity theory of money express as:

$$MV=Py^2$$

Based on the discussion on the potential determinants of money demand in the literature review, I have specified the money demand function as in Equation 3.1.

$$(M/P)_t^d=f(y, r, E, S) \qquad (3.1)$$

The specification of the money demand function drawn from the Keynesian Theory. In the equation above show that the determinant of demand for money. The model is also modified by considering the effects of other potential explanatory variables that has been discussed. The demand functions in the equation 3.1 show that M is money stock, P is general price level, V is velocity of circulation of money, y is real income, r is interest rate, E is exchange rate and S is stock price. Based on money demand I can specify the econometrics model as equation 3.2.

$$\ln (M/P)_t^d = \beta_0 + \beta_1 \ln (Y/p)_t + \beta_2 r_t + \beta_3 \ln E_t + \beta_4 S_t + \varepsilon_t \quad (3.2)$$

Where:

M = nominal money supply

P = Price level

Y = nominal income

r_t = short term interest rate

E_t = real exchange rate

S_t = real stock price

$(M/P)_t^d$ = real money balance

$(Y/p)_t$ = real income

ε = error term

t = time series

From the equation 3.2, the expected coefficients are positive for β_1 and β_2. The expected coefficient β_3 and β_4 to be negative or positive. The expected coefficient will summary in the Table 3.1.

Table 3.1 Determinants of money demand

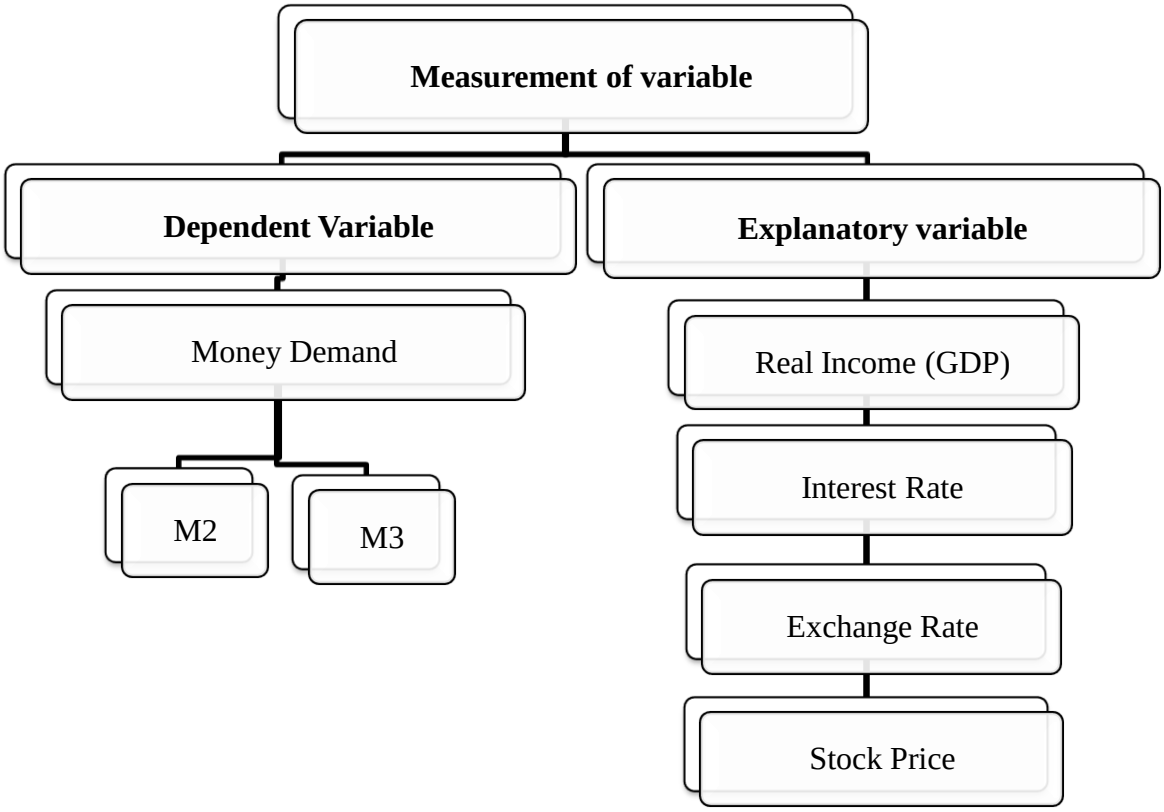
Specification Variable	Sign
Income	Positive
Interest Rate	Positive
Exchange Rate	Positive or negative
Stock Price	Positive and negative

From the above table, I will state that as per theories of money demand real income and interest rate related with demand for money. Beside that for exchange rate and stock price is uncertain.

3.3 Measurement of Variable

In this section, I will discuss a detail description and measurement of the variable in my econometric models at equation 3.1. I can divide it by two, which is dependent variable and explanatory variable. It will be shown at Figure 3.1.

Figure 3.1: Measurement of variable



The detail about graph above will be explain below

a) Money demand

In this study, I will contribute to understand about money demand behavior. I indicate that the determinant stability in money demand in Malaysia. In this study I specify to the evidence to monetary and stability. In this study also used M2 and M3 as a

measure of monetary aggregate and also to analyze its stability. Then I also examine the impact of factors such as real income (GDP), stock price, exchange rate and interest rate in affecting money demand function.

b) Real Income (GDP)

I used GDP data for income to represent the effects on the money demand. I expect that this variable have positive coefficient since increase in income will increase in monetary demand.

c) Interest rate

Interest rate is being as a proxy variable for money demand. In this study, I have interest rate which is 91 Day Treasury bill rate. 91 Day Treasury bill rate is being influenced by policy. I used this income actually because it has indirectly affected money. The expected coefficient for interest rate is positive.

d) Exchange rate

The exchange rate is that foreign exchange constitutes a part of the portfolio of economic agents. Depreciation in exchange rate may be effect in the further

depreciation of the currency. This situation will force individuals to hold money demand either due to substitution or wealth effects. The expected value of the coefficient of exchange rate is uncertain, which it is could positive or negative affect on the money demand.

e) Stock price

Stock price could also be another important variable affecting money demand function. It is possibly due to wealth and substitution effects. If wealth effect is larger than the substitution effect, it will occurred an increase in the stock price that's means higher money holding. So, in this situation, encourage people to hold more money. The impact from that will increase the demand for money in our economy. Furthermore the net effect of stock price will be either positive or negative to the money demand.

3.4 Econometric Procedures

The econometric procedures, I should examine the relationship between the explanatory variable that I discuss latter with the demand for money, firstly I will discuss about the unit root test before I explain with another econometric estimation

method. In the next part I used the Error Correction Model (ECM); Autoregressive distributed Lag (ARDL), CUSUM and CUSUM of squared test.

3.4.1 Unit Root Test

Unit root test will be used in this analysis, with using augmented Dickey – Fuller (ADF test). Dickey – Fuller test was used because to check the stationary of the variables. The negative number will be used in the Augmented Dickey – Fuller test. If I get more negative in my result, strictly I reject the hypothesis in the unit root test in the some level of confidence. So the equations of the unit root test as follows:

$$\Delta y_t = \beta_1 + \beta_{2t} + \delta y_{t-1} + \gamma i \sum \Delta y\ t-1 + \varepsilon_t \qquad (3.3)$$

Where Δ is the differences operator, t is the time trend and ε is the white noise residual of zero mean and constant variance. Meanwhile α, β_1, β_2, δ and γ are the set of parameters to be estimated. In the both test, which is null and alternative hypothesis in unit roots test are:

$H_0 : \delta = 0$ which mean y_t is non stationary

$H_1 : \delta \neq 0$ Which mean y_t is stationary

According to the test, I can rejected H_0 hypothesis if the t-test statistics less than the critical value, which means that, a unit root exists when if the null hypothesis of δ equals to zero that is not rejected (Gujarati ,2003)

3.4.2 Autoregressive Distributed Lag (ARDL)

According to Husin, Jamal and Hylmee (2010) stated that this method has their own advantage of avoiding the classification of variable into I (1) or I (0) and unlike standard cointegration test, where as in this method no need for unit root pre-testing. The error-correction version of the ARDL model affect to the variables in equation below:

$$\ln M_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 r_t + \beta_3 \ln E_t + \beta_4 S_t + \mu_t \qquad (3.5)$$

After that, the error-correction version of the ARDL will become as follows:

$$\Delta \ln M_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta M_{t-1} + \sum_{i=0}^{n} \beta_{2i} \Delta \ln Y_{t-1} + \sum_{i=0}^{n} \beta_{3i} \Delta r_{t-1} + \sum_{i=0}^{n} \beta_{4i} \Delta E_{t-1} +$$

$$\sum_{i=0}^{n} \beta_{5i} \Delta \ln S_{t-1} + \sum_{i=0}^{n} \gamma_1 \ln M_{t-1} + \gamma_2 \ln Y_{t-1} + \gamma_3 r_{t-1} + \gamma_4 E_{t-1} + \gamma_5 S_{t-1} + \mu_t \quad (3.6)$$

The null of no cointegration defined by,

$$H_0 : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$$

Is tested against the alternative of,

$$H_1 : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 \neq 0$$

by means of the familiar F-test

Nevertheless, the asymptotic distribution of F-statistic is non-standard irrespective of whether the variables are I(0) or I(1). Pesaran *et al*. (2001) tabulated two sets of appropriate critical values. One set assumes that all variables are I(1) and another assumes that all variables are I(0).This provides a band covering all possible classifications of the variables into I(1) and I(0)

or even fractionally integrated. In this method, if the calculated F-statistics is lies above the upper level of band, so I reject null hypothesis, indicating cointegration. If the calculated F-statistic is fall below the lower level of band, I did not reject the null hypothesis, supporting lack of cointegration. However, if it falls within the band, the results are inconclusive.

3.4.3 CUSUM and CUSUM of squared test

The CUSUM and CUSUM of squared test were purposed by Brown et al. (1975). Both of two tests are to test the stability of the long run and short run coefficient. When I get the result, which is if the plot of [3]CUSUM or CUSUM of squared test stays with in the 5% significance level, the coefficients estimates are said to be stable otherwise if the test is out 5% significance level means instable.

3.4.3.1 CUSUM test

This test actually looks at the cumulative sum of residuals. The CUSUM test is based on the following statistic:

[3] Ai Deng and Pierre Perron (2007) said CUSUM and CUSUM of squared test is the statistic which play an important role in theory and applications related to structural change. Then t also discuss about the power of this test in the presence of a one-time change in the parameters of a linear regression model.

$$W_t = {}^{1}/_{S} \sum w_t \quad , t = k+1, \dots , T \qquad (3.7)$$

Where,

s = standard error of the regression to all T sample points.

W_t = the cumulative sum and it is plotted against t

Then when I expected that b vector is constant from period to period $E(W_t) = 0$, otherwise if b changes, W_t tend to diverge from the zero mean value line. The significance of any departure from the zero line is evaluated by reference to a pair of straight lines, the distance between which increases with t. In this test actually shows the 5% critical line and also produces al plot of Wt against t then movement of Wt outside the critical line is not stable.

3.4.3.2 CUSUM of square test

This test is based on the test statistic as follow:

$$S_t = \sum_{t=k+1}^{t} w_t^2 \Big/ \sum_{t-k+1}^{T} w_t^2 \qquad (3.8)$$

The mean value line giving the expected value of this test statistic under the hypothesis of parameter constancy is:

$$E(s_t) = {}^{t-k}\!/_{T-k} \qquad (3.9)$$

Which goes from zero at t=k to unity at t=T. The significance of s_t from its expected line is evaluated by reference to a pair of parallel straight lines around the expected line. In this test actually shows the mean value line and pair of 5% critical lines and also gives a plot of s_t against t then movement o outside the critical line is not stable.

3.5 Data

The data used in this study is quarterly time series data from 1982:1 to 2009:4.The period has been chosen based on availability of the quarterly data collected from Economic Report of the Ministry of Finance Malaysia, Economic Planning Unit's website, Bank Negara website and also Malaysian Treasury's website This study uses quarterly data on monetary aggregate M2 and M3. The Treasury bill rate has been used for interest rates. Then I used exchange rate, stock price and real income (GDP)

is measured by real income (GDP) at constant price. After estimate the variable in real term, all variables are expressed by natural logarithms. (See Appendix)

CHAPTER 4

DATA ANALYSIS

4.1 INTRODUCTION

This chapter discuss about the empirical result for analysis based on the Autoregressive Distributed of Lag approach to derive the long run relationship between monetary and the explanatory variables while Error Correction Model (ECM) approach is used to see the short run adjustment. Firstly, after I proceed to another test, I should conduct the unit root test based on Augmented Dickey Fuller (ADF) approach and proceed with bound test upon the Autoregressive Distributed of Lag test to test the existence of a long run equilibrium relationship among all the variables.

4.2 Unit root test

In this section I should get stationary time series data to have a valid t-statistic and F-value statistic. Therefore, it is the first condition to test for unit root before I proceed to another econometric analysis. The result for unit root test will be shown in Table 4.

Table 4.1: The Augmented Dickey Fuller (ADF) test for a unit root test for I(0) and I(1)

Variable	Level		First Different	
	Constant	Constant & Trend	Constant	Constant & Trend
lnM2	-2.212794	-2.462966	-7.293228	-7.388692
	(0.2036)	(0.3453)	(0.0000)***	(0.0000)***
lnM3	-2.053955	-2.438870	-7.246257	-7.319965
	(0.2638)	(0.3571)	(0.0000)***	(0.0000)***
lnGDP	-2.009616	-2.281795	-2.482456	-2.508406
	(0.2822)	(0.4383)	(0.1242)	(0.3233)
REER	-1.192578	-1.927890	-1.9513252	0.509236
	(0.6738)	(0.6301)	(0.3067)	(0.9795)
TBR	-1.498093	-2.334215	-1.651207	0.214196
	(0.5292)	(0.4105)	(0.4475)	(0.9974)
KLCI	-1.874304	-2.062009	-1.304354	-1.164995
	(0.3426)	(0.5580)	(0.6180)	(0.9039)

Note: ***, * indicates the rejection of the null hypothesis of non-stationary at 1% and 10% significant level

( ) indicates the t-statistic value

Table 4.1 show the result for unit root test on all variables. The result which I obtain from my variables, which is ln M2, ln M3, ln GDP, Real Effective Exchange Rate, Treasury Bill Rate, Stock Price (KLCI) to be non-stationary at level then for M2 and M3 it shows stationary at first differentiation otherwise for another variable which is GDP, Real Effective Exchange Rate, Treasury Bill Rate and Sock price are non-stationary at level and also first differentiation.

Table 4.1 represents the unit root result based on Augmented Dickey Fuller (ADF) approach which categorized its analysis into two part, which are at level and first differentiation which are studied as constant and also constant with trend. The result presented use different lag specification to get the best result.

Based on Table 4.1 shows the t-statistics for all variables are statistically not significant to reject null hypothesis of non-stationary at any significance level. So I can say that these series are non- stationary at level. Then for upon these result I conclude that these variables contain a unit root. After that I proceed to ADF test at first difference, the null hypothesis of non-stationary is rejected at 1% significance level for M2 and M3. Otherwise some variable such as real income (GDP), exchange rate, interest rate and stock price are non-stationary. [4]So ARDL approach is suitable to my formulation of demand for money because I have stationary variable such as

[4] Pesaran & Pesaran noted that the advantage of ARDL modeling lies in its flexibility that can be applied when the variable are of different order of integration.
Bahmani-Oskooee also state that ARDL approach has the advantage of avoiding the classification of variables in I(1) or I(0) and unlike standard coinegration test, there is no need for unit root pre-testing.

monetary aggregate along with non-stationary variable real income (GDP), exchange rate, interest rate and stock price in the first different test.

4.3 Cointegration Tests

In this section, the cointegration test in the bounds framework involves the comparison between F-statistic with critical value which is generated for specific sample sizes. (Husin, Jamal & Hylmee, 2010). In this section I begin with an account of the results on the cointegration test. The calculated F-statistic along with the critical value for M2 and M3 are reported in Table 4.2. The calculated F-statictic which is wald test is necessary for testing the presence of cointegration relation among the variables.

4.3.1 Bounds Test

Bounds testing are the first step of the ARDL analysis; I test for presence of long-run relationship. The result for the bound test will be shown at Table 4.2.

Table 4.2: Bounds Test for the existence of a level relationship

	M2	M3
Calculated F-statistic	4.3535 ** (prob 0.037)	8.1939 *** (prob 0.004)
CRITICAL VALUE		
	LOWER	UPPER
1% significance level	2.193	3.161
5% significance level	2.564	3.650
10% significance level	3.373	3.161

Note: the critical value is taken from Narayan (2005) *, **, *** denote significant at the 1%, 5% and 10% levels

Table 4.2 present that calculated F-statistic along with the critical value. Using the asymptotic critical value computed by Narayan (2005), I found that the test statistics are significant at 5% level for M2 and 1% level for M3. Hence, these results will reject the null hypothesis of cointegration.

These tests also show the presence of valid long run relationships between the independent variables and dependent variable (M2 and M3). The F-statistic of 8.1939 for M3 which exceed the upper critical value at the 5% significant level respectively mean while for M2 also show F-statistic of 4.3535 exceed the upper critical value at 5% significant level respectively. The null hypothesis is rejected, indicating

cointegration. Therefore, I conclude that this test have long run relationship among independent variable and dependent variable.

4.4 Diagnostic test

These diagnostic tests actually want to ensure the goodness of the ARDL model. In this test will be perform the Auto-Regressive Conditional Heteroscedasticity (ARCH) to test the heteroscedasticity, LM test based on Breausch-Godfrey test to detect an autocorrelation, normality test to check the distribution of error term and finally the Ramsey RESET stability test. The result for this test will be discussed below.

4.4.1 Heteroscedasticity

If I want to test the heteroscedasticity problem, I perform the Auto-Regressive Conditional Heteroscedasticity (ARCH) test. The result for this test will be shown at Table 4.3.

Table 4.3: Auto-Regressive Conditional Heteroscedasticity (ARCH) test

lnM2		lnM3	
F-statistic	Probability	F-statistic	Probability
0.12036	0.729	1.6843	0.194

Note: Heteroscedasticity problem perform the ARCH test.

It has χ^2 distribution with one degree of freedom. The critical value at the 5% level of significant is 3.84.

Hypothesis testing:

H_0= Homoscedasticity

H_1= Heteroscedasticity

Based on the result, I found that the F-statistic for M2 (0.12036) and M3 (1.6843) is less then critical value 3.84. So we conclude that we failed to reject H_0 . So I conclude that I fulfilled the classical assumption that our model has constant variance of residuals or more specifically and did not have heteroscedasticity problem.

4.4.2 Lagrange Multiplier (LM) test

The Lagrange Multiplier (LM) tests based on Breusch-Godfrey tests for serial correlation actually to detect the autocorrelation problems in my model. It will be shown by Table 4.4.

Table 4.4 LM test

lnM2		lnM3	
F-statistic	Probability	F-statistic	Probability
7.8059	0.099	0.41486	0.981

Note: LM is the Lagrange Multiplier test for serial correlation. It has a χ^2 distribution with four degree of freedom. The critical value at the 5% level of significance is 9.48

Hypothesis testing:

H_0=no autocorrelation (no correlation between error term)

H_1=autocorrelation (correlation between error term)

According with result in table 4.4 the Lagrange Multiplier (LM) statistic, this is distributed as χ^2 with four degrees of freedom. Hence the calculated LM statistic for M2 (7.8059) and M3 (0.41486) is less than the critical value of 9.48. I conclude that the residuals of the estimated ARDL are free from serial correlation. So I fail to reject H_0 and conclude that no evidence of the presence of autocorrelation problem in our model.

4.4.3 Normality Test

Table 4.5 Normality Test

lnM2		lnM3	
F-statistic	Probability	F-statistic	Probability
0.95998	0.619	0.88596	0.194

Note: It has χ^2 distribution with two degree of freedom. The critical value at the 5% level of significant is 5.9915.

Hypothesis testing:

H_0= Residual (u) are normally distributed

H_1= not normal distribution

Based on the result, I found that F statistic is less then critical value. Hence, I conclude that I failed to reject H_0. Therefore I conclude that the residuals are normally distributed.

4.4.4 Ramsey Test

Ramsey RESET test is for functional specification. Which is when the test is successfully the ARDL model is correctly specified.

Table 4.6: Ramsey Test

lnM2		lnM3	
F-statistic	Probability	F-statistic	Probability
2.3302	0.127	20.739	0.000

Note: RESET is Ramsey's specification test. It has a χ^2 distribution with only one degree of freedom. The critical value at 5% level of significant is 3.84

Based on result in table 4.6, report that the Ramsey's RESET test for functional specification, which is distributed as χ^2 with only one degree of freedom. The result for M2 show that, the calculated RESET statistic is less than its critical value of 3.84, so I conclude that the ARDL model is correctly specified otherwise for M3 I conclude that he ARDL is correctly not specified because their RESET statistic is more than critical value.

4.5 Long Run and Short Run Estimation

In this section I report the long run and short run estimation. The estimates of the long run coefficient from the ARDL specification of the short run dynamics are shown by the Table 4.7

Table 4.7 Full Information Estimates Equation 3.6 (M2 Monetary Aggregate)

Short-Run Coefficient Estimates					
Lag Order	ΔLn M2	ΔLn GDP	ΔKLCI	ΔLnREER	Δ TBR
0		1.0554***	0.1014	-0.1426	-0.3044***
		(1.0118)	(1.6256)	(-0.87360)	(-2.9737)
1	0.44380***	-0.6418***	0.6157***	-0.2700	
	(2.7298)	(-6.0010)	(4.3329)	(-1.2259)	
2	-0.25401**		0.3765***	-0.3394	
	(-1.973)		(3.5723)	(-1.8712)	
3	-0.86912		0.1846***		
	(-0.95039)		(3.0653)		
4	-0.15543				
	(-2.3175)				
Long-Run Coefficient Estimates					
C	Ln M2	Ln GDP	KLCI	LnREER	TBR
0.2512	-0.23088*	0.26302***	0.1372*	-0.1596	-0.1285
(0.14553)	(-2.5542)	(2.7920)	(2.7453)	(-1.2304)	(0.022213)
Ecm_{t-1}	-1.2343***				
	(-6.228)				

Notes: ( ) value of the t-raio. Then *, **, *** denote significant at the 1%, 5% and 10% levels

According to the table 4.7 shows that, only GDP and KLCI are significant at 1% that means have relationship with monetary aggregate. GDP has strongly positive relationship to the monetary aggregate (M2) in the long run is statistically significant at 1% level. Meanwhile in the short run, has positive and negative related to the monetary aggregate (M2) is statistically significant at 1% level. It is consistent with previous studies such as by Noer Azam(2010) and Bahmani-Oskooee(2007).

Stock price which is KLCI actually has strongly positive relationship to monetary aggregate (M2) in the long run analysis is consistent with other studies such as by Ahmad Zubaidi Baharumshah et al (2009) and Nguyen and Pfau (2010) is statistically at 1% level. However in the short run have positively related to the monetary aggregate (M2) is statistically significant at 1%.

Then, for the Error correction terms (ECM) show in table 4.7, are found negative sign and highly statistically significant at the 1% level. We found that the coefficient of ECM (-1) is -1.2343. These imply that deviations for the long run in M2 corrected by 123% over the following year. That means the adjustment is relatively high. So I can conclude that, the result at table 4.7contains the final estimation results of the error correction model based on the ARDL approach.

Table 4.8 Full Information Estimates Equation 3.6 (M3 Monetary Aggregate)

Short-Run Coefficient Estimates					
Lag Order	ΔLn M3	ΔLn GDP	ΔKLCI	ΔLnREER	Δ TBR
0		1.2481***	0.3050***	-0.1935	-0.500***
		(21.8141)	(5.0305)	(-1.4270)	(-5.34120)
1	3.3031***	-3.8454***	0.1424***	-0.1861***	-0.6102**
	(6.8418)	(6.6189)	(5.0691)	(-3.3448)	(-2.1454)
2	1.9580***	-5.4074***	0.1040***	-0.2000***	-0.8425**
	(5.1811)	(-2.5442)	(4.3513)	(-4.0596)	(-3.0236)
3	0.79919***	-3.8967***	0.5748***	-0.1637***	-0.8749***
	(3.2465)	(-1.2852)	(3.1617)	(3.8534)	(-3.7137)
4	0.31915**	-4.2673***	0.2085	-0.1567***	-0.7639***
	(1.9697)	(0.82909)	(1.7195)	(-4.1011)	(-4.2963)
5	0.15361	-2.5965***	0.8343	-0.1159***	-0.4269***
	(-1.0607)	(0.32971)	(1.3242)	(-4.2391)	(-5.0802)
6	-0.23007***			-0.7037***	
	(-2.8860)			(3.3222)	
Long-Run Coefficient Estimates and Diagnostics					
C	Ln M3	Ln GDP	KLCI	LnREER	TBR
-0.01087***	0.15281	-0.08337	0.3661***	-0.2330	-0.2100*
(-5.7249)	(1.7861)	(-0.94780)	(4.9034)	(-1.4107)	(-2.5718)
Ecm_{t-1}			-5.2594***		
			(-8.4887)		

Notes: ( ) indicates the value of the t-ratio. *, **, *** denote significant at the 1%, 5% and 10% levels

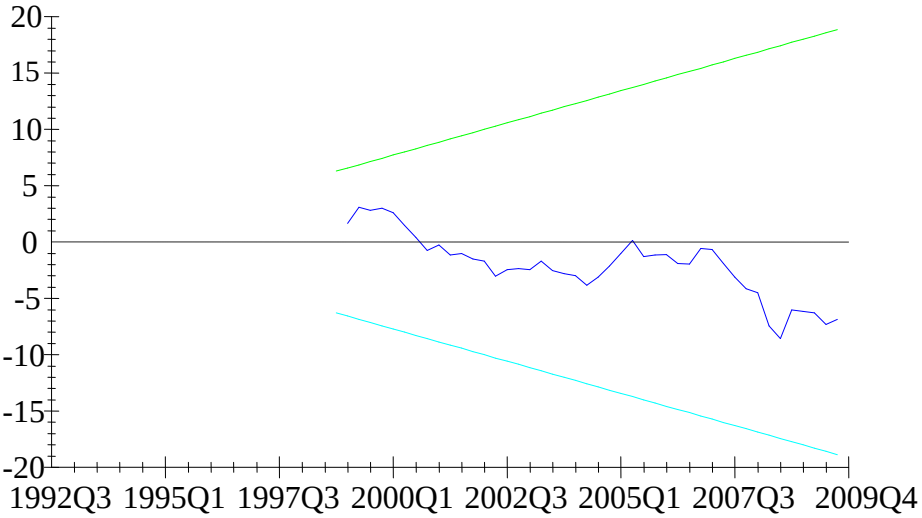
According to the table 4.8 shows that, only TBR and KLCI significant and have relationship with monetary aggregate. TBR has negative relationship to the monetary aggregate (M3) in the long run is statistically significant at 10% level. Meanwhile in the short run also has negative related to the monetary aggregate (M3) is statistically significant at 1% level.It is consistent with another study such as by Hamori and Hamori(2008).

Stock price which is KLCI actually has strongly positive relationship to monetary aggregate (M3) in the long run is statistically at 1% level. However in the short run have positively related to the monetary aggregate (M3) is statistically significant at 1%.

Then, for the Error correction terms (ECM) show in table 4.7, are found negative sign and highly statistically significant at the 1% level. I found that the coefficient of ECM (-1) is -5.2594.So I can conclude that, the result at table 4.7 contains the final estimation results of the error correction model based on the ARDL approach.

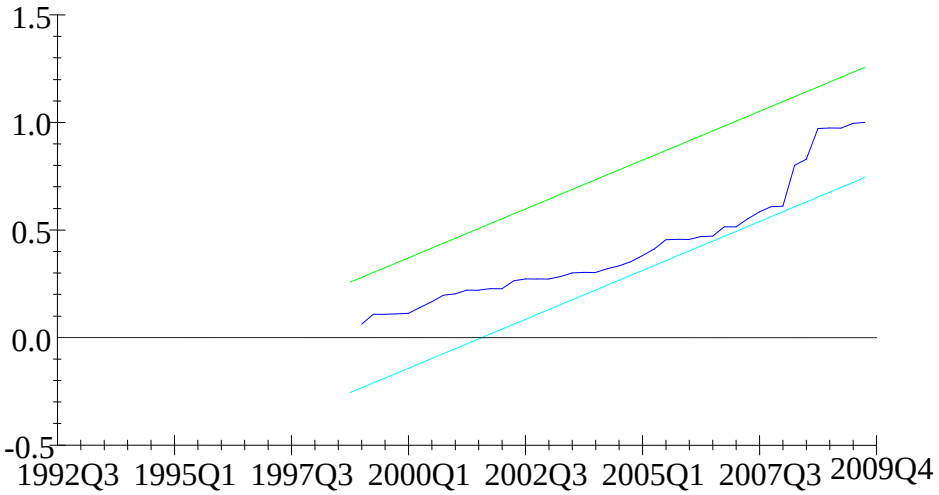
Figure4.1-4.4 CUSUM and CUSUM of Squared for Monetary Aggregate (M2 and M3)

Figure 4.1 Plot of Cumulative Sum of Recursive Residuals M2



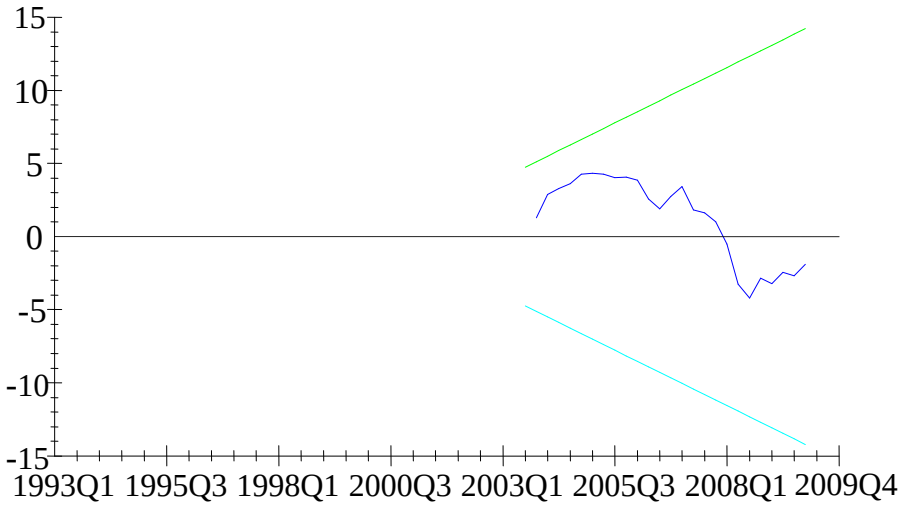
The straight lines represent critical bounds at 5% significance level

Figure 4.2 Plot of Cumulative Sum of Squares of Recursive Residuals M2



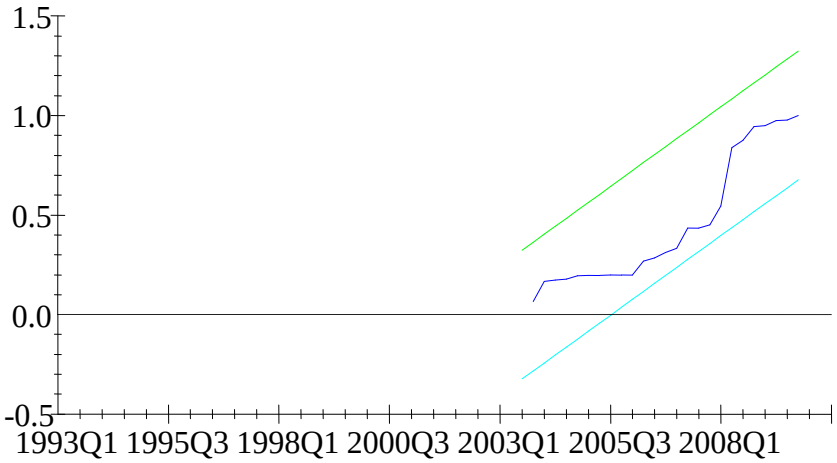
The straight lines represent critical bounds at 5% significance level

Figure 4.3 Plot of Cumulative Sum of Recursive Residuals M3



The straight lines represent critical bounds at 5% significance level

Figure 4.4 Plot of Cumulative Sum of Squares of Recursive Residuals M3



The straight lines represent critical bounds at 5% significance level

Hosein (2007) said that, the CUSUM test is based on cumulative sum of recursive residuals based on the first set of n observation. Then CUSUMQ is based on the squared recursive residual. Figure1-4 shows the plot of cumulative sum of recursive residual and cumulative sum of squares of recursive residuals. It shows that the statistic stays within 5% significant level. So I can say that the coefficient estimates are stable. I conclude that the monetary aggregate M2 and M3 have stability and can use as monetary policy.

CHAPTER 5

CONCLUSION AND POLICY IMPLICATION

5.1 Conclusion

In this thesis I have examine the stability of demand for money in Malaysia over the period 1982:1 to 2009:4. Since, stability of demand for money is very important to economic in formulating suitable money demand function and knows how the fast innovative is taking place in the economy. At here, I'm very interesting to analyze its determinants. So now, the question of what determines is still unclear and remains an important research and policy agenda.

The main objective of this thesis is to examine the stability of demand for money in Malaysia: using ARDL model. The variable I choose in this analysis is guided by the theoretical framework based on Keynes theory and also based on previous research. The variables that I'm using in my thesis are real income (GDP), interest rate, exchange rate and stock price (KLCI). All variable are the key variable that effect monetary aggregate. In this thesis also I used bound testing using ARDL model to examine long run relationship while Error Correction Model (ECM) is used to see the

speed adjustment in the short run. Furthermore, I have conducted the CUSUM and CUSUM of squared test to test stability of demand for money.

Based on my result for long run analysis, I found that stock price KLCI) and real income (GDP) have a statistically significant impact on monetary aggregate M2 meanwhile interest rate (TBR) and stock price (KLCI) have statistically significant impact on monetary aggregate M3. The result for Error Correction Model (ECM) also shows that my model is well adjusted in short run.

In addition, the stability test using CUSUM and CUSUM of squared test, I found that monetary stability aggregate M2 and M3 are stable in 5% significant level. These results suggest that, it is possible to use monetary aggregate M2 as a target of monetary policy in Malaysia. As far as, concerned I assume that stability of money demand will reduce the uncertainty associated with the financial environment and will increase the credibility of its ability to pursue a monetary target.

This finding has successfully achieved its objective with significant variable found to influence money demand in Malaysia. Moreover, the ARDL and CUSUM and CUSUMQ test also support my arguments that expect economic growth, to maintain and to protect our policy. The stability of demand for money is very important to

economic in formulating suitable money demand and know fast innovative is taking place.

5.2 Policy Implication

In a policy context, this finding actually to bring knowledge to policy maker that stability of money demand is very important to know how much money to be hold and to control economy. Furthermore, monetary policy is very important to economy enhance the economic growth in Malaysia. From the CUSUM and CUSUMQ test I had proven that M2 are stable than M3 and it can be used when drawing a policy. Therefore, the information based on my results on long-run and short run determinants of money demand can be used when designing a policy.

The several policy implications can be drawn on my result. Based on my result show that real income (GDP) is the one factor influences monetary aggregate M2. I have successfully found positive correlation between monetary aggregate M2 at 1% significant level. Means a rise in real income would lead to a 0.26% rise in demand for money. Meanwhile in monetary aggregate M3, it is not significant and did not have correlation with monetary aggregate. So the positive relationship with monetary aggregate M2 seems to support the view of the monetary economist who would advocate that the monetary supply should be to allow to grow.

Based on the result, stock price (KLCI) has significant impact on the demand for M2 and M3. One unit rise in KLCI lead to a 0.13 unit increasing in the monetary aggregate M2 meanwhile one unit rise in KLCI lead to 0.37 unit increase in the monetary aggregate M3.That means, the wealth effect is over the substitution effects, increasing in stock price (KLCI) means more money will be hold. The increasing of stock price (KLCI) because strong performance of the plantations sector response to stronger crude palm oil prices and also positive of corporate earning. Therefore policies should focus more on that sector to increase stock price.

Lastly, interest rate on 3 month Treasury bill rate has negative influence on monetary aggregate M3 at 1% significant level. This means that, interest rate can be used to influence money policy in Malaysia. The implication of this is that if M3 used as monetary target, it will quite a large change in interest rate to induce a desire change in the demand for money. So this simply suggests that there is a limit to which monetary authorities can use the interest rate to reduce demand for money. It is indicative of the fact that monetary policy may not necessarily achieve the maximum effective. Thus, policies to stabilize the economy must go beyond monetary policy.

5.3 Recommendation for Future Studies

In this study just have 4 explanatory variables in explaining the monetary aggregate M2 and M3, so for the future study we should add more variables such as inflation, saving, import, export and other explanatory variables that may explain the model better.

Since this study only used data for 27 years, so for future research, should have larger data whether we add more years or divide the data into monthly data to provide good results. Then, to have more information and knowledge provide better result, in future result should add more country to make comparison with other countries to see how the result may differ across countries. More interesting, future study may add Asian countries such as Thailand, Singapore, Philippines and Indonesia since some study such as by Husin, Jamal and Hylmee (2010) are examine the demand for money in ASEAN-5 countries which is Indonesia, Malaysia, Philippines, Singapore and Thailand using autoregressive distributed lag (ARDL) approach to cointegration analysis.

REFERENCE

Ahmad Zubaidi Baharumshah, Siti Hamizah Mohd & A. Mansur M. Masih. (2009). The Stability of Money Demand in China: Evidence from the ARDL Model. *Economic System*. Vol.33, pp. 231-224

Akinlo, A.E. (2006). The Stability of Money Demand in Nigeria: An Autoregressive Distributed Lag Approach. *Journal of Policy Modeling*. Vol.28, pp. 445-452

Bahmani-Oskooee, M. & Bohl, M.T. (2000). German Monetary Unfcation and the Stability of the German M3 Money Demand Function. *Economics Letters*, Vol.66,pp. 203-206

Bahmani-Oskooee, M. & Ng,R.C.W. (2002). Long-Run Demand for Money in Hong Kong: An Application of the ARDL Model.Internaional J*ournal of Business and Economics.* Vol.1 (2), pp. 147-155

Bahmani-Oskooee,M. & Wang, Y. (2007). How Stable is the Demand for Money in China?*Journal of Economic Development*. Vol.32 (1), pp. 22-33

Cameron, N. (1979). The Stability of Canadian Demand for Money Function 1954-175. *The Canadian Journal of Economics*. Vol.12 (2), pp. 258-281

Coenan, G. & Vega, J.L. (2001). The Demand for M3 in the Euro Area. *Journal of Applied Econometrics*. Vol.16, pp. 727-748

Deng, A. & Perron, P. (2008). A non-local Perspective on the Power Properties of the CUSUM and CUSUM of squares tests for structural change. *Journal of Econometrics*. Vol.142, pp. 212-240

Department of Statistic Malaysia.www.statistic.gov.my

Economic Planning Unit (EPU).www.epu.jpm.my

Economic Report, 1990-2009, Ministry of Finance Malaysia

Enzler, J. Johnsan, L. & Paulus, J.(1976). Some Problems of Money Demand. Brookings *Papers on Economic Activity*. Vol:1979, pp. 261-280

Friedmen, B.M. & Kuttner K.N.(1992). Income, Price and Interest Rate. *The American Economic Review*, Vol.82 (3), pp. 472-492

Froyen, R.T(2005).*Macroeconomic Theories and Polices*, 8th Edition.Pearson Education Inc

Gujarati, D.N. (2003). *Basic Econometrics*, 3rd. Edition. McGraw Hill, Inc

Hamori, S & Hamori, N. (2008). Demand for Money in the Euro Area. *Economic System.* Vol. 32, pp. 274-284

Hosein, S.R. (2007). Demand for Money in Iran : An ARDL Approach. *MPRA Working Paper*. Munich Personal RePec Archive. Processed.

Husin Abdullah, Jamal Ali, & Hylmee Mahathir. (2010). Re-Examining the Demand for Money in Asean-5 Countries, *Canadian Center of Science and Education*, Vol.6(7).

Husin Abdullah, Jauhari Dahlan & Helm Hidthir (2010). Empirical Evidence for a Money Demand Function in Sourtheast Asian Countries: A Panel Data Analysis. *Journal of Yala Rajabhat University*. Vol.5 (1)

Khan Muhammad Arshad & Muhammad Zabir (2005). The Exchange Rate and Monetary Dynamics in Pakistan: An Autoregressive Distributed Lag (ARDL) Approach. *MPRA Working Paper*. Munich Personal RePec Archive. Processed.

Klovland, J.T. (1982). The Stability of the Demand for Money in the Interwar Years: The Case of Norway, 125-1939. *Journal of Money, Credit and Banking*. Vol.14, pp. 252-264

Laidler, D.E.W. (1993).*The Demand for Money: Theories, Evidence & Problems*, 4th. Edition. HarperCollins College Publisher.

Lu, X. Maekawa, K. & Lee, S. (2008). The CUSUM of squares Test for the Stability of Regression Models with non-stationary Regressor. *Economics Letter.* Vol.100, pp.234-237

Luger, R. (2001). A Modified CUSUM test for Orthogonal Structure Changes. *Economic Letters.* Vol.73, pp. 301-306

Malaysia Treasury. www.treasury.gov.my

Muzafar Shah Abdullah (1990). Gelagat M3 di Malaysia: Satu Kajian Empirical. *Pertanika*. Vol 13 (3), pp 419-425

Narayan, P.K. (2005) The Saving and Investment nexus for China: evidence from Cointegration tests. *Applied Economics*. Vol.37, pp. 1979-1990

Nguyen, H.D & Pfau W.D (2010). The Determinants and Stabilty of Real Money Demand in Vietnam, 1999-2009. *Discussion Paper:10-14*. National Graduate Institute for Policy Studies (GRIPS)

Noer Azam Achsani (2010). Stability of Money Demand in an Emerging Market Economy: An Error Correction and ARDL Model for Indonesia. *Journal of International Studies*. Vol.13

Oluwole, O. & Oluybenga, A.C (2007). M2 Targeting, Money Demand and Real GDP growth in Nigeria: Do Rules Apply? *Journal of Business and Public Affairs*. Vol: 1

Pesaran, M.H, Pesaran B. (1997). Working with Microfit 4.0: *Interactive Econometric Analysis*: Oxford, Oxford University Press

Qayyum (2005). Modelling the Demand for Money in Pakistan. *MPRA working paper*. Munich RePEc Archieve. Processed.

Ramachandran, M. (2004). Do Broad Money, Output and Prices Stand for a Stable Relationship in India? *Journal of Policy Modeling*. Vol.26, pp. 983-1001

Rizaudin Sahlan. (2010). *Econometrik: Teori dan Aplikasi*. Cengage Learning.

Samreth, S. (2008). Estimating Money Demand Function in Cambodia: ARDL Approach. *MPRA Working Paper*. Munich Personal RePec Archive. Processed.

Saten, K. & Billy, M. (2008). Testing the Stability of Demand for Money in Tonga. *MPRA Working Paper*. Munich Personal RePec Archive. Processed.

Sriram, S. (1999). Survey of Literature on Demand for Money: Theoretical and Empirical Work with special Reference to Error Correction Model. IMF Working Paper

Sriram, S.S. (2002). Determinants and Stability of demand for M2 in Malaysia. *Journal of Asian Economics*. Vol.13, pp. 337-356

Tang, T.C. (2004). Demand For Broad Money and Expenditure Components in Japan: An Empirical Study. *Japan and the World Economy*.Vol.16, pp. 487-502

Wang, Y. (2007). Long-run Stability of Demand for Money in China with Consideration of Bilateral Currency Substitution. *The Singapore Economic Review*.

Xiao, Z. & Philips, P.C.B. (2002). A CUSUM test for cointegration using regression residuals. *Journal of Econometrics*. Vol.108, pp. 43-61

APPENDIX

DESCRIPTOR	GDP	TBR	REER	M3	M2	KLCI
1982Q1	15118.7	4.6	162.67	39189.8	32928.1	306.2
1982Q2	15452.2	4.99	165.82	40770.1	33999.1	288.57
1982Q3	15811.5	5.12	168.56	41490.8	34621.1	266.56
1982Q4	16196.7	5.12	170.43	44357.8	37648.1	291.44
1983Q1	16607.7	5.09	170.88	46543.3	39023.2	354.01
1983Q2	17123.1	5.09	175.73	47049.1	38834.5	412.73
1983Q3	17743.0	5.13	180.12	48974.7	39726.7	396.92
1983Q4	18467.2	5.19	181.94	51705.7	41193	401.6
1984Q1	19295.8	5.16	185.54	53374.9	42218.8	391.91
1984Q2	19864.0	5.09	186.51	55462.7	43771.5	347.99
1984Q3	20171.6	5.09	190.23	57219	44027.9	336.89
1984Q4	20218.7	5.08	187.44	59772.6	45888.3	303.55
1985Q1	20005.2	5.02	183.05	62061.9	47184	305.88
1985Q2	19672.5	4.87	182.65	62655	47906.1	279.78
1985Q3	19220.4	4.74	177.89	63459.9	47596.9	297.27
1985Q4	18648.9	4.3	168.76	65607.7	48396.5	233.47
1986Q1	17958.1	4.18	159.59	67189.3	49333.5	190.33
1986Q2	17658.0	4.18	147.91	67800	50151.4	218.02
1986Q3	17748.4	4.14	142.97	69977.7	51850.2	221.01
1986Q4	18229.5	4	147.53	71399.9	53767	252.43
1987Q1	19101.1	3.08	145.01	72253.2	55690.8	317.2
1987Q2	19917.8	2.08	144	72580.2	54807.5	410
1987Q3	20679.6	2.58	141.75	73314.8	55363.3	415.37
1987Q4	21386.5	2.96	136.05	74891.7	56459	261.19
1988Q1	22038.4	3.25	130.16	75784.2	59661.9	286.53
1988Q2	22720.8	3.55	128.52	77133.1	60796.4	364.97
1988Q3	23433.7	3.37	130.8	78242.9	61360.2	338.77
1988Q4	24177.1	3.77	124.5	80987.4	64968	357.38
1989Q1	24951.1	5.25	123.07	85195.9	65507.8	409.71
1989Q2	25802.5	5.59	126.46	86965.7	66826.3	445.55
1989Q3	26731.5	5.34	128.56	91034.8	69493.6	496.08
1989Q4	27737.9	4.98	126.67	97668.3	74066.6	562.28
1990Q1	28821.8	4.92	129.53	102843	78160.1	583.64
1990Q2	29634.8	5.86	129.52	105334	78700	584.65
1990Q3	30176.7	6.43	124.22	108601	80396.3	459.08

1990Q4	30447.7	7.25	119.91	115420	83902.9	505.92
1991Q1	31604	6.82	122.21	121977	61931.6	487.56
1991Q2	31549	7.06	125.89	121958	60948.6	595.5
1991Q3	35294	7.5	124.31	127018	62935.3	592.69
1991Q4	36676	7.71	121.8	133121	68525	516.6
1992Q1	35077	7.69	127.65	139343	78160	572.23
1992Q2	36006	7.96	133.52	146452	78700	572.46
1992Q3	39250	7.71	132.02	152886	80396.3	602.76
1992Q4	40348	7.28	134.36	159178	83902.9	614.96
1993Q1	39892	7.16	132.28	164353	88345.8	622.61
1993Q2	42472	6.89	131.27	173178	88311.4	672.53
1993Q3	45152	6.38	133.11	183021	91103.9	745.9
1993Q4	44677	5.49	134.24	196611	96092.5	922.95
1994Q1	43605	3.07	127.3	212026	100115	1050.02
1994Q2	46665	3.51	129.06	210611	104774	1039.66
1994Q3	51777	3.98	128.94	218227	110161	1009.72
1994Q4	53413	4.17	128.7	222330	114481	1124.39
1995Q1	51315	5.03	127.68	228653	117540	885.13
1995Q2	54511	5.41	126.98	242530	122879	962.64
1995Q3	57189	5.56	130.85	256006	128314	1062.09
1995Q4	59457	6.02	129.37	271948	139800	959.23
1996Q1	58835	6.28	130.3	290498	154480	1056.69
1996Q2	61994	6.32	133.75	297663	151018	1172.2
1996Q3	65274	6.54	134.68	310366	155862	1126.4
1996Q4	67628	6.51	134.2	329708	160367	1175.6
1997Q1	64994	6.29	139.65	346582	164687	1235.69
1997Q2	67790	6.43	138.69	362606	176552	1104.58
1997Q3	71854	6.2	128.61	372750	185709	1001.55
1997Q4	77157	6.7	107.73	390809	198873	767.97
1998Q1	70779	5.95	100.86	394150	209497	585.35
1998Q2	70218	8.88	105.39	389127	214674	634.29
1998Q3	71976	6.93	101.85	387742	222697	445.28
1998Q4	70271	5.7	102.7	401459	238209	422.97
1999Q1	67576	5.43	103.6	409502	249522	598.97
1999Q2	73737	3.1	104.94	419362	260235	621.53
1999Q3	78080	2.84	103.78	419502	270202	830.75
1999Q4	81373	2.73	102.1	434590	292051	736.36
2000Q1	82738	2.75	102.85	433967	288595	950.86
2000Q2	86726	2.76	104.25	436511	281734	895.27

2000Q3	92726	2.99	105.3	440890	286081	835.3
2000Q4	94211	2.95	107.42	456496	296472	778.99
2001Q1	85158	2.85	108.35	453519	305437	694.5
2001Q2	87765	2.81	110.89	453892	317154	575.67
2001Q3	90080	2.79	110.04	464736	322896	648.78
2001Q4	89576	2.72	111.11	469519	338718	615.02
2002Q1	87499	2.73	113.36	481327	338279	698.53
2002Q2	93830	2.72	111.03	482664	340568	798.35
2002Q3	100709	2.73	108	490172	340729	726.48
2002Q4	101174	2.75	108.44	501125	356567	652.25
2003Q1	99292	2.8	105.9	513722	350509	666.36
2003Q2	102091	2.78	104.73	522410	350612	635.61
2003Q3	106829	2.8	104.5	535367	357898	716.52
2003Q4	110557	2.77	101.44	549649	364723	781.45
2004Q1	110391	2.53	99.15	568522	372809	824.66
2004Q2	116508	2.55	100.36	578392	373276	861.33
2004Q3	122802	2.46	100.35	591972	374189	838.64
2004Q4	124348	2.05	98.21	617639	386512	848.65
2005Q1	121695	2.35	97.18	644015	392883	929.72
2005Q2	126582	2.32	98.9	652273	404402	871.91
2005Q3	136445	2.42	101.13	656557	412839	924.01
2005Q4	137724	2.85	102.79	667326	429436	911.69
2006Q1	135921	2.95	103.42	683854	442797	905.41
2006Q2	141272	3.1	104.57	693861	450381	946.62
2006Q3	149369	3.41	103.36	708175	487133	916.62
2006Q4	147878	3.45	104.7	749691	537636	979.19
2007Q1	144326	3.42	108.4	789247	555901	1147.76
2007Q2	153852	3.39	108.88	788611	595813	1315.37
2007Q3	165353	3.49	106.02	804249	605384	1382.36
2007Q4	176245	3.44	106.7	832788	621346	1370.17
2008Q1	175458	3.37	108.7	884373	643050	1439.49
2008Q2	188544	3.44	108.92	899120	663472	1267.65
2008Q3	197634	3.43	109.55	912780	681539	1105.04
2008Q4	177041	3.31	106.48	931656	727684	909.51
2009Q1	155342	2.38	105.44	949307	754203	880.37
2009Q2	161219	1.9	105.55	950455	750009	968.37
2009Q3	173256	1.96	103.47	975445	764524	1139.25
2009Q4	184617	1.98	104.95	1017303	796876	1265.74