Faculty of Economics and Business

Economic Uncertainty and the Demand for Money in Indonesia

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Bachelor of Economics with Honours

(International Economics)

2020

ECONOMIC UNCERTAINTY AND THE DEMAND FOR MONEY IN INDONESIA

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This project is submitted in partial fulfilment of the requirement for the degree of
Bachelor of Economics with Honours

(International Economics)

Faculty of Economics and Business

UNIVERSITI MALAYSIA SARAWAK

2020

Statement of Originality

The work described in this Final Project, entitled

"**ECONOMIC UNCERTAINTY AND THE DEMAND FOR MONEY IN**

INDONESIA"

is to the best of the author's knowledge that of the author except

where due reference is made

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ACKNOWLEDGEMENT

First and foremost, I am deeply indebted to my supervisor Associate Professor Dr. Puah Chin Hong. The door to Dr. Puah office and WhatsApp were always available whenever I had question about my thesis. He always shows his expertise and dedicates in leading me throughout the process of accomplished this thesis.

Most importantly, none of this could have happened without my family. My mother and my sibling always show their unconditional love and encouragement in inspiring me through the up and downs in the past three years in pursuing my degree.

I would like to thank my friends and coursemate who had help me in sharing information and cheering me whenever I felt down. Also, the unforgettable is the assist from my seniors who pursuing their Master or PhD in guiding with patience that cannot be underestimated to me throughout the thesis.

ABSTRACT

ECONOMIC UNCERTAINTY AND THE DEMAND FOR MONEY IN

INDONESIA

By

THIAN SZE MEI

This study examines the effect of economic uncertainty and other determinants in the money demand and its stability in Indonesia over the quarterly period 2000Q1 to 2018Q4. Indonesia experiences its massive hit from the financial crisis that affects the economy, social and politic that make the stagnancy of the economy for a long time. After the crisis, Indonesia also faced with the extraordinary depreciation of the Rupiah. The monetary aggregate has increased rapidly in Indonesia. Therefore, to better understand the demand for money in Indonesia with the economic situation, the economic uncertainty employed in this study. The economic uncertainty index will be computed using GARCH model then ADF, PP, KPSS unit root test, ARDL model of bound test, long run test and diagnostic test is employed to test the relationship of the determinants with the demand for money. The five elements used to form the economic uncertainty index believed has explained the Indonesia economy. The result showed a positive relationship for real income, real effective exchange rate and economic uncertainty index while a negative relationship for the interest rate with money demand. The model studied is found to be stable.

ABSTRAK

PERGOLAKAN EKONOMI DAN PERMINTAAN WANG DI INDONESIA

Daripada

THIAN SZE MEI

Kajian ini akan mengkaji impak pergolakan ekonomi dan penentuan lain yang dikajikan terhadap permintaan wang serta kestabilan modal tersebut di Indonesia dengan meliputi tempoh 2000Q1 hingga 2018Q4. Indonesia menghadapi kesan yang serius daripada krisis kewangan yang mengancamkan ekonomi, social dan politik dan menyebabkan kemurungan ekonomi berlaku untuk tempoh masa yang panjang. Selepas krisis tersebut, Indonesia juga menghadapi dengan isu keruntuhan rupiah yang teruk. Hal ini juga menyebabkan permintaan wang meningkat dengan pesat. Oleh sebab itu, kajian ini termasukkan penentuan pergolakan ekonomi supaya lebih memahami permintaan wang dengan situasi ekonomi Indonesia. Pergolakan ekonomi indeks akan dijangka dengan menggunakan model GARCH. Seterusnya, ujian punca unit ADF, PP dan KPSS, ujian kaedah ARDL dan ujian diagnostik telah digkajikan bagi menentu hubungan antara penentuan kaji bersama permintaan wang. Hasil kajian ini menunjukkan bahawa lima faktors penentuan yang digunakan telah menerangkan indeks pergolakkan ekonomi di Indonesia. Faktors kajian menujukkan hubungan positif dengan permintaan wang kecuali kadar bunga yang menunjukan hubungan negatif. Selain itu, model kajian dibuktikan wujud and didapati stabil.

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CHAPTER 1
INTRODUCTION

1.0 Introduction

Money is a commodity for people to get what they need or wants by exchange it with the goods and services. Before the money exists as a medium of exchange, people did follow barter and use their assets to make an unfair and inefficient trade with others. The official fiat money issued by every country is currently used by their citizen in doing the transaction on a daily basis. It represented a value that gives a perception of worth to people.

Money can be measured by three categories which are M1, M2 and M3. All the categories are equal to the total money available within the country economy. M1 are included the physical and touchable cash, demand deposits for current account and traveller's checks. M1 also categorised as narrow money where they are mostly used to buy and make a payment on the daily transaction. M2 is a broader category which included M1, saving accounts and non-institutional money market funds. M2 is a category which means that the money is able transferred into cash quickly. M3 is the broadest category of money which combined M2, many fixed deposits, institutional money market funds, repurchase agreement and larger liquid assets.

Money as a medium of exchange also acts as a standard of value which used to measure the value of the goods and services. In the production side, the producers will measure the value of a product by using the money. This will then be affecting the market

in supplying the products, as a higher price value will make the society not afford to purchase as the income of household are different and the willingness to pay will also be different. Hence, the money becomes the standard of value that help people to differentiate the superior, normal and inferior goods based on their abilities.

To have a higher ability to purchase the goods and services, we will need to have more money. The store value of money enhances a person's wealth. A person's wealth is accumulated when they kept and held a large amount of money. The more money a person kept, the richer they are. For example, people kept the money when the value of store is high so that they are able to earn more. In the stock market, people will tend to hold the stock if the stock price is high until the uncertainty or risk happen.

However, money value will change over time due to the economy and market situation. Thus, the stored value of money will affect its function as a standard of deferred payment. Some people will rather acquire goods and services at present and having debt in future. As the money's value of store is low, debts will be cheaper to pay in the same amount. For instance, people will rather purchase an asset or financing loan when the store value of money is low. The debtor can pay a lower price for the goods and services in present value.

The demand for money functions is used to predict the relationship among real money balances, a scale variable which the real income was regularly used and the opportunity cost of holding real money which interest rate was often used. According to Atta-Mensah (2004), although the simple relationship of the money demand functions

was widely used, the function is hard to explain the various behaviour of monetary aggregates. The uncertainties and crisis happened are threatening the monetary aggregates of the household. The uncertainty risk like financial crisis, politically unstable and the trade war were depreciated the currency of the country and make the value of store become lower that make high monetary aggregates for the country. Thus, the uncertainty in economic is considerable to form an appropriate money demand function that helps in managing the monetary policy for a country.

There were shown that the uncertainty in economic is able to affect the money demand function either in large or small impact. Hence, we can include economic uncertainty to be the components of the demand for money function in order to predict the behaviour of the monetary aggregates. There have five economic uncertainty components that used to investigate previously which are the level of economic activity, monetary uncertainty, exchange rate uncertainty, stock market uncertainty and short-term interest rates. The uncertainty components are measured by the shock of each of the variables then form as an index of economic activity that will give impact in the amount of money held by the economic agents (Atta-Mensah, 2004).

1.1 Background of Study

Indonesia is a country located off the coast of mainland Southeast Asia. It is made up of several parts of the islands. The country still lies on the agriculture base as the leading economic contributor. The natural resource is abundant in Indonesia that makes the country be the source of raw material to other countries. However, it does not support

much in helping the economy where the Indonesia economy stagnates for almost two-decade after the financial crisis in 1998. The financial system takes an important role to manipulate the economy. Money demand will be the foundation for financing the economy that makes the country develop better. Therefore, the background of each variable in demand for money function is worth to be analysis to know the conditions particularly over time.

1.1.1 The Demand for Money in Indonesia

In order to make the money market to achieve balance, the demand for money is always assumed to be equal to the supply of money. Hence, in this study, the demand for money is proxy by the supply of money to solve the problem of the unavailability of the money demand data. The money demand in Indonesia can be categorized to narrow and broad money. The narrow money or M1 in Indonesia is defined currency outside the banks and demand deposits measure in Rupiah currency. Broad money (M2 and M3) is covered M1 together with the Rupiah and foreign currency's time deposits and saving deposits, foreign currency demand deposits and securities other than shares issued domestic private sector.

Figure 1.1 shows that the money growth rate of the M1 supply with the inflation rate in Indonesia from 2000 to 2018. The inflation rate is shown to have a figure on how inflation rate changes simultaneously with the money supply. The money supply M1 has a fluctuated growth rate over the time. This was probably due to the money supply is changing along with the inflation rate. The money supply is increased when inflation is

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decreased most of the time. The money supply M1 then have a rapid decrease in the year

2008 mainly due to the subprime mortgage crisis which makes the citizens felt uncertainty

and insecure to hold more money.

Figure 1.1 Money M1 supply growth rate with the inflation rate in Indonesia, 2000-2018
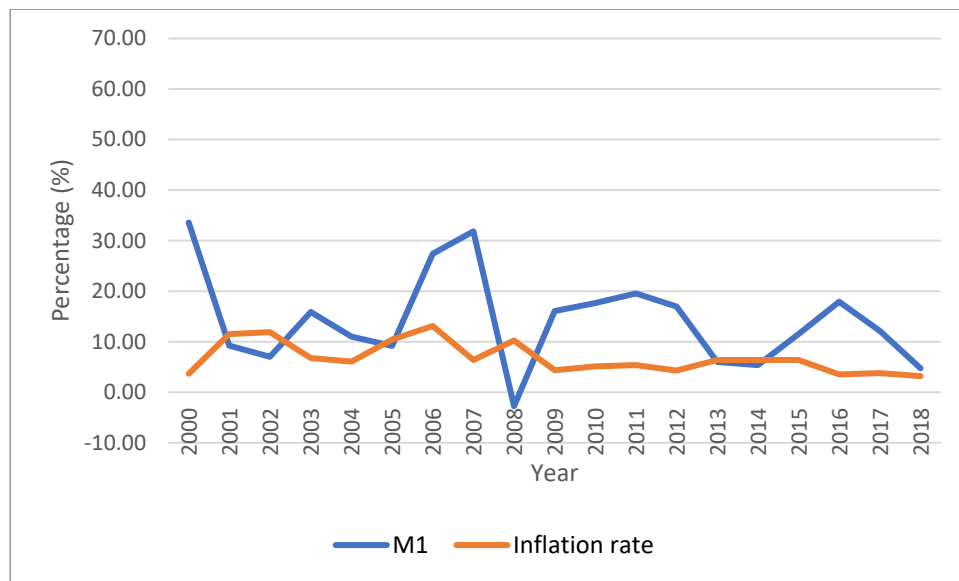
Source: CEIC database and International Financial Statistics of IMF (2019).

1.1.2 The Indonesia Economy

Indonesia is a small open economies country that has a mixed economic system.

As the largest economy country in Southeast Asia, its main economic activity is the

exportation and the main exported goods are the natural resource such as mining, oil and

natural gas and the agriculture products. However, Indonesia has started its manufacturing

sector in the early 1970s which as the contributor of the country economy and labour force

sector. Moving to 1980s Indonesia economy shifting slower toward developing large-

scale and high technology industries until now. The services sector of Indonesia also take

place in its economy like tourism sector is generating about one-third of GDP.

Figure 1.2. The real GDP growth rate in Indonesia, 2000-2018
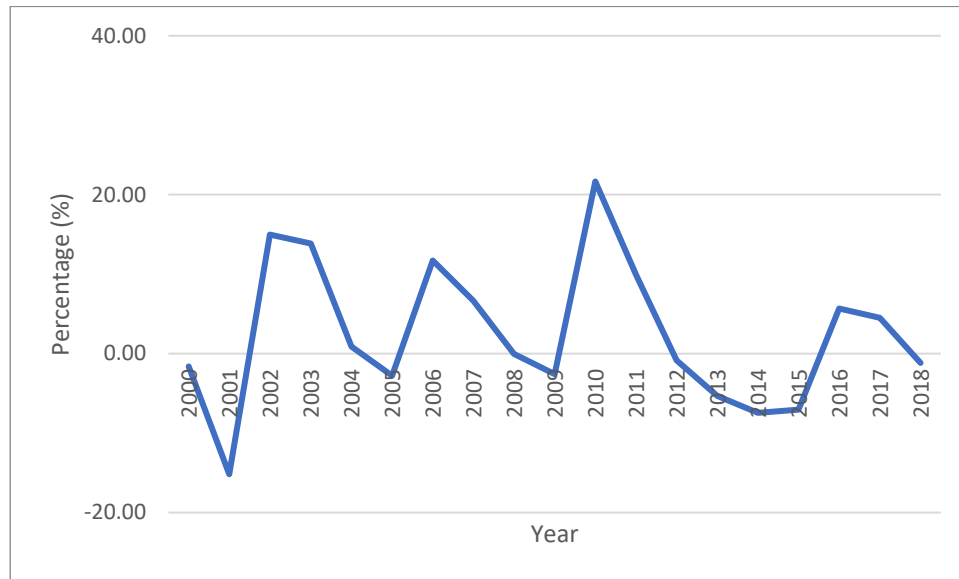
Source: Central Bureau of Statistics (2019).

From Figure 1.2, the Indonesia economy turned to the worst in the year 2001 and

decreased in 2005 which due to the social unrest that happened. There has a noticeable

decline in 2008. The financial and economic crisis has caused the economy unstable in

Indonesia. At the same time, this has lost the trust of the foreign investor and many

investors decide to shift their project to other countries. However, in 2008, the Indonesia

government is targeting growth in the coming years by promoting investment and boost

public purchasing power (Economic Report on Indonesia, 2009). The plan is effectively

worked on where the real GDP growth is maintained around 20% in the consecutive years.

In the year 2013 until 2015, the drop in crude oil price has given a negative impact on the

Indonesia economy since Indonesia is one of the largest exporters of palm oil.

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1.1.3 Interest Rate

The interest rate is chosen to indicate the opportunity of a person to hold money. In this study, the lending rate is used to measure the opportunity of the person holding the money. The lending rate is the bank rate that meets the financing needs of the private sector in short- or medium-term. The conventional bank takes its role in managing the money in order to have enough credit to be lean by the investor. Hence, the lending rate is applicable to analysis the credit lent to the borrowers with the rate.

Figure 1.3. The lending rate in Indonesia, 2000-2018
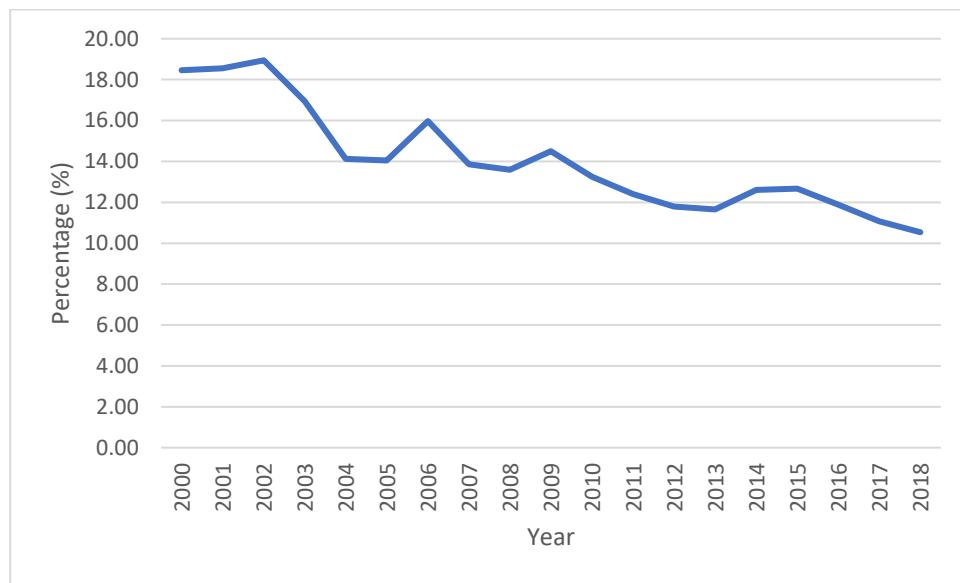
Source: Bank Indonesia and International Financial Statistics of International Monetary Fund (2019).

The lending rate is differentiated based on the creditworthiness of the borrowers. During the financial crisis in 1998, Bank Indonesia has to maintain the exchange rate by tightening Rupiah by introducing extremely high interest rate to the private sector and

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shift their belonging funds from bank to the Bank of Indonesia (Special Unit for Bank Indonesia, 2008). Hence, the lending rate was increased approximate of 10.00% in 1998. A high interest rate in Indonesia triggers the domestic firms to compete with foreign firms. However, the lending rate start to regulate by moving downwards slowly in the continuous years. This shows that Bank Indonesia is trying to increase the demand for money and circulate the economy slowly.

1.1.4 Exchange Rate

Figure 1.4. Real effective exchange rate in Indonesia, 2000-2018
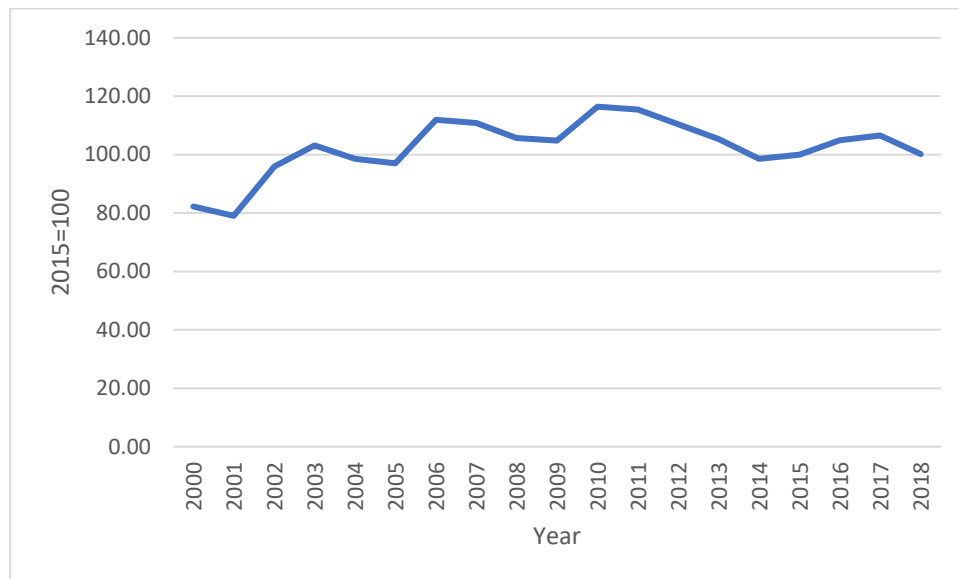
Source: Organisation for Economic Co-operation and Development (2019).

The exchange rate is the factor that may have an impact on the value of money and also the purchasing power of a person. The exchange rate that employed is the real effective exchange rate which is used to measure the weighted average of a country's currency in relation to its main trading partners currency. This variable is measured in the

index form. As the exchange rate of Rupiah depreciated, economic agents will have the favour to own foreign currencies than the domestic currency.

From Figure 1.4, the real effective exchange rate fluctuated over time. It goes up and down but it still maintained with minor changes. It experiences sharp depreciation in the early 2000s that mainly due to the economy and social unrest happened. It has created a panic in the market and loss of value in holding the Rupiah. However, according to the Special Unit for Bank Indonesia Museum (2008), the government started to intervene and introduces the floating exchange rate that slowly lifts the real effective exchange rate over time. In 2015, it was affected by the price drop event of crude oil. The oil price will have positive influences on the exchange rate, if the oil price drops, it will depreciate the Rupiah against the US dollar (Narayan et. al., 2019).

1.1.5 Economic Uncertainty Index

Economic uncertainty index is proposed by Atta-Mensah have an inclusion of the risk in the financial and monetary market. The economic turmoil in Indonesia brings out the reason to carry out this study to better understand the impact and factors of the economic uncertainty index.

1.1.5.1 Economy Activity

Nominal gross domestic product (NGDP) is the total economic production in an economy that considers the change of the price than just growth for goods and services. While the economic activity discusses previously is the growth of real economic activity.

However, NGDP is able to show the total value of the economic activity. Nominal income means that the amount of spending increases together with the money supply. It also used to show the impact of inflation toward the economy such as the purchasing power.

Figure 1.5. Nominal gross domestic product, 2000-2018
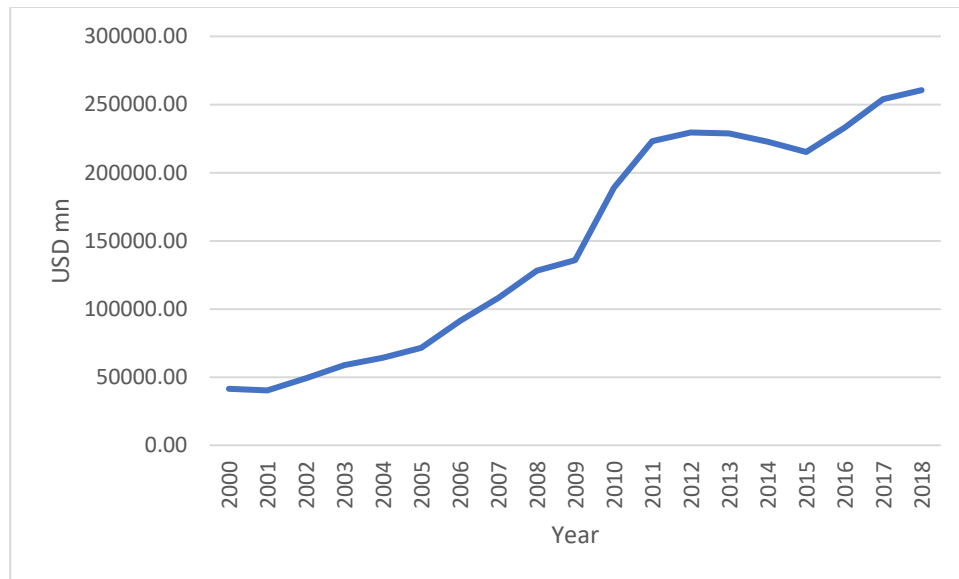
Source: National Statistical Institute (2019).

The NGDP figure shows an upward trend in general. However, there shows that a low NGDP in the early of 2000s. In 1998, the NGDP declined almost half of it from 56,165 million US dollar to 24,616 million US dollar. The impact from the Asian Financial crisis is triggered the Indonesian to decrease their purchasing power due to the depreciation of currency and fear of losing a job due to money tightening policy. There is a slight decline in 2009 due to the financial crisis. In 2015, the NGDP was declining for about 8,000 million US dollar. This might occur due to the fallen of crude oil price which took a large part in the GDP of Indonesia. Since Indonesia is one of the large crude oil

exporters, so when the price of crude oil fell, the revenue of the export countries will thus decrease. However, the hard work of the government and Indonesian in the regulate the economy help to recover the fall in the NGDP.

1.1.5.2 External Shock

Figure 1.6. Real exchange rate, 2000-2018
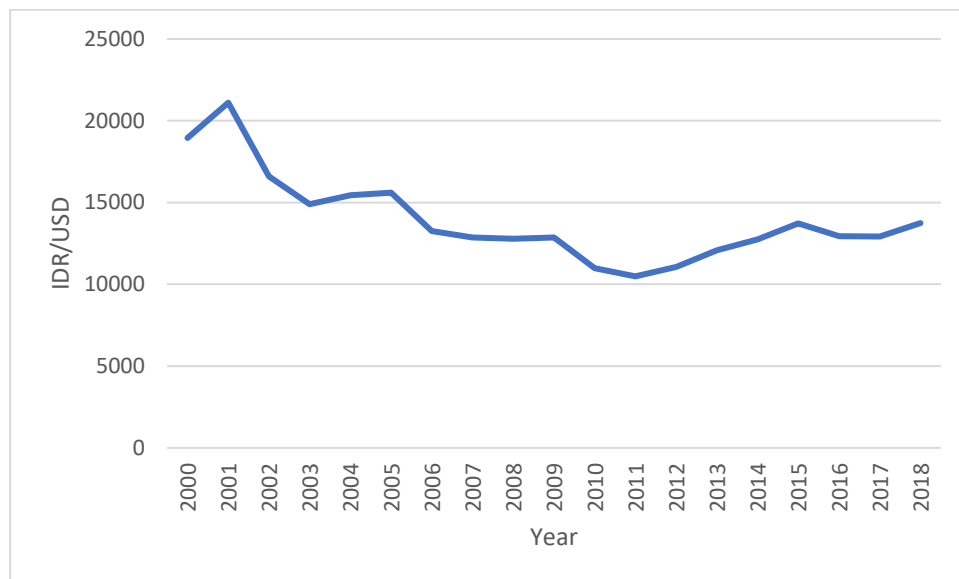
Source: International Financial Statistics of International Monetary Fund (2019).

The foreign indicator will also take it parts in affecting the national events such as the Asian Financial crisis which happened due to the unpegged of the Thai baht from the US dollar which result in a currency devaluation and pull out of capital in the neighbour countries. Real exchange rate of Indonesia Rupiah against the US dollar is used to assume the external shock. US dollar is used because it is strong and most traded currency globally. The exchange rate also can show Indonesia competitiveness in the external sector.

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The exchange rate in Figure 1.6 shows a downward trend. In the early 2000s, the high inflation happened to lead to the price of goods and services increase thus the currency is depreciated from the previous period. In 2015, the Rupiah devaluated due to the external shock of unexpected yuan devaluation by People's Bank of China (PBoC) and uncertainty of the proposed FFR interest rate augment in U.S. However, at the same year, the external risk eased when the U.S has determined the direction of U.S. normalization policy through the FOMC meeting and this has maintained the exchange rate and foreign capital flowed back to Indonesia (Bank Indonesia, 2016).

1.1.5.3 Deposit Rate

Deposit interest rate is the rate of commercial bank paid for the demand, time and saving deposits. The deposit rate is the rate that can directly influence the household to save or to spend their money. Same applied to the deposit rate as lending rate when it is high, the economic agents will hold less money. Economic agents will take the initiative to earn from the interest rate offered.

Figure 1.7. Deposits rate, 2000-2018
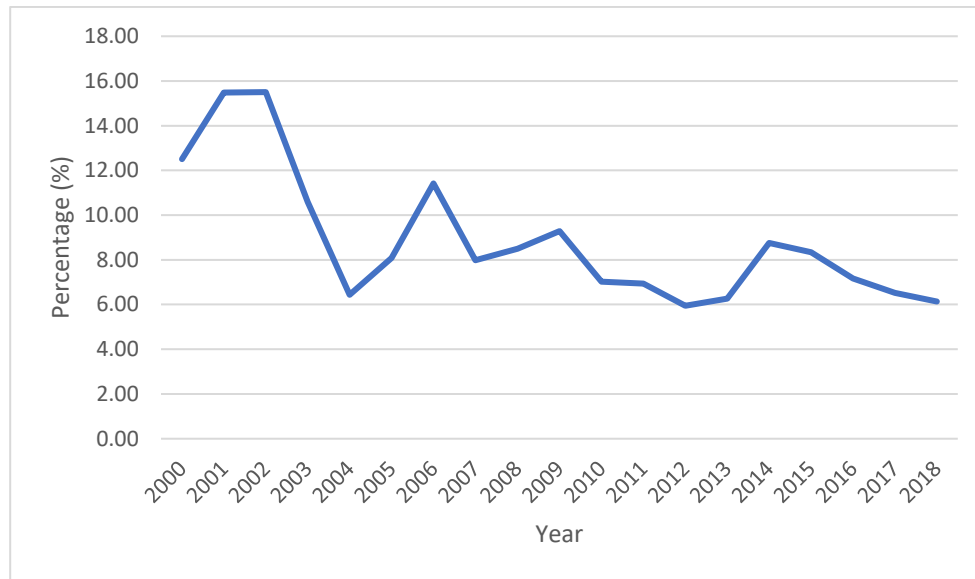
Figure 1.7 visualises the deposit interest rate that shows almost the same trend as the lending rate. The purpose of the interest rate is to control the money demand from the economic agents indirectly. Thus, we can see that the two peaks in Figure 1.7 are probably used to limit the money over demanded in the money market. In the early 2000s, the high interest rate is the prolonging of economic expansion. The higher deposit rate can avoid the over-demanding of money in the market. Development or investment will increase the money demand as more job and higher income are available for the Indonesian. After the financial crisis in 1998, higher deposit rate introduced is to encourage people to save and hold less money in hand.

1.1.5.4 Monetary Policy Uncertainty

Monetary policy used is important in controlling the demand for money in a country. The Indonesia government has implemented the monetary targeting with credit

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and interest rate control policy, together with the exchange rate and capital flow management since the 1970s. However, the monetary policy regime after the Asian Financial Crisis happened in 1997 has been adjusted to inflation targeting framework and the framework is continuous to maintain the stability of the country. The inflation-targeting framework not only used in controlling inflation but will help in managing the exchange rate in a stable range following by the macroeconomic fundamentals also the intervention in the foreign exchange market.

Figure 1.8. Monetary policy framework adopted in Indonesia

1959-1965 Monetary targeting	→	1966 Interest rate targeting	→	1967-1983 Multiple exchange rate system and interest rate targeting

2000-current Inflation targeting 2005-2006 Multiple rate system	←	1987-1999 Exchange rate targeting	←	1983-1987 Interest rate targeting
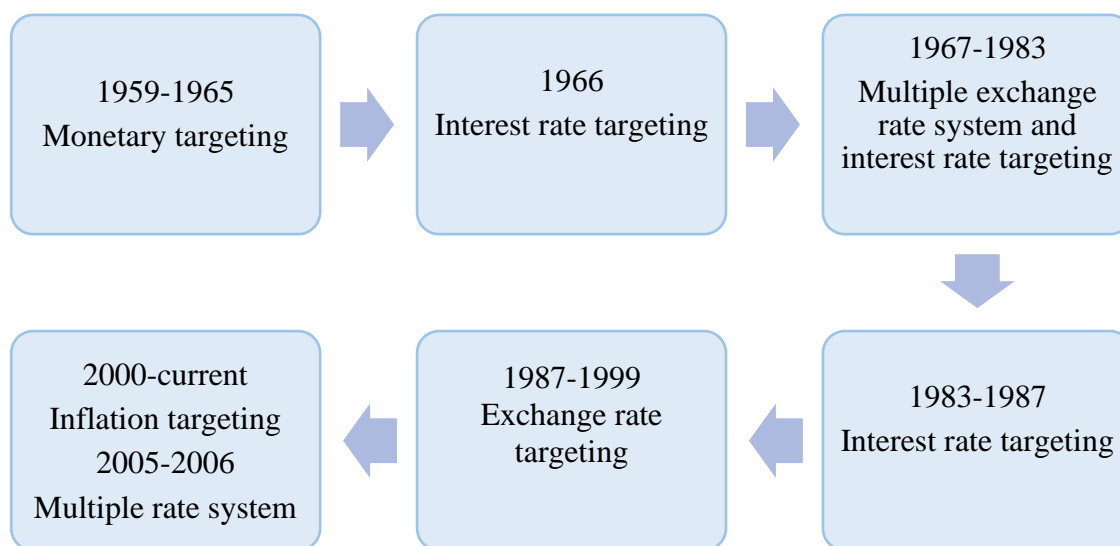
Source: Hiew (2010).

Inflation targeting framework allow Bank Indonesia to set up an inflation target and achieve it with the public by using the monetary policy suggested. Bank Indonesia need to monitor the policy suggested to the public in progress to reach the targeted inflation. If the progress is too fast, the Bank Indonesia can make some adjustment on the

monetary policy to moderate it or vice versa. The common tools used in monetary policy is the interest rate. For example, the Bank Indonesia can adjust the policy rate as it can influence the money market rate, lending rate and deposit rate. All the interest rate changes will give an impact on the country output and inflation.

1.1.5.5 Stock Market

Figure 1.9. Stock market index, 2000-2018
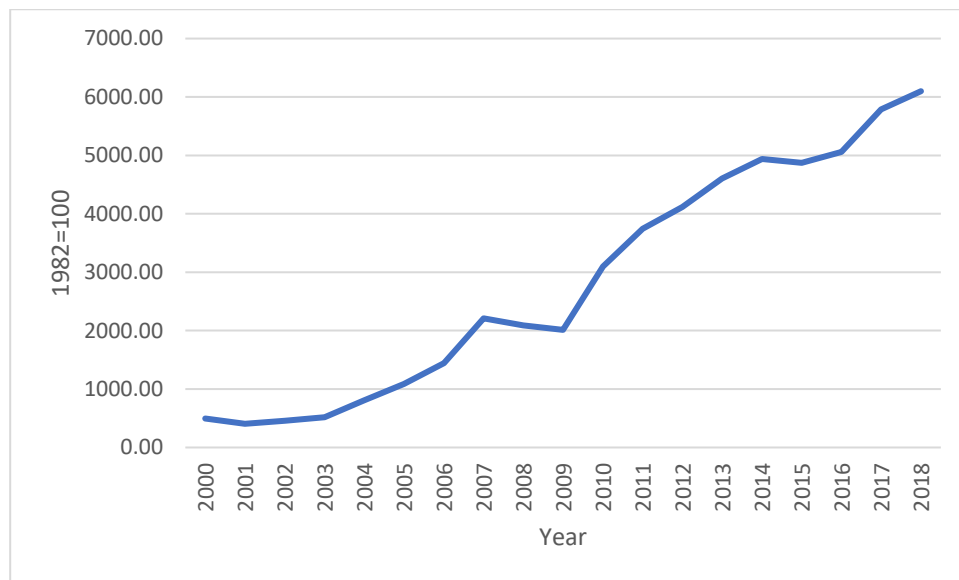
Source: International Financial Statistics of International Monetary Fund (2019).

The merger of the Jakarta Stock Exchange (JSX) and Surabaya Stock Exchange (SSX) is formed the Indonesia Stock Exchange (IDX) by which currently has 669 companies listed. IDX is responsible for managing the trading activity and market capitalization in Indonesia's private sector and financial markets. The stock market is functioning as the agency in raising the capital for the company listed. In this study, the IDX composite is used as the uncertainty index.

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The IDX composite has an upward trend since there will have companies keep joining the stock market. However, there has a decline in 2009. The drop of the stock market index might due to the insecure of the financial crisis had hit the economic as well as IDX where the average daily transaction value is decline 29.0% from IDR 5.40 trillion 2008 quarter 2 to IDR 3.84 trillion in 2009 quarter 2 (Indonesia Stock Exchange, 2009). The IDX must take strategic to increase the trust and confidence of the public to attract investors through a hard time. IDX also take the initiative to develop and increase the knowledge of the public toward the stock market by the help of technology (Sadono, 2019).

1.2 Problem Statement

The money is a simple measurement of the country economic development which indicated the country is well managed or lack of management. Indonesia is lack of preparation where the depreciation of currency happened for several times and shock that made the demand for money in Indonesia increase sharply during the financial crisis. The poor management in the financial market will slow down the growth and development of the country. At the same time, identify a suitable demand for money function able to create a better financial system that can control the monetary aggregate to leads to more development and economic growth for a country.

Conventionally, the demand for money is formed by the scale variable which is the real income and the opportunity to hold the money which is the interest rate. When the real income rise, people can hold more money. As the interest rate is raised, people

can earn more in money deposit, hence the money demand is lesser. Therefore, the traditional demand for money is well applicable, which Indonesia is not excluded. Apart from that, the Asian Financial crisis brought a huge influence on the value of the currency to the Southeast Asian countries such as Thailand, Malaysia, Indonesia and South Korea. During that time, Indonesia's government is not ready to develop an effective policy to respond to the rapid fall in the exchange rate and this event has lost the confidence of economic agents to hold the Rupiah. Hence, there is a need to observe how this affect the money demand in Indonesia.

Despite that, the economic uncertainty is the factor that worth to be discussed in the demand for money in Indonesia due to the uncertainty economy situation. The demand for money is an indicator that helps to show the economic growth of Indonesia in term of money. The economic uncertainty will be a significant variable that contributes to the Indonesia demand for money since it is a new variable that used by researchers in previous research. Based on Atta-Mensah (2004), economic uncertainty is adequate to the demand for money in today economy. The previous research in Indonesia did not cover the economic uncertainty but the component such as monetary policy uncertainty is used as the exploratory variable for the demand for money (James, 2005). Economic uncertainty can also detect the impact of crisis toward the demand for money in Indonesia. The change of economic growth, external shock, the uncertainty of monetary policy, stock market and bond market control will lead to the economic uncertainty is affecting the money demand in Indonesia. The economic structure changes can bring Indonesia to a critical level in term of the money supply.

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In this study, we will investigate the narrow money (M1) to examine the stabilization of the money demand function is related to adjust the monetary policy. According to Anglingkusumo (2005), the real narrow money M1 demand is empirically stable. However, there is some argument from Jacobs, Kuper and Lestano (2011) state that broad money is observed to form a stable demand for money function and is preferably used to evaluating the long-run influence of the changes in monetary policy in Indonesia. Therefore, it is worth to examine the relationship of narrow money with the variables investigated in this study.

From the previous studies, the researches provide enlightenment to have further discovered and ascertain the demand for money in Indonesia. Hence, there are few research questions can be stated in this study as follow:

1. Do the criteria include as economic uncertainty index are applicable to be investigated as the factors of the money demand of Indonesia?

2. Is it the relationship between the macroeconomic indicators included domestic income, interest rate and exchange rate with the money demand significant?

3. Does the function of demand for money stable in Indonesia?

1.3 Objective of the Study

1.3.1 General Objective

To discuss the economic uncertainty effect on the demand for money in Indonesia.

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1.3.2 Specific Objective

1. To investigate the effectiveness of the volatility of components in the economic uncertainty index for the money demand in Indonesia.

2. To identify the long-run relationship between the macroeconomic indicators and economic uncertainty with the money demand.

3. To examine the stability of the money demand function in Indonesia.

1.4 Significance of the Study

The study on the relationship of the level of economic activity, interest rate, exchange rate and economic uncertainty helps in policymaker to understanding the impact of the variables on demand for money. The real income of Indonesia is moving upward slowly which show that the competition in the market to have a positive sign. However, an excellent monetary system will take an essential role in boosting economic growth. Thus, there is significant in the study the demand for money function for a developing country like Indonesia.

Demand for money function is useful to construct a monetary policy. Monetary policy can be used by the government in controlling the money supply and the interest rate in the financial market (Puah and Hiew, 2010). In contrast, the exchange rate is another component that can be adjusted to stable the demand for money. Hence, the

policymaker can have further action to adjust the monetary policy by control the significant variable.

The economic uncertainty that includes the five components introduced by Atta-Mensah (2004) was able to show the situation of economic fluctuation happened. This variable can give a strong impact to the economic agents in deciding to hold the money. The economic uncertainty index gives inspiration to other researchers to take it as a consideration such as Ozdemir and Saygili (2013) which used the shock of variables to form the studied model in their research. Apart from testing the shock of a single variable, this study will use five components that suitable to the Indonesia money demand to forms the economic uncertainty index as a variable.

1.5 Scope of the Study

This study aims to investigate the influences of economic uncertainty to the demand for money in Indonesia. Despite that, the macroeconomic indicators real income, interest rates and exchange rate also used as the conventional demand for money. The data used for this study are quarterly data from the first quarter of 2000 to the fourth quarter of 2018. The money demand is the proxy by money supply which measured in million US dollars. The real income is the real GDP measured in million US dollars. The interest rate used is the base lending rate in percentage. The real effective exchange rate used measure in index with the base year in 2015. The economic uncertainty index is the volatility of the nominal GDP, deposit rate, real exchange rate, money market rate and stock market index.

1.6 Organization of the Study

This study is presenting in 5 chapters with the discussion itself. Chapter one is the introduction of this study which include the background of the study, problem statement, objective, significant of the study and the scope of the study. In Chapter two, there will be a literature review that provides the theoretical framework and the reviews of previous studies in developed and developing countries. For Chapter three, the empirical framework, the method can be use and the data description will be introduced. Then, Chapter four will be the result and the discussion of results. Lastly, there will have a conclusion and recommendation in Chapter five.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

The demand for money is a conventional function that has been discussed. The traditional money demand function is not suitable for the current generation and economic situation. This is because of the economic transaction and the dynamic of spending are changing. Upon 20 centuries, many researchers developed new factors in determinants the money demand of society. Several econometric techniques applied to the study of money demand give unexpected results to affect the policy and enhance the economic development of countries. Hence, the previous studies will be discussed to have a better understanding and investigation does in this study.

This chapter will consist of four division which is section 2.0 introduction, section 2.1 is the theoretical framework, section 2.2 is the discussion on the literature review in developed countries, section 2.3 is the discussion on the literature reviews in the developing countries while the last section is the discussion on the literature reviews in the developed and developing countries.

2.1 Theoretical Framework

Money carries a significant role in regulating the country economy, especially in the small open economic country, Indonesia. The money demand is the indicator for the policymakers in adjusting the monetary policy to boost the economy. Hence, identified

the factors that influence the demand for money function can use to determining the money supply. The Keynes theory of demand for money by Keynes (1936), which used the concept of liquidity preference concludes that an individual holds the money with a motive. The three motives introduced are the transaction motive, precaution motive and speculation motive.

Transaction motive means that the money held by the economic agents are using it to make a transaction between household and firms. If the goods and services have a high price level, the more money a person will have to hold to purchase. Moreover, the transaction motive is affected by the real income as a higher-income person have more money to hold. Precautionary motive means people tend to hold more money due to the unpredicted future. This happened when the people are thought to have some bad event such as unemployment, sickness and accidents. Speculative motive treats money held as an alternative way of the store of value for money. This motive is closely related to the interest rate which people expected to have a return from the money that invested in the mutual funds. Hence, more money holds under the speculative motive.

From the Keynes theory, it reflects the conventional money demand consists of two factors which are real income and interest rate that defines as:

$$M_d = \left(\frac{M}{P}\right)_d = f(Y, i) \qquad (2.1)$$

real income is directly related to the demand for money while the interest rate is inversely related to the money demand (Parato, 2008). The money demand function by Keynes

explained the money demand changes according to the change of interest rate. However, there was a drawback of the Keynes theory which assume the people will either hold all money or all bonds which is not relevant to the real situation.

From previous research, many studies were using the exchange rate in the study the demand for money function. Mall (2013) state that the inflation and exchange rate included is preferable to be used in the countries hit by high inflation rates which can be used to measure the decrease rate in retaining the national currency compared to foreign currency. Since Indonesia was a country that went through higher inflation compared with the other emerging countries (Anugrah, Ismaya and Pratama, 2019). Hence, this study is employed the exchange rate as the components of the demand for money function. The exchange rate has the uncertainty effect on the money demand. The exchange rate can appear as a currency substitution effect or the wealth effect depend on the economies. The currency substitution effect happens when the devaluate of the currency, the wealth holders will respond by holding more foreign currency and hence the domestic currency demand decreased. Vice versa, the domestic currency demand will increase due to the wealth effect. The depreciation of domestic currency will lower its value and higher foreign currency value. Hence, the foreign currency holder's wealth is enhancing and can exchange more domestic currency with less foreign currency.

Despite that, a country is a small part of the world which is quickly getting influence by the threat and uncertainty such as the economy and financial crisis happened which hit Indonesia badly. Therefore, this study will employ Atta-Mensah (2004) model of demand for money which comes with economic uncertainty to predict the effect of

uncertainties towards the demand for money. The function below is showing the determinants used by Atta-Mensah in his studies.

$$\frac{M_t}{P_t} = \beta_0 + \beta_1 Y_t + \beta_3 r_t + \beta_4 EUI_t + \varepsilon_t \tag{2.2}$$

The components of the economic uncertainty used by him are economic activity, external shocks, monetary policy uncertainty, the stock and bond market. The economic uncertainty index is computed by using a weighted average of the estimated volatilities of the components. The GARCH technique is used to derivate the volatilities of the components. From the GARCH, the volatilities standardized is minus with its mean and then divided by the standard deviation. The measure of the economic uncertainty index is hence express as:

$$EUI = \sum_i^n \lambda_i \left(\frac{vol_i - \overline{vol_i}}{\sigma_{vol}} \right) \tag{2.3}$$

where vol_i is the volatility of the component, $\overline{vol_i}$ is the average volatility of the component, σ is the standard deviation of volatility and $\sum$ is the weight of each component contributed.

The economic uncertainty index can bring positive or negative influences on money demand. When the economic uncertainty index is positively related, it shows that the uncertain happened will encourage more money demand from the household and firms to spend now. While if it is negative related, the uncertain happened will decrease the money demand such as keep it as saving for future use.

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2.2 Review of Literatures in Developed Countries

Domestic money demand has been discovered in the study of Darrat (1985), he investigates the Saudi Arabia money demand for the period 1962Q1 to 1981Q4. In this study, the researcher used the real income (GDP), inflation, foreign interest rate and exchange rate to observe the money demand. The result indicates that the real income has the positive signs to the money demand which is same as the studies of Chowdhury (1995) with money M1, Bahmani-Oskooee (2001), Bahmani-Oskooee and Ng (2002), Bahmani-Oskooee and Bahmani (2014), Bahmani-Oskooee, Bahmani, Kones and Kutan (2015), Bahmani-Oskooee and Maki Nayeri (2018) with money M2, Bahmani-Oskooee & Bohl (2000), Bahmani-Oskooee and Maki Nayeri (2017), Mohmood and Alkhateeb (2018) with money M3, Hafer and Dennis (1991) with money M1 and M2, Atta-Mensah (2004) with money M1, M1++ and M2++, Siklos (1995) with money M1 and M3, and Hayo (2000) with money M1, M2 and M3.

Other than positive signs for real income, some studies also indicate a negative sign for it with the money demand. Hueng (1998) and Hayo (1998) studies show the negative impact to the money M2 in Canada and money M1 and M3 in European Monetary Union 11 (EMU11) and Bahmani-Oskooee and Economidou (2005) for the study of money M2 in Greece. Some countries employed the different variable which can represent the real income such as the GNP from Lutkepohl and Wolters (1998) in German, and Huang, Lin and Cheng (2001) in Taiwan and use of GNE in the study of Valadkhani (2005) in Australia. The researchers found that GNP and GNE have a positive impact on

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the money demand and more compatible with the economic circumstance of the countries respectively instead of GDP.

Moreover, Darrat (1985) is using the inflation rate as the measure the yields of physical assets or mean the return of the good from the price paid. The inflation rate shows the negative impact to the money demand of Saudi Arabia which have a same result as the Lutkepohl and Wolters (1998), Valadkhani (2005), Bahmani-Oskooee et al. (2015), Mohmood and Alkhateeb (2018). However, Siklos (1995), Hayo (2000), Bahmani-Oskooee and Maki Nayeri (2018) found that inflation has a positive impact on the money demand of the study. However, the positive impact of inflation rate only present in the broad money demand in the studies. This might be due to the inflation a has a less significant impact on the research.

Moreover, the interest rate is the regular indicator that always use to be the opportunity to hold the money in the research of money demand. The study of Darrat (1985) using the foreign interest rate variable, it shows the negative impact on the money demand which have the same result as Hueng (1998) for Canada. However, Chowdhury (1995), Siklos (1995), Bahmani-Oskooee & Ng (2002) have found that the foreign interest rate gives a positive impact on their research.

Furthermore, the saving deposit rate, corporate bond rate, commercial paper rate, short-term interest rate, long-term interest rate, and domestic interest rate will be the preferable interest rate used in the study of money demand. The interest rate gives the negative impact most of the time like the research of Hafer & Dennis (1991), Chowdhury

(1995), Hayo (2000), Lutkepohl & Wolters (1998), Bahmani-Oskooee & Bohl (2000), Bahmani-Oskooee (2001), Huang, Lin & Cheng (2001), Bahmani-Oskooee & Ng (2002), Atta-Mensah (2004), Bahmani-Oskooee and Economidou (2005), the long-term interest rate of Valadkhani (2005), Bahmani-Oskooee and Bahmani (2014), Bahmani-Oskooee, Bahmani, Kones and Kutan (2015), Bahmani-Oskooee and Maki Nayeri (2017). When the interest is high, people tend to save more money than spending. Apart from that, Hayo (1998), Hueng (1998), the short-term interest rate of Valadkhani (2005), Bahmani-Oskooee & Maki Nayeri (2018) have given a positive impact to the money demand. The people believed to have a low speculative motive with the interest rate offered.

From the study of Darrat (1985), the exchange rate also has the negative impact to the money demand in this study as well as the study of Chowdhury (1995) and Bahmani-Oskooee and Bahmani (2014). It shows the wealth effect which the appreciation of currency has decrease the foreigner to exchange the domestic currency with the foreign currency. However, most of the study will show the currency substitution effect or bring a positive impact to the money demand. Hueng (1998), Huang, Lin and Cheng (2001), Bahmani-Oskooee and Ng (2002), Bahmani-Oskooee, Bahmani, Kones and Kutan (2015), Bahmani-Oskooee and Maki Nayeri (2017), Bahmani-Oskooee and Maki Nayeri (2018), and Mohmood and Alkhateeb (2018) found that when the domestic currency appreciated, the money demand will be increase as the purchasing power of the local people increased.

The uncertainty in the world will always affect the economy of a country. Therefore, Atta-Mensah (2004) has used the economic uncertainty index (EUI) as the variable in indicating the money demand model. The variable is formed by the volatility

of the level of economic activity, the mood of the stock market, inflation uncertainty, exchange rate uncertainty, long-term interest rates, and short-term interest rates. The EUI show a positive impact on the money M1 and M1++ and negative impact on the money M2++ in Canada. Bahmani-Oskooee and Bahmani (2014) use the volatility of nominal money stock and it shows a positive impact on the money demand. The political uncertainty also considered in the research of some researches to indicate the money demand model. It gives a positive impact on the Bahmani-Oskooee et al. (2015), but a negative impact on the Bahmani-Oskooee and Maki Nayeri (2017), and Bahmani-Oskooee and Maki Nayeri (2018).

The studies that are using the Johansen cointegration test, Vector Error Correction Model (VECM), granger causality and related methodology can found in Hafer and Dennis (1991), Chowdhury (1995), Siklos (1995), Bahmani-Oskooee and Hueng (1998), Hayo (1998), Lutkepohl and Wolters (1998), Bahmani-Oskooee and Bohl (2000), Hayo (2000), Huang et al. (2001), Atta-Mensah (2004), Bahmani-Oskooee and Economidou (2005), and Valadkhani (2005). Moreover, the use of Autoregressive distributed lag model (ARDL) model of the bound test, long run form test and ECM test can be found in Bahmani-Oskooee (2001), Bahmani-Oskooee & Ng (2002), Oskooee & Bahmani (2014), Bahmani-Oskooee, Bahmani, Kones & Kutan (2015), Bahmani-Oskooee & Maki Nayeri (2017), Bahmani-Oskooee & Maki Nayeri (2018), Mahmood & Alkhateeb (2018). While the Farley and Hinich test, Durbin Watson, Chow test were used in the Darrat (1985). Moreover, the unit root test, diagnostic test and CUSUM and CUSUMSQ test were employed by the researchers to check the validity of the data.

Table 2.1 Summary of developed countries

Author(s)	Data	Methodology	Finding(s)
Darrat (1985)	Sample Period: 1962Q1-1981Q4 (Quarterly) Country: Saudi Arabia Variables: real money balance, real income, foreign interest rate, inflation, and exchange rates Source: International Monetary Fund, International Financial Statistic and OECD Main Economic Indicator.	● Durbin-Watson ● Chow test ● Farley and Hinich test	● All variables are significantly affecting Saudi Arabia money demand. ● The demand for money is substantial stable over time.
Hafer & Dennis (1991)	Sample Period: 1915Q1-1988Q4 (Quarterly) Country: United States Variables: M1 and M2, real income, corporate bond rate and commercial paper rate Source: NBER Macrohistory Database	● ADF Unit root test ● Johansen-Juselius cointegration test ● VECM	● This study indicates that the broader M2 aggregate is the better measure of the implementation of monetary policy.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Chowdhury (1995)	Sample Period: 1973Q2-191Q (Quarterly) Quarterly Country: Switzerland Variables: monetary base, narrow money supply (M1), real GDP, nominal effective exchange rate, foreign interest rate, short term interest rates, long term interest rate Source: OECD Main Economic Indicators Data and Citibank Database	● Unit Root Test (ADF, KPSS Test) ● Johansen cointegration test ● Chow test	● In the long run, the monetary based money demand function is statistically significant with real GDP, short run and long lung interest rate. ● Long run relationship also found in M1 with income, short run interest rate and exchange rate. ● No cointegration presence only when including the exchange rate in both models. ● Cointegration vector is present at 5% significance level when foreign interest is included.
Siklos (1995)	Sample Period: 1981Q1-1994Q1 (Quarterly) Country: New Zealand Variables: real M3, real GDP, foreign interest rate, inflation rate and institutional change factors Source: Reserve Bank of New Zealand	● Unit root test ● Johansen and Juselius cointegration test ● VECM ● Granger causality	● The results strongly conclude that institutional change yields an econometrically satisfactory equilibrium and error-correction relationship in demand for money function.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Hueng (1998)	Sample Period: 1973Q2-1990Q1 (Quarterly) Country: Canada Variables: real money demand M2, real income, foreign interest rate, domestic interest rate and exchange rate Source: International Financial Statistics of IMF	● ADF and PP unit root tests ● Johansen's FIML Test ● ECM	● In the long run, all the variables have statistically significant ● In short run, the signs of variables are consistent as long run. However, only the exchange rate and domestic interest rate e is statically significant.
Hayo (1998)	Sample Period: 1964Q1-1994Q4 (Quarterly) Country: 11 EMU countries (Germany, France, Belgium, Ireland, Netherlands, Finland, Italy, Austria, Spain, Portugal) Variables: narrow and board(M3) money, income, long run interest rate Source: OECD database and International Financial Statistics	● ADF unit root test ● Johansen cointegration test ● VECM ● Diagnostics test ● Chow teat	● Estimated demand for money function appears as stable over time. ● Income unity elasticity for both narrow and board money ● Narrow money has higher sensitivity towards the change of interest rate compare to board money.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Lutkepohl & Wolters (1998)	Sample Period: 1976Q1-1996Q4 (Quarterly) Country: German Variables: real board(M3) money, real GDP, inflation rate, long run interest rate Source: West Germany and unified Germany	● Cointegration test ● Error correction model ● Diagnostic test ● Impulse response	● No clear relationship of inflation on money growth exist in this study. ● Interest rate is exogenous in as shown in this study and hence it can use to control inflation and growth through the monetary policy.
Bahmani-Oskooee & Bohl (2000)	Sample Period: 1969Q1-1995Q4 (Quarterly) Country: German Variables: real M3, real GDP and long run interest rate Source: Economic Indicators of OECD; International Financial Statistics of IMF, Saisonbereinigte Wirtschaftszahlen of the Deutsche Bundesbank and Kapitalmarktstatistik of the Bundesbank	● ADF and KPSS unit root test ● Johansen and Juselius cointegration test ● ECM ● CUSUM and CUSUMSQ	● There is a no stable money demand function found in the CUSUMSQ test in the context of error-correction modelling and cointegration.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Hayo (2000)	Sample Period:1964Q1-1996Q3 (Quarterly) Country: Austria Variables: real money demand for M1, M2, M3, real income, inflation rate and interest rate Source: Economic Indicators of OECD; International Financial Statistics of IMF	● ADF Unit Root Test ● Johansen cointegration test ● Granger causality ● Error correlation term ● Diagnostic test	● Stable money demand function found in all types of money ● In long run equilibrium of M1 is similar to conventional money demand after the structural break in 1979. ● For M2 and M3, the income has unity influence and negative influence of long-term interest rate.
Bahmani-Oskooee (2001)	Sample Period: 1964Q1-1996Q3 (Quarterly) Country: Japan Variables: real M2 money demand, real income and interest rate Sources: International Financial Statistics of IMF, and OECD Main Economic Indicator.	● Error correction ARDL model ● CUSUM and CUSUMSQ	● M2 monetary aggregate is cointegrated with all variable except inflation rate with its signs respectively. ● The long run money demand M2 is stable in Japan.
Huang, Lin & Cheng (2001)	Sample Period: 1962Q1-1996Q4 (Quarterly) Country: Taiwan Variables: Real money balance M2, Gross	● ADF and PP unit root test ● Johansen cointegration test	● This paper found that a nonlinear path is used in the short-run dynamics towards the long-run equilibrium for

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
	national product, three month time deposit rate and real exchange rate Source: Directorate-General of Budget, Accounting, and Statistics office in Taiwan	●Error correction model	money demand in Taiwan. ●The stable money demand is a useful guide for macro policy in Taiwan in the long run.
Bahmani- Oskooee & Ng (2002)	Sample Period: 1985Q1-1999Q4 (Quarterly) Country: Hong Kong Variables: real board money (M2), real GDP, domestic interest rate, foreign interest rates, nominal effective exchange rate Source: Hong Kong Census and Statistics Department, Hong Kong Monthly and Digest of Statistics and Federal Reserve Statistical Release	●Unit root test ●ARDL model ●CUSUM and CUSUMSQ	●The currency depreciation will reduce the demand for domestic currency. ●The money demand in Hong Kong is stable and the variables are cointegrated with the M2.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Atta- Mensah (2004)	Sample Period: 1973Q2-191Q4 (Quarterly) Country: Canada Variables: the monetary aggregate of M1, M1++ and M2++, real income, interest rates and economic uncertainty index Source: Bank of Canada	● GARCH ● ADF Unit root test ● Johansen and Juselius cointegration test	● In the short run, the economic uncertainty increase will lead to an increase of M1 and M1++ demand that agents to hold while there is a negative impact on M2++
Bahmani-Oskooee & Economidou (2005)	Sample Period: 1975Q1-2002Q4 (Quarterly) Country: Greece Variables: real monetary aggregate M1 and M2, real income, and interest rate Source: Monthly Statistical Bulletin of Bank of Greece, OECD Main Economic Indicator, International Financial Statistics and National Statistical Service of Greece of Bank of Greece.	● ADF unit root test ● Johansen and Juselius cointegration analysis ● ECM ● CUSUM and CUSUMSQ	● Cointegrated exist between income and interest rate withM1 and M2 monetary aggregates. ● The money demand M1 is stable but not stable for M2.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Valadkhani (2005)	Sample Period: 1976Q3-2002Q2 (Quarterly) Country: Australia Variables: real board money, real GNE, long run interest rate, short run interest rate, inflation Source: International Monetary Fund, International Financial Statistic and OECD Main Economic Indicator.	● ADF and KPSS unit root test ● Johansen cointegration test ● VECM ● CUSUM and CUSUM square	● The model estimated highly significant and have consistent signs and order of magnitude ● The model developed can provide useful policy guide for RBA in its quest for price stability by measuring the impact of a change in the official cash rate on money demand and hence inflation.
Bahmani-Oskooee & Bahmani (2014)	Sample Period: 1971-2010 (Annually) Country: South Korea Variables: real M2, real GDP, interest rate, nominal effective exchange rate, the volatility of nominal money stock Source: International Financial Statistics of IMF.	● ADF unit root test ● Bounds testing approach ● Diagnostic test	● Monetary uncertainty included shows stable in the demand for money in Korea.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Bahmani-Oskooee, Bahmani, Kones, & Kutan (2015)	Sample Period: 1997Q1-2013Q3 (Quarterly) Country: United Kingdom Variables: real M2 money demand, real income, the nominal rate of interest, real effective exchange rate, inflation rate and policy uncertainty Source: International Financial Statistics of IMF, and Economic Policy Uncertainty Group.	● ADF Unit root test ● Bounds test ● Error correction model ● Diagnostic test	● In the short run, at least one significant coefficient can obtain in different lag order for the variables except for the inflation rate. ● In the long run, the income, interest rate and the exchange rate are statistically significant with their expected sign respectively. ● The policy uncertainty only has a negative impact in the short run demand for money.
Bahmani-Oskooee & Maki Nayeri (2017)	Sample Period: 1998Q2-2016Q2 (Quarterly) Country: Australia Variables: quantity of money demand, real income, interest rate, nominal effective exchange rate, policy uncertainty Source: International Financial Statistics of IMF and Economic Policy Uncertainty Group	● ADF Unit root test ● Linear and nonlinear ARDL ● ECM ● CUSUM and CUSUMSQ	● Nonlinear model and a new measurement of policy uncertainty have shown a significant long run asymmetric effects on the money demand in Australia.

Table 2.1 Summary of developed countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Bahmani-Oskooee & Maki-Nayeri (2018)	Sample Period: 1985Q1-2017Q4 (Quarterly) Country: United States Variables: real M2, real income, inflation rate, interest rate, exchange rate and policy uncertainty Source: International Financial Statistics of IMF, Economic Policy Uncertainty Group and Federal Reserve Bank of St.Louis	● ADF unit root test ● Linear ARDL and nonlinear ARDL ● ECM ● CUSUM and CUSUMSQ	● Policy uncertainty in linear ARDL only had short run effects. ● While for nonlinear ARDL test, the variables are significant at least once in short run and have an asymmetric. ● The policy uncertainty influences the demand for money in the U.S.A for all time horizon. However, increase the policy uncertainty will make less money held by the public but nothing happened when the policy uncertainty decreased.
Mahmood & Alkhateeb (2018)	Sample Period: 1968-2016 (Annually) Country: Saudi Arabia Variables: nominal money supply M3, inflation, income level and real exchange rate Source: Saudi Arabian Monetary Agency (SAMA), World Development Indicators	● Unit root test ● Nonlinear ARDL ● CUSUM and CUSUMSQ	● Income and inflation have a positive and negative effect on money demand. ● There is an asymmetrical effect of exchange rate on demand for money. A real appreciation or depreciation of the US dollar has negative symmetrical effects toward the demand for SAR and there is the existence of a

Author(s)	Data	Methodology	Finding(s)
			substitution effect in the short run.
			• The money demand function is found stable.

Table 2.1 Summary of developed countries (Continued)

2.3 Review of Literatures in Developing Countries

In the developing countries, Dekle and Pradhan (1997) had researched of money demand M1 and M2 in ASEAN countries included Indonesia, Malaysia, Singapore and Thailand since the early 1980s. Most of the money demand employed in the developing countries literature review was the money M1 and M2. The result shows that the real income (GDP) always show the positive signs to the money demand in the countries studied. Obben (1998), James (2005), Bahmani-Oskooee and Wang (2007), Nair, Muthi and Vaithilingam (2008), Prwoto (2010), Puah and Hiew (2010), Karnel (2011), Baharumshah and Soon (2013), Baba, Knneth and William (2013), Mall (2013), Bahmani-Oskooee and Xi (2014), Bahmani-Oskooee and Bahmani (2015), Ghumro and Karim (2016), Barros, Faria & Gil-Alana (2016), Chuke Nwude, Onochie Offor and Udeh (2018), Dou (2018), Folarin and Asongu (2019), and Djebbouri, Mansouri and Tahi (2019) have the same results were showing the real income is positively related with the money demand. In contrast, the real income is negatively related to the money M1, M2 and M3 for Bahmani (2011) and the budget deficit for Ozdemir and Saygih (2013). Apart from that, Salisu, Ademuyiwa and Fatai (2013) using the nominal income in the study and get a positive result towards the money demand.

The volatility of real GDP also been employed by Bahmani-Oskooee & Xi (2014) in his study of 6 Asian countries. The India, Philippines and Singapore have shown the positive signs while Indonesia, Malaysia and Pakistan showed the negative signs to the money demand. Moreover, the total wealth and real wealth also used in the Prwoto (2010)

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and Baharumshah and Soon (2013) and both shown the positive impact on the money demand. The increase in economic activities will require more money demand.

Another critical factor affecting the money demand is the interest rate, the common interest rate employed are the time deposit rate, saving deposit rate, and call money rate. From the literature reviewed, we can know that the interest rate always gave a negative impact on the money demand due to the speculative motive. Dekle & Pradhan (1997), Obben (1998), Puah and Hiew (2010), Salisu et al. (2013), Bahmani-Oskooee and Xi (2014) except Indonesia, Chuke Nwude et al. (2018) and Dou (2018) show the negative signs to the money demand. However, there has some research obtained an opposite result such as Ademuyiwa and Fatai (2013), Ozdemir and Saygih (2013)**,** Barros et al. (2016), and Djebbouri et al. (2019).

Some study has employed the domestic and foreign interest rate in their study. James (2005) has found that both interest rate can give a negative impact on the money demand in Indonesia. Bahmani- Oskooee and Wang (2007) and Prwoto (2010) have the same result where the domestic interest rate has a negative impact, while foreign interest rate has a positive impact on the money demand. Also, Folarin and Asongu (2019) found that the foreign interest rate has a positive impact on the money demand in Nigeria. Other than than, Baharumshah and Soon (2013) use the interest rate differential has shown a negative impact on the money demand in Singapore. Karnel (2011) has employed the volatility of interest on time deposits and treasury bills as the factors of money demand in Turkey. It shows that the volatility of interest on treasury bills give a positive sign while the volatility of interest on time deposits give a negative sign on the money demand.

Another related factor that can be investigated in money demand model is the inflation rate as developing countries has a lack of well-developed financial markets (Bahmani Oskooee and Bahmani, 2015). Hence, we can see that the inflation rate has shown the negative impact to the money demand in the study of Nair et al. (2008), Prwoto (2007), Bahmani (2011), Karnel (2011), Baba et al. (2013), Salisu et al. (2013), Bahmani-Oskooee and Xi (2014) for Pakistan, the Philippines and Singapore, Bahmani-Oskooee and Bahmani (2015), Barros et al. (2016), Chuke Nwude et al. (2018) and Dou (2018). However, there has the exception where we can find from Baharumshah and Soon (2013), Bahmani-Oskooee and Xi (2014) for Indonesia, Djebbouri et al. (2019) have shown the positive impact of the inflation rate to the money demand. The positive impact might be due to the money illusion or have an expectation of a high inflation rate in future.

Furthermore, the exchange rate also is the factor that can affect the money demand as the people react to the value change of money. Nair et al. (2008), Mall (2013), Bahmani-Oskooee & Xi (2014), Barros et al. (2016), Ghumro and Karim (2016), Chuke Nwude et al. (2018) and Dou (2018) have found that the exchange rate used in their study show the positive sign to the money demand. However, Bahmani- Oskooee and Wang (2007), Tang (2007) for Thailand, Puah and Hiew (2010), Bahmani (2011) for Burundi, Karnel (2011), Baba et al. (2013), Salisu et al. (2013), Bahmani-Oskooee and Bahmani (2015), Folarin and Asongu (2019), Djebbouri et al. (2019) have shown the negative sign to the money demand. In the Bahmani (2011) study, another factor that employed is the exchange rate volatility. This factor shows a negative sign to the money demand in Cyprus.

The exchange rate can be positively or negatively affecting the money demand as it is determined by the public response towards the currency value.

Dekle and Pradhan (1997) employed a broad money return and foreign return to indicate the money demand. Due to the instability of money growth in financial markets, the researcher decided to understand the ASEAN countries money demand by adding new factors other than the conventional factors. From the result, the broad money return has a positive relationship with the money demand while the foreign return has a negative relationship to the money demand in the ASEAN countries.

Other than that, Obben (1998) is employed the banks' foreign placements and bank asset to be the determinants of money demand of Brunei. This is because the researcher found that Brunei still facing the underdevelopment such as lack of securities market and overdependency on the non-renewable primary resources. The limitation on the absorptive capacity of the Brunei economy has encouraged the banks to place their funds in liquid financial assets offshore which cause the choose of money demand determinants in this study. The result shows a positive effect of the factors on the money demand in Brunei.

Tang (2007) also has his point in determining the determinants of money demand in the Asian countries including Indonesia, Malaysia, Thailand, Singapore, and the Philippines. The researcher has tried several money demands models with mixing variables. From the result, he found that the final consumption expenditure will give a negative relationship to the money demand in Thailand. Moreover, the expenditure on

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investment goods has a negative impact on Indonesia. However, the exports on goods and services give a positive impact to the money demand in all the countries.

In the study of Baharumshah and Soon (2013) for the Singapore money demand, they use the residential property price index and share price. The result shows that the residential property price index shows a positive impact on the money demand while the share price shows a negative impact on the money demand. This study is using the unique determinants of money demand than conventional money demand. This is because the variables are more suitable to the situation of the Singapore economy in predicting the money demand.

The money demand function in the Prwoto (2010) has investigated the effect of the return of real stock and it has a positive relationship with the money demand in Indonesia. The volatility of nominal money supply has been employed in the study of Bahmani-Oskooee and Xi (2014). It has shown a negative relationship with the money demand in India, Indonesia and the Philippines. Also, Djebbouri et al. (2019) use the velocity of circulation of money to be the factor affecting the money demand, but it shows a negative relationship on the money demand. The volatility is reliable since it captured the uncertainty in the economy of a country in order to react to the money demand.

Apart from the determinants used, the methodology employed is always the main role in obtaining an accurate result. From the literature reviewed, the Salisu et al. (2013) are using the panel data analysis method to analysis the demand for money in Sub-Saharan Africa (SSA). Other than that, the Johansen cointegration test, ECM, granger causality

test were employed by Dekle and Pradhan (1997), Obben (1998), Prwoto (2010), Baba et al. (2013), Puah and Hiew (2010), Ozdemir and Saygih (2013), and Dou (2018).

Another method called ARDL will be employed once the data are mixed between the level I(0) and first different I(1) in the unit root test. James (2005), Bahmani- Oskooee and Wang (2007), Tang (2007), Nair et al. (2008), Bahmani (2011), Karnel (2011), Baharumshah and Soon (2013), Mall (2013), Bahmani-Oskooee and Xi (2014), Bahmani-Oskooee and Bahmani (2015), Barros et al. (2016), Ghumro and Karim (2016), Chuke Nwude et al. (2018) and Folarin and Asongu (2019) had employed ARDL method in their researches.

Table 2.2 Summary of developing countries

Author(s)	Data	Methodology	Finding(s)
Dekle & Pradhan (1997)	Sample Period: 1974-1995 (Annually) Country: Indonesia, Singapore, Malaysia, Thailand Variables: narrow and broad money, GDP, time deposit rate, broad money return, foreign return Sources: World Bank and International Financial Statistics of IMF's	● ADF unit root test ● Johansen cointegration test	● Stable demand equation only exists in Malaysia in both real narrow money, nominal broad money and real broad money. The GDP is significant with the real narrow money.

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Table 2.2 Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Obben (1998)	Sample Period: 1974-1995 (Annually) Country: Brunei Variables: narrow and broad money, real GDP, banks' foreign placements, bank assets, interest rate Source: Brunei Darussalam Statistical Yearbook	● ADF and PP Unit root tests ● Johansen cointegration test ● Error correction models	● Narrow money is responsive to the changes in real income and interest rate in all time horizon. ● For the board money, the interest rate is elastic for in long run. Also, the income is inelastic in all time horizon. ● The proportion of commercial bank assets placed in foreign money market do not affect the demand of narrow money but do affect to board money.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
James (2005)	Sample Period: 1983Q1-2000Q4 (Quarterly) Country: Indonesia Variables: real M2, real income, domestic interest rate and foreign interest rate Source: Central Bank, Bank Indonesia, Biro Pusat Statistics and International Financial Statistics of IMF's	● ADF unit root test ● Bounds testing approaches ● UECM	● The income, domestic and foreign interest rate are statistically significant with expected sign in short run. ● The variables will only show significant when the financial liberalization variable is included in the function in long run. ● Overall, financial liberalization can be used to influence the money demand in Indonesia.
Bahmani-Oskooee & Wang (2007)	Sample Period: 1983Q1-2002Q4 (Quarterly) Country: China Variables: real M1 and M2, real income, domestic inflation rate, foreign interest rate, and exchange rate. Source: International Financial Statistics of the IMF, Chinese Statistical Yearbook and Federal Reserve Statistical Release.	● ARDL model ● ECM ● CUSUM and CUSUMSQ	● Except for the exchange rate, other variables show significant in short run. ● In long run, the income and domestic interest rate are significant in M1 while only income is significant in M2. ● The model adopted in this study is stable with the demand for money M1 but is not stable for M2.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Tang (2007)	Sample Period: 1961-2005 (Annually) Country: Malaysia, Thailand, Singapore, the Philippines and Indonesia Variables: Money supply M2, expenditure on investment goods, final consumption expenditure, exports on goods and services and exchange rate Source: International Financial Statistics of IMF.	● ADF unit root test ● Bound test ● ARDL model	● The real M2 aggregate, real expenditure components, exchange rate and inflation rate are cointegrated for Malaysia, Singapore and the Philippines. ● The statistical significance of real income exists in both short-run and long-run. ● The stability test shows that all Southeast Asian countries tested is stable with the estimated model except Indonesia.
Nair, Muthi & Vaithilingam (2008)	Sample Period: 1970-2004 (Annually) Country: Malaysia Variables: M1, M2, M3, real income, 3 month fixed deposit rate, 3 month treasury bill rate, 3 month interbank rate, saving interest rate, consumer price index, real effective exchange rate Source: Bank Negara Malaysia (Central Bank of Malaysia) Monthly Statistical Bulletin and	● Gregory–Hansen structural break Approach ● PP Unit root test ● Bounds test ● UECM	● The demand for all types of money are cointegrated with the variables. ● The demand for money is stable in long run.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
	International Financial Statistics of IMF.		
Prawoto (2010)	Sample Period: 1990-2008 (Monthly) Country: Indonesia Variables: currency money, real income, domestic and foreign interest rate, price changes, return of real stock and total wealth Source: Bank Negara Malaysia (Central Bank of Malaysia) Monthly Statistical Bulletin and International Financial Statistics of IMF.	● ADF unit root test ● Cointegration test ● Insukindro-Error correction model	● Monetarist real currency money demand performed better than Keynesian real currency money demand. ● In short run, the monetarist real currency money demand is positively affected by total wealth and negatively affected by CPI. ● In long run, the monetarist base demand for money is positively affected by foreign interest rate and negatively influenced by domestic interest rate and composite stock price index.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Puah & Hiew (2010)	Sample Period: 1981Q1-2005Q4 (Quarterly) Country: Indonesia Variables: Simple-sum and divisia of M1 and M2, real income, domestic inflation rate, foreign interest rate, and exchange rate. Source: International Financial Statistics of IMF	● ADF Unit root test ● Johansen and Juselius Cointegration test ● VECM ● Granger causality test ● Residual test	● The coefficients for all the determinants demonstrate correct signs and statistically significant in the money demand divisia M1 and M2. ● The coefficient for all the variables in the money demand simple-sum M1 model are shows the correct signs and statistically significant while the domestic and foreign interest rate in the money demand simple-sum M2 show the unexpected signs but statistically significant. ● Divisia M1 have the fastest adjustment towards the long run equilibrium level of money demand and the residual test show the divisia M1 is free from any problem. Overall, the divisia M1 model is found is more suitable to be used as in adjust the monetary policy in Indonesia.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Kemal (2011)	Sample Period: 1987Q1-2007Q3 (Quarterly) Country: Turkey Variables: real monetary aggregate M2, GDP, volatility of treasury bills, volatility of time deposit, inflation rate and exchange rate. Source: Electronic Data Delivery System, Central Bank of the Republic of Turkey and International Financial Statistics	● ADF unit root test ● Bound test ● ARDL model ● Diagnostic test	● Gross domestic product is positively related and statistically significant to money demand. ● Volatility of treasury bills is positively related but statistically insignificant to the money demand. ● The volatility of time deposit, exchange rate and inflation rate are negatively related and statistically significant to the money demand.
Bahmani (2011)	Sample Period: 1980-2009 (Annually) Country: Algeria, Bahrain, Belize, Bolivia, Burundi, Cyprus, Hungary, Morocco, South Africa, St. Kitts and Nevis, Tunisia, Uganda, Uruguay, Venezuela, and Zambia Variables: real M1, M2 and M3 balances, real income, inflation rate, exchange rate and exchange rate volatility Source: International Financial Statistics of IMF	● ADF unit root test ● Bounds testing approach ● ECM	● In the 15 less developed, all variables are significant at least once in short run. ● Only Belize, Cyprus, Uruguay, Uganda and Zambia is not showing real income significant. ● The inflation rate yields a significant and negative side in Hungary, Venezuela and South Africa. ● The exchange rate is positively significant in Algeria, Uganda, Hungary and Zambia while showing negatively significant

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
			in Burundi and South Africa.
			● The study shows that exchange rate volatility has short run effect in LDCs for M2 but not in long run.
Baharumshah, & Soon (2013)	Sample Period: 1985Q1-2012Q4 (Quarterly) Country: Singapore Variables: real M1, M2 and M3 balances, real income, interest rate differential, inflation and real wealth Source: International Financial Statistics of IMF.	● ADF and Ng-Perron unit root test ● Bounds testing ● ARDL model ECM	● Both M2 and M3 models with the inclusion of housing price index (hpi) are stable in short run. ● The coefficient for the hpi and income carries positive sign but interest rate differential and inflation are insignificant in long run. ● The money demand in Singapore is closely related to the developments in the housing market.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Baba, Kenneth & William (2013)	Sample Period: 1990-2010 (Annually) Country: Ghana Variables: real M1, Gross domestic income, nominal exchange rate, inflation Source: International Financial Statistics of IMF.	● ADF, PP, KPSS unit root test ● Johansen cointegration test ● Error correction model	● Results show that inflation, money demand and exchange rate are cointegrated. ● A positive relationship exists between money demand and income. ● A negative relationship between money demand with inflation and exchange rate
Ozdemir &Saygili (2013)	Sample Period: 1992Q1-2008Q3 (Quarterly) Country: Turkey Variables: Budget deficit to GDP ratio, real GDP, inflation, exchange rate, stock market index Source: CBDT database	● ADF and PP unit root test ● Johansen Cointegration test ● Diagnostic test ● Nymblom type test	● The inclusion of the appropriate measure of uncertainty is necessary to estimate a stable and consistent money demand function for Turkey.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Mall (2013)	Sample Period: 1973-2010 (Annually) Country: Pakistan Variables: real M2 money demand, call money rate, real income and exchange rate Source: CBDT database	● ARDL ● ADF and PP unit root test ● Bound test ● CUSUM and CUSUMSQ	● Real income and exchange rate are positively related to real demand for money in all time horizon. ● Call money rate has negatively affected the demand for money. ● This model strongly recommends the real demand for M2 is an important monetary aggregate in terms of policy implications of the results including the suitability of model in Pakistan. ● The function for the demand for money is stable in Pakistan.
Salisu, Ademuyiwa & Fatai (2013)	Sample Period: 1980-2010 (Quarterly) Country: 24 Sub-Saharan African countries Variables: narrow money, nominal GDP, nominal interest rate and nominal effective exchange rate. Source: World Development Indicators database.	● Panel unit roots ● Panel cointegration test ● Fully modified OLS	● There is a cointegrated relationship between money demand, income, price level, exchange rate and interest rate. ● Interest rate and exchange rate have a negative relationship with money demand, while the income has a positive relationship with money demand.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Bahmani-Oskooee & Xi (2014)	Sample Period: 1994Q1-2011Q4 (Quarterly) Country: India, Indonesia, Singapore, Malaysia, Philippines, and Pakistan Variables: real M2, real income, inflation rate, interest rate, exchange rate, volatility of real GDP and volatility of nominal money supply. Source: International Financial Statistics of the IMF, Central Statistical Organization and Bloomberg	● GARCH ● Bounds testing approach. ● ECM ● Diagnostic test	● Almost all variables are significant in the short run but only income is highly significant in the long run for all countries. ● The interest rate is significantly negative in Pakistan, Indonesia, and Singapore while positive in India, the Philippines and Malaysia. ● The inflation rate negatively affected in Pakistan, the Philippines, and Singapore and positively significant in the case of Indonesia. ● Monetary uncertainty is positively significant long-run effect on the demand for money in Singapore, and negatively significant effect in India and Indonesia. ● Economic uncertainty had the negatively significant effect in Malaysia while the positively significant effect in the Singapore and Philippines.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Bahmani-Oskooee & Bahmani (2015)	Sample Period: 1990Q1-2014Q1 (Quarterly) Country: Iran Variables: real M2 monetary aggregate, real income, inflation rate, exchange rate Source: International Monetary Fund, International Financial Statistics	● ADF unit root test ● ARDL model ● Diagnostic test	● The relationship for the exchange rate and demand for money is not significant when the study is assuming a linear adjustment mechanism among the variables. When the nonlinearity used in the partial sum concept, currency depreciation or appreciation cloud affect demand for money in an asymmetric manner.
Barros, Faria & Gil-Alana (2016)	Sample Period: January 2000- August 2013 (Monthly) Country: Angola Variables: real M1 and M2, real output, inflation rate, interest rate and exchange rate. Source: Central bank of Angola and the World Bank	● Unit root test ● Johansen-Juselius multivariate cointegration ● Endogeneity test	● In the short run, money demand is statistically significant related to inflation. ● In the long run, demand for money is statistically significant related to oil receipts and exchange rate. ● Based on this result, Angola should focus on decrease inflation by increase the velocity of money.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Ghumro & Karim (2016)	Sample Period: 1972-2014 (Annually) Country: Pakistan Variables: broad money supply, gross domestic product, inflation rate, discount rate and exchange rate. Source: State bank of Pakistan, Pakistan Statistical Bureau, Pakistan Economic Survey, International Financial Statistics of IMF and WDI, World Bank	● ADF unit root test ● Bound test ● ARDL model ● Diagnostic test	● The exchange rate has positive influence in all time horizon. ● Exchange rate contributed as a component to the stability of the model.
Chuke Nwude, Onochie Offor & Udeh (2018)	Sample Period: 1991Q1-2014Q4 (Quarterly) Country: Nigeria Variables: real M2 money balances, real GDP, domestic interest rate, inflation rate, exchange rate, foreign interest rate Source: statistics portal of the CBN, CBN's statistical bulletins and the International Financial Statistics	● ADF unit root test ● Wald-test ● ARDL error correction model ● CUSUM and CUSUMSQ	● Real income and exchange rate are directly related to the real broad money balances while domestic interest rate, inflation rate and foreign interest rate show a negative effect on the demand for broad money. ● The money demand function is stable in Nigeria in long run.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Dou (2018)	Sample Period: 1996-2016 (Annually) Country: China Variables: real monetary aggregate M2, real income, interest rate, inflation rate, government debt, exchange rate and capital mobility Source: World Bank, and China's statistics bulletin of the National Bureau of Statistics.	● ADF unit root test ● Johansen's cointegration test ● Pairwise Granger causality test ● OLS ● ECM model estimation ● SVAR model analysis ● Impulse response ● Decomposition of variance ● Diagnostic test	● The income, inflation rate and interest rate are statistically significant to the money demand ● The money demand function is unstable.
Folarin & Asongu (2019)	Sample Period: 1992Q1-2015Q4 (Quarterly) Country: Nigeria Variables: real narrow and broad money, real income, interest rate, inflation rate, foreign interest rate and real effective exchange rate. Source: International Financial Statistics of IMF and Central Bank of Nigeria (CBN) Statistical Bulletin	● Ng-Perron unit root test ● Bounds test ● ARDL model ECM ● CUSUM and CUSUMSQ	● The study shows that there is cointegrated vector in money demand M1 and M2. ● Real income and exchange rate are significant in all time horizon for M1 and M2. While inflation is only significant in M2. ● Compare with interest rate, inflation rate can better suit as opportunity variable in Nigeria. ● The demand for money in both M1 and M2 in Nigeria are stable.

Table 2.2. Summary of developing countries (Continued)

Author(s)	Data	Methodology	Finding(s)
Djebbouri, Mansouri, & Tahi (2019)	Sample Period: 1980-2017 Data Frequency: Annually Country: Algeria Variables: Demand for real cash balances, real income, velocity of circulation of money, inflation, nominal interest rate, nominal exchange rate Sources: World Bank and International Monetary Fund (IMF)	● Unit Root Test ● Cointegration test ● VECM ● Diagnostic test	● Income, the velocity of money circulation and the inflation are showed the corresponding sign as the economic theories and had long term relationship with the money demand.

2.4 Review of Literature in the combination of Developed and Developing Countries

Gan (2014) was studied the influence of economic uncertainty index towards the money demand in 7 countries including 3 developed countries, Canada, United States and Japan, and 4 developing countries which are Malaysia, Thailand, Singapore, and Indonesia. The determinants of this study are the real income, interest rate, exchange rate and consumer price index. The method used by the researchers were PP unit root test, grid search optimization procedure, generalized method of moments estimator, estimated response function and diagnostic test. After the test, the author derived an optimal economic uncertainty index which included all related endogenous variables at the optimal level and weighted using the estimated optimal coefficient and aggregated of the variables. The estimated optimal economic uncertainty found to support the hypothesis show that it can be used to achieve the best economic outcome. Overall, the response impulse result suggests that the variables used are appropriate indicators for policymakers.

In this research, Bahmani-Oskooee, Xi and Bahmani (2018) tried to find the significant of the exchange rate as a new measure in the conventional money demand theory in some Asian countries. The countries observed include India, Indonesia, Singapore, Korea, Malaysia, Thailand, Philippines, and Japan. The researchers used the linear and nonlinear ARDL to identify the short run and long long-run effect of the model. The exchange rate has a short-run effect in a nonlinear model in all countries. Also, the exchange rate only has the log run effect in the nonlinear model for all countries. There is a significant short run asymmetric effect in Indonesia, Thailand and Japan while

significant long-run asymmetric effects in India, the Philippines, Thailand and Singapore.

However, only India is found to be fixed with the model specified since the variables are

coefficient estimate is stable and the test shows that most nonlinear model will be a better

fit to the model compare to the linear model.

Table 2.3 Summary of the combination of developed and developing countries

Author(s)	Data	Methodology	Finding(s)
Gan (2014)	Sample Period: 1995Q1-2010Q4 (Quarterly) Country: Indonesia, Singapore, Malaysia, Thailand, Canada, Japan, United States Variables: narrow and broad money, real effective exchange rate, interest rate, real income, inflation Sources: International Financial Statistics of IMF, Bank for International Settlements Statistics (BIS Statistics) and ECONSTATS	● PP unit root test ● Grid search optimization procedure ● Generalized method of moments estimator ● Estimated response function ● Diagnostic test	● Exchange rate, inflation, interest rate and output are the useful indicators for central banks' decision-making. ● The optimal index supports the prediction of economic uncertainty.

Table 2.3 Summary of the combination of developed and developing countries
(Continued)

Author(s)	Data	Methodology	Finding(s)
Bahmani-Oskooee, Xi & Bahmani (2018)	Sample Period: 1979Q1-2015Q4 (Quarterly) Country: India, Indonesia, Singapore, Korea, Malaysia, Thailand, Philippines, Japan Variables: real M2, real income, inflation rate, and exchange rate. Source: International Financial Statistics of IMF, Wind Economic Database and Bank for International Settlements	●Linear ARDL and nonlinear ARDL ●Diagnostic check	●In linear ARDL model, the exchange rate has a significant short run effect in six countries while seven countries in the nonlinear model. ●There has an asymmetry short run effect in all nonlinear model. ●There is no long run effect of the exchange rate in the linear model but it does significant in the nonlinear model in India, Korea, Indonesia, Singapore and the Philippines. ●India seem to fit with the model specified which the coefficient estimates are stable. Overall, nonlinear models are accepted in all country compare to the linear model.

CHAPTER 3
METHODOLOGY

3.0 Introduction

In this chapter, this study will be going to explore further on the data chosen and technique and method that can be applied. This chapter will be dividing into three sections. First, is the information of the data employed is presented. The second section is the empirical model to be specified in this study. The last section is the empirical testing procedures which the techniques and methodology that will be used in this study.

3.1 Data and Description

In this research, we are using one dependent variable with four independent variables. The demand for the narrow money (M1) and will be chosen as the dependent variable for the model respectively. The dependent variables that will be used are the real income, interest rate, exchange rate and uncertainty index. Sample period used is quarterly data start from 2000Q1 to 2018Q4. The money demand and the gross domestic product will be divided by the consumer price index to become real money demand and real gross domestic product to be used in this study. The economic uncertainty index is built up with five compounds which is the nominal gross domestic, real exchange rate, deposit rate, money market rate and equity market index. Description of the data and sources are provided as

Table 3.1 The information of variables

Variables	Unit	Sources
M1 money supply Gross domestic product (GDP)	USD million	CEIC database and The Bank of Indonesia
Consumer price index (CPI) Real effective exchange rate (REER)	2015=100	Statistics Indonesia and Bank of Indonesia and International Financial Statistics of IMF
Lending rate Deposit rate Money market rate	Percentage	International Financial Statistics of IMF
Bilateral exchange rate	IDR/USD	
Stock market index	1982=100	Indonesia Stock Exchange

3.2 Empirical Model

The Indonesia economy stagnancy still an issue after the Asian Financial crisis and the May 1998 riots. Many uncertainties that happened in Indonesia has indirectly affected its growth. Hence, the economic uncertainty index is used to detect the stability of Indonesia. This study adopted the determinants of economic uncertainty used by Atta-Mensah (2004) by substituting the bond rate to the deposit rate. Scale variable and the opportunity to hold cash are always the well-known factors of the traditional demand for money. To better explain the demand for money in Indonesia, this study is included the exchange rate and economic uncertainty which are adequate to the Indonesia economy situation. Hence, the demand for money model in Indonesia to be investigated in this study is as

$$\frac{MD_t}{P_t} = f\left(\frac{GDP_t}{P_t}, \ LR_t, REER_t, EUI_t\right) \tag{3.1}$$

where MD_t is the demand for money for M1, P_t is the inflation rate, GDP_t is the nominal gross domestic product, LR_t is the lending rate, $REER_t$ is the real effective exchange rate and EUI_t is the economic uncertainty index.

In order to have a better explanation, the equation then expressed into the logarithm form and inflation problem is excluded in the econometric model:

$$LRM1_t = \beta_0 + \beta_1 LRGDP_t + \beta_2 LLR_t + \beta_3 LREER_t + \beta_4 EUI_t + \varepsilon_t \qquad (3.2)$$

where the β_0 is the constant, $\beta_1, \beta_2, \beta_3, \beta_4$ are the estimated coefficient, L is logarithmic, and ε_t is the error term. The EUI is the index computed by the five components that are logarithmic.

In this study, real money demand and real GDP are employed to know the true money of demand without the inflation issue. According to the demand money function, real income or real GDP is expected to be positively affecting money demand function. As the real income increases, the economic agents will increase the demand for money for transactions motive. Then, the lending rate is expected to show a negative sign. The interest rate increase will urge economic agents to save more money and hold less money. Hence, the demand for money will be decreased. The real effective exchange rate can be a positive sign or negative sign due to the wealth effect or the currency substitution effect. The depreciation of currency will decrease the money demand while the appreciation of currency will increase the money demand in theory.

For the economic uncertainty index, it can either be a positive or negative sign in different types of money demand. Economic agents might prefer to hold cash for future

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needs. This situation happened due to the precautionary motive that leads the economic agents to think is safer to hold a large amount of money. At the same time, this will lead to the economic agents that hold mutual funds such as bond and stock to move out. The economic uncertainty brings the fear of losing or no return from the investment nominal asset. Therefore, the economic uncertainty predicted to be had a positive sign in the money demand M1.

3.3 Econometric Approaches

Econometric approaches are the methods that will be utilized in this study. The methods included to analysis the model are Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model, the Augmented Dickey-Fuller (ADF), Phillip-Perron (PP), and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) unit root test, Autoregressive-Distributed Lag (ARDL) models approaches which included the Bounds test and long run form, error correction model and diagnostic tests.

3.3.1 Generalised Autoregressive Conditional Heteroscedasticity (GARCH) Model

Before proceeding to the test on the data and the model, this technique is needed to deal with the volatilities of variables to form the economic uncertainty index. The components of the economic uncertainty are the economic activity (nominal GDP), exchange rate risk (real exchange rate), monetary risk (money market rate), stock market risk (stock market index) and interest risk (deposits rate). Autoregressive Conditional

Heteroskedasticity (ARCH) models are published by Engle (1982) which are used to model and forecast conditional variances. Then, the models were generalised as GARCH by Bollerslev (1986) Taylor (1986). The models are widely used in the financial field to analysis the stock. The forecasted components will show its volatility from the conditional variance results.

GARCH models have three types included GARCH (1, 1) model, GARCH (q, p) model and GARCH-M model. This study will employ the GARCH (1, 1) model. GARCH (1, 1) can be defined as follows:

$$Y_t = X_t'\theta + \epsilon_t \tag{3.3}$$

$$\sigma_t^2 = \varphi + \alpha\epsilon_{t-1}^2 + \beta\sigma_{t-1}^2 \tag{3.4}$$

where the Y_t is the variable, X_t' is the mean, θ is the exogenous variables an ϵ_t is an error term. The second equation (3.2) is the forecast the variance of one period ahead based on the past period values or so call conditional variance function. Engle and Bollerslev (1986) mention that if a GARCH (1, 1) model show the result as $\alpha + \beta = 1$, the model will show the characteristic of the estimated conditional variance is persistence over all horizons and the unconditional distribution of ϵ_t has an infinite variance which means that the current shock is persisted indefinitely in conditioning the future variance. Also, Atta Mensah (2006) stated variable will has a better persistence of shock to the volatility (conditional variance) and slow decay rate if the total sum of α and β close to unity. When the volatility of the components is found, the economic uncertainty index is calculated by using the equation (2.3).

3.3.2 Unit Root Test

Unit root test commonly used to know the stationary of the variables in a study. There have six unit root tests which are the Augmented Dickey-Fuller (ADF) Test, Dickey-Fuller test with GLS Detrending (DFGLS), the Phillips-Perron (PP) test, The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test, Elliot, Rothenberg, and Stock Point Optimal (ERS) test and Ng and Perron (NP) tests can be employed to test the stationary of the series data. In this study, only ADF and PP tests will be employed. Unit root test has two types which are constant, and constant and trend results. If the series data is not pass through the level stage, the test will proceed to the first difference to obtain a stationary in the series data. To get a stationary series data, the test statistic must be significant at a certain level determined by the researcher. Normally at most 5% level of significance is the ideal level to achieve.

3.3.2.1 Augmented Dickey-Fuller (ADF) Unit Root Test

Augmented Dickey-Fuller test is developed by Said and Dickey (1984) which used to test stationary of the series data. ADF test is able to perform better and analysis the larger sample data. The ADF test is explained as stated:

$$\Delta Y_t = \beta_1 + \beta_2 X + \delta Y_{t-1} + \alpha_1 \sum_{t=1}^{k} \Delta Y_{t-1} + u_t \qquad (3.5)$$

where Δ is the first difference, Y represented variable to be tested, k is the lagged

difference terms, ΔY_{t-1} is the change in lagged values, and u_t means the white noise error

term. The null hypothesis of ADF test is the unit root exist in the series data while the

null hypothesis is the unit root does not exist in the series data. In order to obtain a

stationary data in ADF test, we must reject the null hypothesis.

3.3.2.2 Phillip-Perron (PP) Unit Root Test

Phillips-Perron (PP) test is a method to produce a better result by avoiding the

problem brought by serial correlation in the series data. To check the accuracy of the unit

root test result, several tests can use to get a consistent result. Thus, the (PP) test

introduced by the Phillips and Perron in 1988 is applied. The regression model is

illustrated as follows:

$$\Delta Y_t = \delta d + \alpha Y_{t-1} + \mu_t \tag{3.6}$$

since the advantage of PP test in fixing the serial correlation in the series data hence does

not give impact on the asymptotic distribution of the test statistic. PP test statistic can be

stated as shown below:

$$t_\alpha = t_\alpha (\frac{\gamma_0}{f_0})^{\frac{1}{2}} - (\frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{\frac{1}{2}}s}) \tag{3.7}$$

where t is the t-ratio, $\hat{\alpha}$ is the estimate, γ_0 is the consistent estimate of the error variance

in (3.2), f_0 is an estimator of the residual spectrum at frequency zero and $se(\hat{\alpha})$ is the

coefficient of standard error. The rejection rule of the PP test is same as ADF test which will reject the null hypothesis of has a unit root when the t-statistic is found to be greater than the critical value at a level of significance.

3.3.2.3 Kwiatkowski, Phillips, Schmidt and Shin (KPSS) Test

To get an accurate unit root results, robust is needed to ensure the accuracy of the unit root of each variable. Therefore, KPSS (Kwiatkowski, Phillips, Schmidt, & Shin., 1992) is used to test the stationary of the variables to ensure the robustness. The KPSS test can be defined as,

$$Y_t = \beta' D_t + \mu_t + u_t \tag{3.8}$$

$$\mu_t = \mu_{t-1} + \varepsilon_t \, , \varepsilon_t \sim WN \, (0, \sigma_\varepsilon^2) \tag{3.9}$$

where D_t is the deterministic components with constant or constant with time trend, μ_t is the pure random walk, u_t is the $1(0)$ and ε_t is the error term. The rejection rule of the KPSS test which will reject the null hypothesis of the variable is stationary when the t-statistic is found to be greater than the critical value at a level of significance which is opposite as ADF and PP unit root test.

3.3.3 Autoregressive-Distributed Lag (ARDL) Model

Compared to Johansen and Juselius cointegration test and Engle and Granger causality test, Autoregressive-Distributed Lag (ARDL) models is also widely used in the

time series data analysis that testing for the presence of long-run relationships. ARDL is able to produce good results for the small sample size data and also remove the biased results for the data with a mixture of I(0) and I(1) according to the Pesaran and Shin (1999). Moreover, this model involves only a single equation set-up which able to implement and interpret easily. The variables also allow to have a different lag length in the model. Before testing the long run relationship test, the cointegration test known as the bounds test will be carried out to ensure the existence of cointegration between the variables. Then the estimated ARDL long run relationship test will be carried out.

The ARDL cointegration regression model can be defined as

$$\Delta LRM1_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LRM1_t \sum_{i=0}^{q} \beta_2 \Delta LRGDP_t + \sum_{i=0}^{r} \beta_3 \Delta LREER_t$$

$$+ \sum_{i=0}^{s} \beta_4 \Delta LLR_t + \sum_{i=0}^{t} \beta_5 \Delta EUI_t + \delta_1 LRM1_{t-1} + \delta_2 LRGDP_{t-1}$$

$$+ \delta_3 LLR_{t-1} + \delta_4 LREER_{t-1} + \delta_5 EUI_{t-1} + \varepsilon_t \qquad (3.10)$$

where the *RM1* is the real money M1 demand, *RGDP* is the real gross domestic product, *LR* is the lending rate, *REER* is the real effective exchange rate while *EUI* is the economic uncertainty index. All variables are in log form except the *EUI*. p, q, r, s and t are the optimal lag length chosen and the ε is the error term.

The null hypothesis of the F-tests indicates that there is no cointegration between the variables while the alternative hypothesis means that there is a cointegration exists between the variables. The decision rule for the F-tests is referring to the lower and upper bounds critical value at the significance level decided. If the F-statistic value is smaller

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than the lower bounds, it can know as no cointegration exist because the null hypothesis cannot be rejected. If the F-statistic value is greater than the upper bounds critical value, it can know as there is cointegration exist because the null hypothesis can be rejected. It is inconclusive when the F-statistic value is falling between the value of the lower and upper bounds (Pesaran et al., 2001). However, the decision rule can be determined by following its order of integration. If the variable is I(0), the decision rule is made upon the lower critical value. If the variable is I(1), the decision rule is made upon the upper critical value.

The long run cointegration equation in this study stated as

$$LRM1_t = \beta_0 + \sum_{i=1}^{p} \beta_1 LRM1_t + \sum_{i=0}^{q} \beta_2 LRGDP_t + \sum_{i=0}^{r} \beta_3 LREER_t$$

$$+ \sum_{i=0}^{s} \beta_4 LLR_t + \sum_{i=0}^{t} \beta_5 EUI_t + \varepsilon_t \qquad (3.11)$$

When the existence of cointegration is confirmed, the long run test is carried out to get the estimated coefficient and to know the significant of the variables. The long run equation is able to perform once the existing of cointegration is confirmed in the bounds test. After conducted the long run test, the error correction model (ECM) is performed to know the error correction term (ECT) of the model.

The error correction model can be described as below

$$LRM1_t = \beta_0 + \sum_{i=1}^{p} \Delta\beta_1 LRM1_t + \sum_{i=0}^{q} \Delta\beta_2 LRGDP_t + \sum_{i=0}^{r} \Delta\beta_3 LREER_t$$

$$+ \sum_{i=0}^{s} \Delta\beta_4 LLR_t + \sum_{i=0}^{t} \Delta\beta_5 EUI_t + \gamma ECT_{t-1} \qquad (3.12)$$

where the γ is the estimated coefficient for the ECT. The ECT means the speed of adjustment of variables in short run towards the long run equilibrium.

3.3.4 Diagnostic Tests

There is important to do the diagnostic check for the residual after the exist of cointegration between the variables. It can increase the reliability of the variables in the model and ensure there is no econometric problem in the estimated model. The tests will be carried out are the normality test, serial correlation LM test, Heteroskedasticity test and CUSUM family tests.

3.3.4.1 Normality Test

Normality test is conducted to test the skewness of the error term. Normally distribution means the populations taken from the samples are normally distributed (Field, 2009). Jarque-Bera test will be carried out in this thesis. The test statistic measures the difference between the skewness and kurtosis of the series from the normal distribution. Jarque-Bera statistic is defined as:

$$JB = \frac{N}{6}\left(S^2 + \frac{(K-3)^2}{4}\right) \qquad (3.13)$$

where N is the number of observations, S is the skewness, and K is the kurtosis.

The null hypothesis of the Jarque-Bera test is that the error term is normally distributed while the alternative hypothesis is that the error term is not normally distributed. To produce a good result, the probability value for the test should be large than the critical value so that it cannot reject the null hypothesis. The null hypothesis cannot be rejected when the probability value is greater than the critical value or vice versa.

3.3.4.2 Autocorrelation Test

Autocorrelation test is to check the error term is autocorrelated or not in the lag order of correlation determined. The test used is the Lagrange multiplier (LM) test which suitable to test the large sample data in this thesis. The test is carried out so that the data series is not serial dependence. The null hypothesis of the LM test is that there is no serial correlation exists while the alternative hypothesis is that there is serial correlation exists. To produce a good result, the probability value for the test should be larger than the critical value so that it cannot reject the null hypothesis. The null hypothesis cannot be rejected when the critical value is lower than the probability value of the result.

3.3.4.3 Heteroscedasticity Test

Heteroscedasticity test is to check the presence of the constant variance in the error term from the sample data. If there do not have a constant variance for the error term, the sample data is said to have heteroscedasticity or unequal scatter. The test carried out to

test the heteroscedasticity problem in this thesis is the ARCH LM test. The ARCH LM test is computed from an auxiliary test regression as below:

$$\varepsilon_t^2 = \beta_0 + \left(\sum_{s=1}^{q} \beta_s \varepsilon_{t-s}^2\right) + v_t \tag{3.14}$$

where ε is the error term, q is the lagged order and β is the estimated coefficient. The null hypothesis of the test is there is homoscedasticity exists while the alternative hypothesis is there is heteroscedasticity exists. The test shows an idea result when the probability value is greater than the critical value, the model residual show that it is homoscedasticity.

3.3.4.4 Model Specification Test

Model specification test is to diagnose the general functional form misspecification. Misspecification of general functional form can cause bias in the remaining parameter estimators. The test that carried out in this thesis is the CUSUM and CUSUM square tests. CUSUM family test is now used formally for testing the coefficient constancy and detect the unknown structural break (Turner, 2010). In the CUSUM test, there is a graph showing the systematic movements of the structure change of coefficient values. For CUSUM squares, it used to test the random movement of the regression model. If the structure is unstable, a breakpoint will be shown in the figure, it shows that there is misspecification in the breakpoint period. The null hypothesis for CUSUM and CUSUMSQ tests is that the coefficients are stable while the alternative hypothesis is that the coefficients are not stable. When there is a breakpoint, it shows that it is greater than the critical value, thus the null hypothesis is rejected, the coefficients are not stable.

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CHAPTER 4
RESULT AND DISCUSSION

4.0 Introduction

In this chapter, this study will be going to discuss further on the result found out related to the money demand in Indonesia. Several methods mentioned in the previous chapter will be used to test the sample data. The results will be analyzed including the GARCH test, unit root tests, ARDL bound test and long run relationship test, and diagnostic checking tests. This chapter consists of three sections which include section 4.0 introduction, section 4.1 empirical findings and discussion, and section 4.2 the chapter remark.

4.1 Empirical Findings and Discussion

4.1.1 Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Test

The GARCH test is able to show the volatility of the variables over the time. To have a better capture of the volatilities of all variables, and economic uncertainty index is formed. The volatilities of the variables are computed and plotted in Figure 4.1 to Figure 4.6. From the figure of economic uncertainty index, we can clearly know that the volatility in the early 2000s is higher than the other period. The volatilities of the GDP, real exchange rate, saving rate, money market rate and stock market index has corresponded to the index of economic uncertainty. The social unrest happens along in the early of 2000

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created a lot of insecurity sense between the people and thus causing the economic instability during that period. Indonesia economy takes a longer time to recovery after the 1997 financial crisis and the social unrest which show in the economic uncertainty index. There has a little fluctuation from the period 2005 to 2006 in the economic uncertainty index. This can be reflected from the volatilities of the real exchange rate, saving rate and the money market rate. During that period, several natural and man-made disasters such as the earthquake and haze has led to the damage in term of social and economy in Indonesia. Moreover, the 2008 financial crisis also build up economic uncertainty in Indonesia. The volatility of economic uncertainty from 2008 to 2009 was due by all the components observed. This shows that the components computed by GARCH as economic uncertainty index are essential which able to capture the change of economic circumstances in Indonesia.

Figure 4.1 Economic uncertainty index

Year
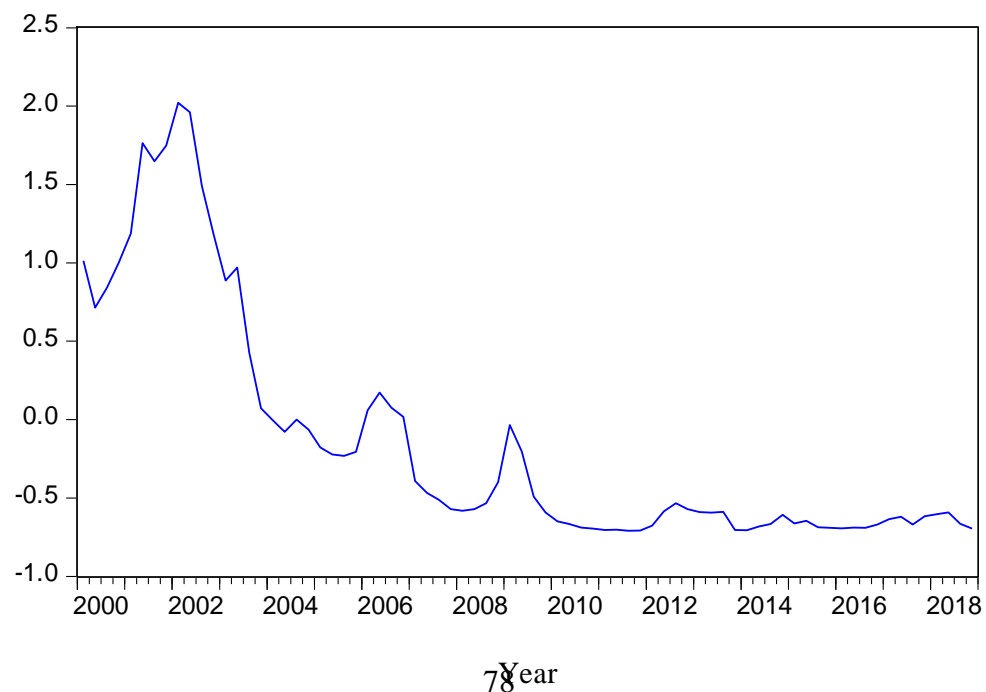
Figure 4.2. The volatility of the nominal GDP

Year
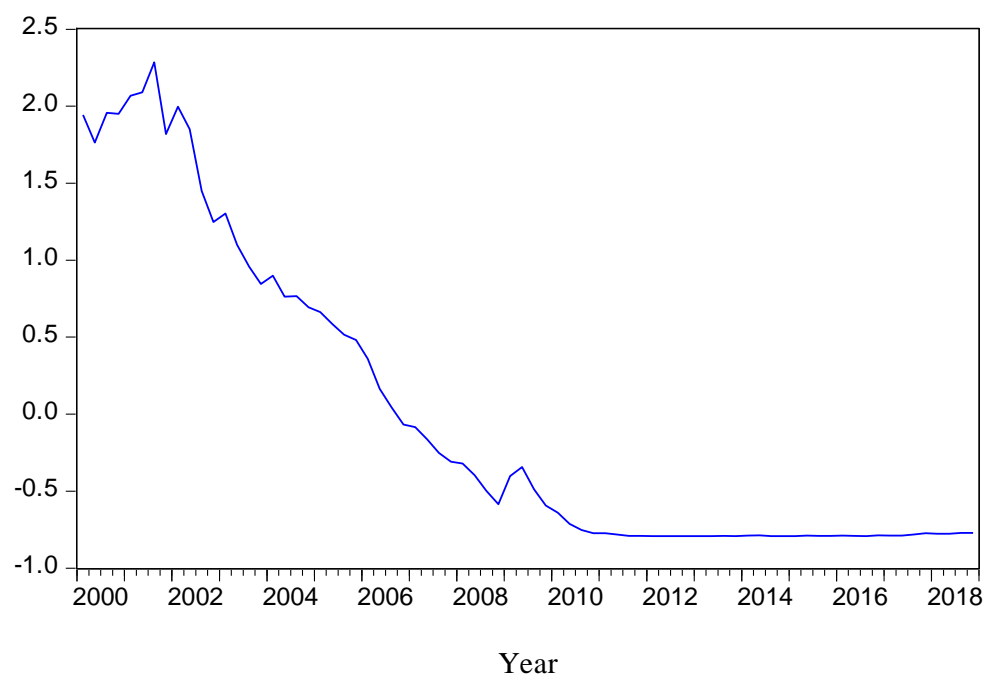
Figure 4.3.The volatility of the real exchange rate

Year
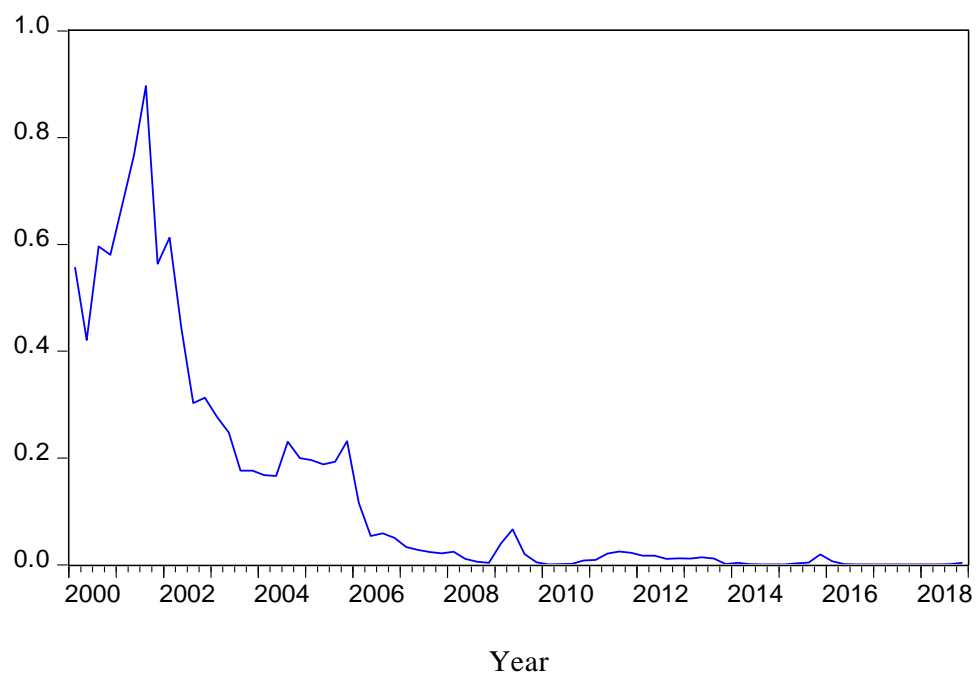
Figure 4.4.The volatility of the deposits rate
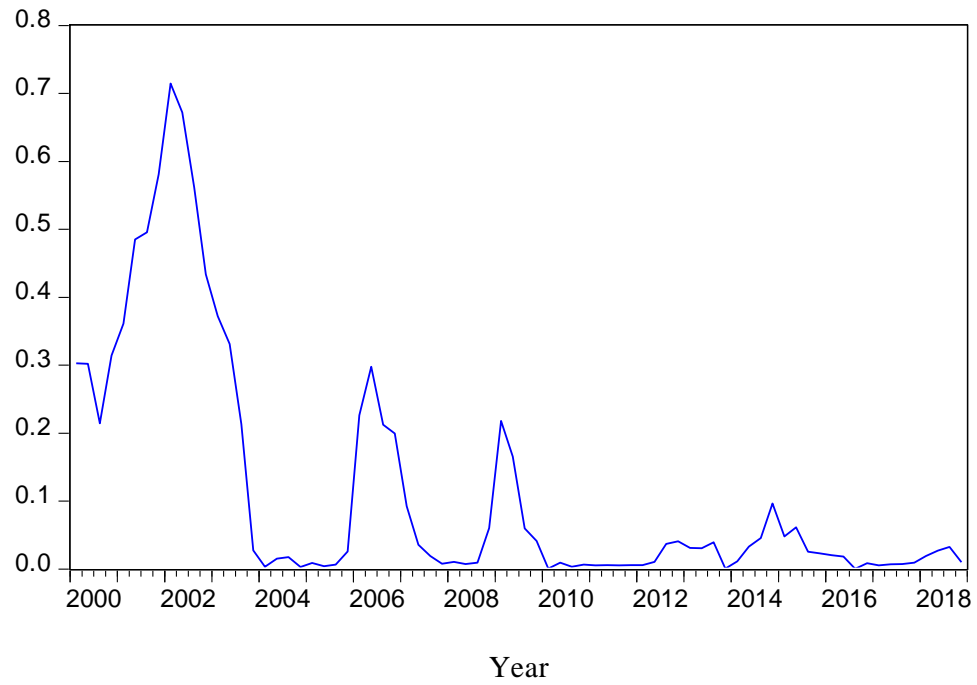
Figure 4.5.The volatility of the money market rate
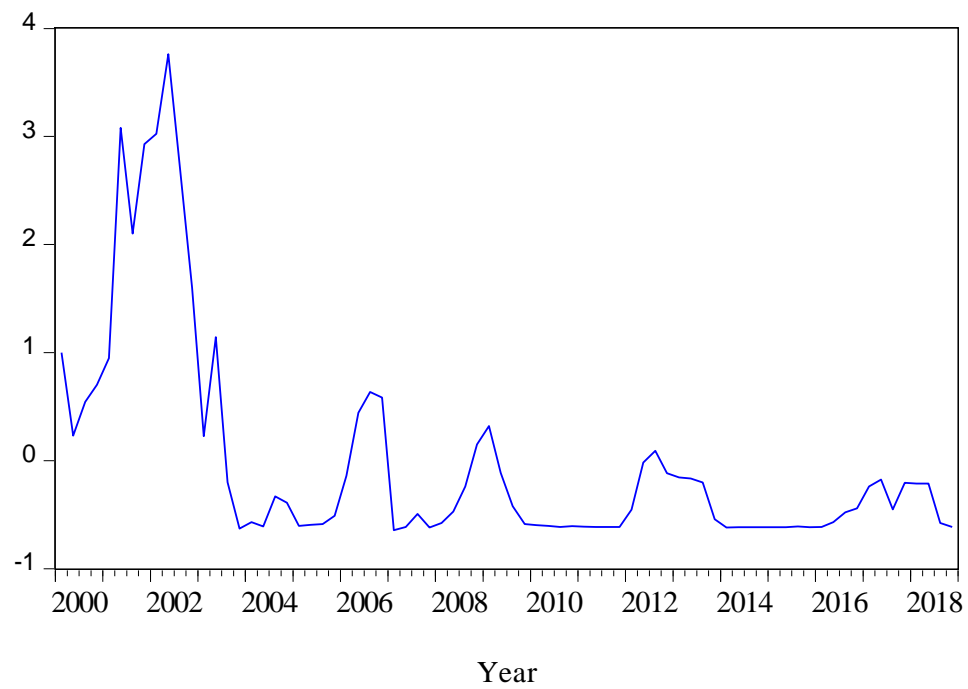
Figure 4.6. The volatility of the stock market index

Year
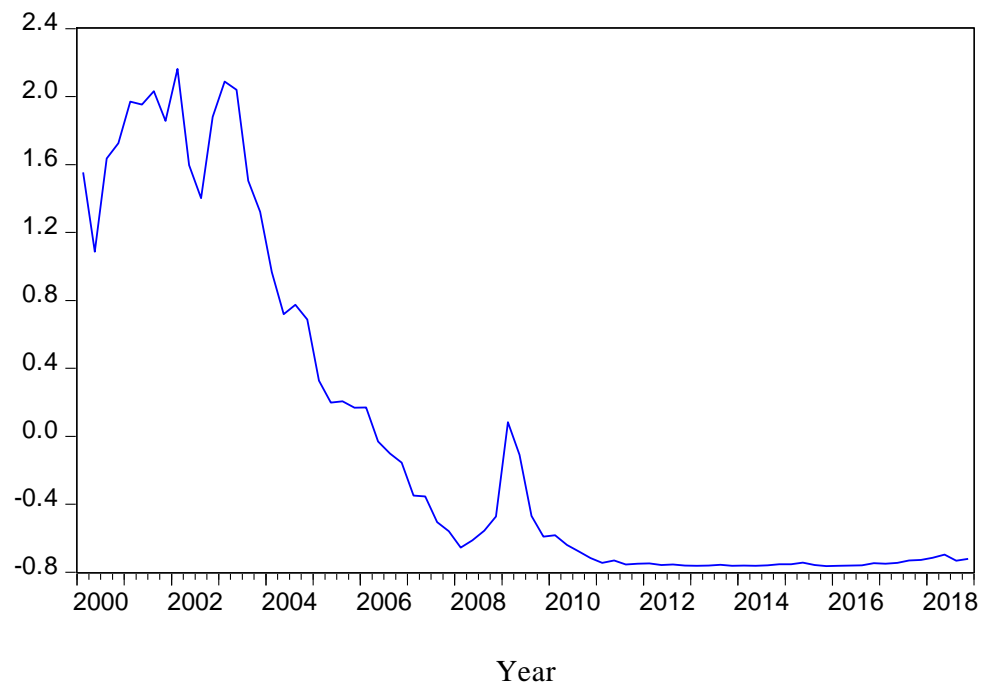
4.1.2 Unit Root Tests

Unit root test is the diagnose that need to carry out before proceeding to the cointegration test. It used to check the stationary properties and know the order of integration of the variables. The non-stationary variables might mislead parameter estimates of the relationship between variables in the further test. This thesis is carried out three types of unit root tests which are the ADF test, PP test and KPSS test to enhance the robustness of the results.

From Table 4.1, the ADF test shows the lending rate is statistically significant at 5 per cent significance level with the trend and constant while other variables are not significant in levels. However, all variables are statistically significant at 1 per cent

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significance level at first differences. The lending rate is stationary at the levels compare to other variables. PP test shows a slightly different result from ADF test. For PP test, all variables are not significant at their levels while significant after first differencing. All the variables are stationary at 1 per cent significance level. Due to the contrasting result from the ADF and PP tests, KPSS test is then carried out to ensure the stationary of lending rate and other variables. From the KPSS test, lending rate and real effective exchange rate are not significant in levels to mean that the variables are stationaries in levels. However, the real money M1, real GDP and economic uncertainty index are statistically significant in levels to mean they are stationary in first difference.

From the three types of unit root test results, we can conclude that the lending rate is integrated in zero order integration which is I(0), while other variables are integrated in first order integration which is I(1). Hence, the variables employed are said to have a mixed order of integration and this study must perform the ARDL approaches.

Table 4.1 The ADF unit root test result

| Variable | Level | | First Difference | |
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LRM1	-1.3363(0)	-2.9095(0)	-10.3998(0)***	-10.3348(0)***
LRGDP	-1.1041(2)	-1.0235(2)	-7.2545(1)***	-7.2537(1)***
LLR	-1.3613(1)	-4.0386(1)**	-4.3188(0)***	-4.2730(0)***
LREER	-2.4741(1)	-2.1042(1)	-8.7194(0)***	-8.8271(0)***
EUI	-1.4093(0)	-1.3616(0)	-6.3440(0)***	-6.2935(0)***

Note: Asterisks ***, ** and * indicate significance levels at 1%, 5% and 10% levels respectively. Figure in parentheses ( ) indicate the lag length.

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Table 4.2 The PP unit root test result

Variable	Level		First Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LRM1	-1.1445(6)	-2.9095(0)	-10.6956(6)***	-10.6408(6)***
LRGDP	-0.9623(3)	-1.4784(0)	-7.9829(7)***	-7.9720(7)***
LLR	-1.4530(4)	-2.8617(4)	-4.3188(0)***	-4.2730(0)***
LREER	-2.1019(3)	-2.0627(4)	-8.7113(3)***	-8.8394(2)***
EUI	-1.5679(4)	-1.8736(4)	-6.4409(3)***	-6.3929(3)***

Note: Asterisks ***, ** and * indicate significance levels at 1%, 5% and 10% levels respectively. Figure in parentheses ( ) indicate the lag length.

Table 4.3 The KPSS unit root test result

Variable	Level		First Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
LRM1	1.0202(6)***	0.1545(6)**	0.7868(9)	0.0784(9)
LRGDP	0.9769(6)***	0.2051(6)**	0.1567(3)	0.1363(3)
LLR	1.0568(6)***	0.1002(6)	0.0440(4)	0.0335(4)
LREER	0.4576(6)*	0.2229(6)***	0.1020(3)	0.0371(3)
EUI	0.8411(6)***	0.2115(6)**	0.0980(3)	0.0483(3)

Note: Asterisks ***, ** and * indicate significance levels at 1%, 5% and 10% levels respectively. Figure in parentheses ( ) indicate the lag length.

4.1.3 Autoregressive-Distributed Lag (ARDL) Model

The mixed integrated order of I(0) and I(1) variables is detected in the unit root test for the money demand model. Therefore, ARDL approach is adopted to identify the

relationship between the variables. The AIC is used in this test to obtain the lag length for the ARDL model. The AIC model performs better with the smallest value of standard error and high R^2 when compared to the largest value of standard error and low R^2 (Nkoro and Uko, 2016). Thus, the model chosen is (1, 5, 2, 1, 0) since it shows the characteristics of the best fitted model.

For this model, the F-statistic of bound test computed is 12.5777, which is higher than the upper critical value of 5 per cent significance level. From the result, we can reject the null hypothesis of no cointegration relationship exist. Hence, the cointegration relationship exists between the variables in the long run.

Table 4.4 The bound test results

Model (1, 5, 2, 1, 0)

k=4 n=71	Critical value	
	I(0)	I(1)
10%	2.320	3.232
5%	2.725	3.718
1%	3.608	4.860
F-statistic	12.5777***	

Note: Asterisks ***, ** and * indicate significance levels at 1%, 5% and 10% levels respectively.

After confirmed the existence of the cointegration relationship, the long run test will be performed to get the estimated coefficient of the variables. For the long run test, the estimated coefficient of the real GDP (LRGDP) was 0.6504 which statistically significant at 1 per cent significance level. It shows the positive relationship of the real GDP towards the money demand M1 (LRM1) which is same with the researches of Dekle

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and Pradhan (1997), James (2005), Prwoto (2010), Puah and Hiew (2010), and Bahmani-Oskooee and Xi (2014). The grow of the real GDP will support more money spend in Indonesia which requires more money in the market. It concludes that 1 per cent increase in real GDP will increase 0.6504 per cent of the money demand M1.

Meanwhile, the lending rate (LLR) has a coefficient of -0.6517 that show significant at 1 per cent significance level. The lending rate has a negative impact on the money demand M1. Dekle and Pradhan (1997), and Puah and Hiew (2010) also found out that interest rate is negatively related to the money demand. When the lending rate is high, it will encourage people to save more instead of spending and hence decrease the money demand. Thus, the result indicates an increase of 1 per cent of the lending rate will decrease the demand for money M1 in 0.6517 per cent.

Moreover, the coefficient for the real effective exchange rate (LREER) is 0.5742 which also statistically significant at 1 per cent significance level. The real effective exchange rate is positively related to the money demand M1 which has the same result as Bahmani-Oskooee & Xi (2014). The real effective exchange rate which means the appreciation of the Rupiah will encourage more money demand. Hence, the result shows that 1 per cent increase in the real effective exchange rate will rise 0.5742 per cent of money demand M1.

On the other hand, the economic uncertainty index (EUI) has a coefficient of 0.1306 that shows significant at 1 per cent significance level. The economic uncertainty index has a positive relationship towards the money demand M1 which is consistent with

the result by Atta-Mensah (2004). The economy unstable will increase the awareness of people to hold more money. Therefore, the result shows that one unit increase in economic uncertainty index will then increase 0.1306 per cent of money demand M1.

The table also shows the result for the ECT coefficient for the model. The model has an ECT of -0.8754 and shows significant for the coefficient. The estimated coefficient is a negative value which is not more than one and is statistically significant at 1 per cent. Therefore, we can say that the speed of adjustment for the money demand model will take medium period to reach equilibrium in short run to long run.

Table 4.5 The long run form test results

| Variable | Model (1, 5, 2, 1, 0) | |
	Coefficient	(P-value)
Constant	0.7009	(0.3166)
LRGDP	0.6504	(0.0000)***
LLR	-0.6517	(0.0000)***
LREER	0.5742	(0.0019)***
EUI	0.1036	(0.0000)***
ECT	-0.8754	(0.0000)***

Note: Asterisks *** indicate significance levels at 1%.

4.1.4 Diagnostic Tests

Several diagnostic checks are done to ensure the sample data used is suitable in model estimation. From the results, the Jarque-Bera test shows a probability value of 0.7474 which is greater than all significance levels. The null hypothesis of the test cannot

be rejected, the error term in the model is normally distributed. For the serial correlation LM test, the probability value computed is 0.6019 which is greater than all significance levels. The null hypothesis of the test cannot be rejected mean that the model does not have serial correlation problem. Moreover, the ARCH heteroscedasticity test illustrates the probability value of 0.1458 which is greater than all the significance level. The null hypothesis of the test cannot be rejected and determined that the model does not have heteroscedasticity problem. The CUSUM and CUSUMSQ tests do not have a structural break in the model. The line of the CUSUM and CUSUMSQ are lies within the range of the dotted line which represented 5 percent significance level. The tests show that the model is stable over the period.

Table 4.6 The diagnostic test results

Diagnostic Test	Jarque-Bera / F-statistic	Prob. F
Normality test	0.5824	0.7474
Serial correlation LM Test	0.4973	0.6109
ARCH Heteroscedasticity test	2.1646	0.1458

Figure 4.7 The CUSUM test result
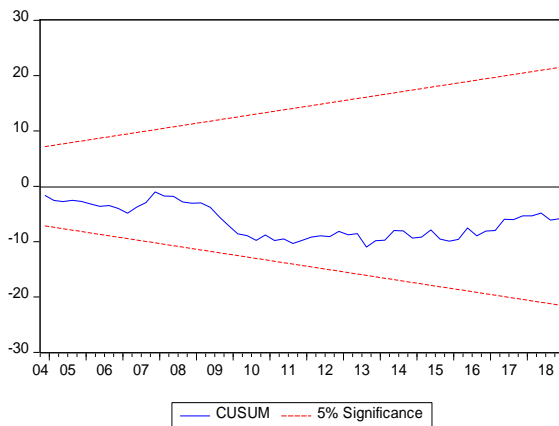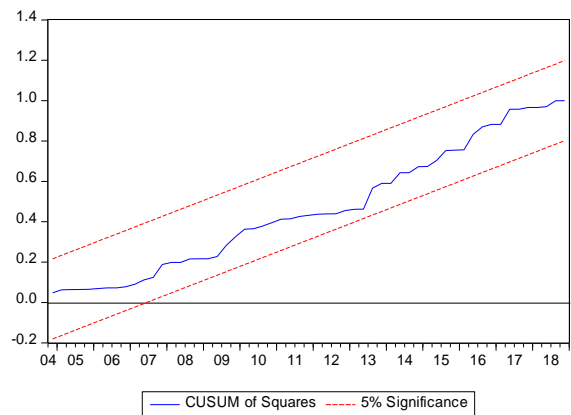

Figure 4.8 The CUSUMSQ test result

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CHAPTER 5
CONCLUSION

5.0 Introduction

This chapter consists of the conclusion on the findings of the thesis. The objective of the thesis will be explained by the empirical results found. In the same time, some policy recommendations and limitations of this study will be discussed. There have three sections that show the research summary, the policy suggested and limitations in this chapter.

5.1 Summary of the Study

In this thesis, the economic uncertainty is used as one of the components in affecting the money demand in Indonesia. Economic uncertainty always happens in the economic sector that gives a huge impact on the country. Indonesia has gone through a lot of uncertain and crisis in the past. This study is conducted because money is an important tool for the government to control the economic cycle to make the country growth better. Then, it can increase the value of the Rupiah and the purchasing power of the Indonesian. This study employed the quarterly time-series data along with the period 2000Q1 to 2018Q1. To ensure the accuracy of the model, the variables used in this study are the money demand proxy by money supply. Real GDP, lending rate, real effective exchange rate, and economic uncertainty index which consists of five economy components of Indonesia.

The unit root tests were used to test the stationary of the time series data before proceeds to the relationship test between the variables. ADF and KPSS unit root test showed the consistent result of the stationary test which the variables showed the mixed order of integrated. The lending rate has a zero-order integrated, while others variable show first-order integrated. Then, the ARDL approach was used to know the cointegration relationship and long-run form the relationship between the variables. From the bound test, the result showed that the cointegration relationship exists since the computed F-statistics is greater the lower and higher critical values which have rejected the null hypothesis. For the long run form test, the variables showed significant in all significance level. The real GDP, real effective exchange rate and economic uncertainty index had a positive relationship to money demand. However, the lending rate showed a negative relationship to the money demand which is consistent with the theory. The speed of adjustment indicates that the money demand model will recover in an average rate to reach long run equilibrium. Some diagnostic tests were used in this study which are the normality test, autocorrelation test and heteroscedasticity test. All the tests did not show significant which indicated the time series is not facing the problems. Lastly, the CUSUM and CUSUMSQ were used in the study, the results showed that the model is stable in this model where the structure line falls within the range of the significance level line.

5.2 Policy Suggestions

From the result, this study was found that economic uncertainty was positively affecting the money demand in Indonesia. Economic uncertainty is one of the significant

components that influence money demand. The GDP, exchange rate, money market rate, stock index and interest rate were investigated as the economic uncertainty in Indonesia. This show that economic activities are affecting money demand. Many uncertain issues happened will lead create the insecurity in the residents. Therefore, people tend to hold more money and spend now than later.

Indonesia has implemented the monetary targeting, interest rate targeting, exchange rate targeting, multiple rates targeting and inflation rate targeting in the past to control the money demand or the currency. Before the Asian financial crisis, Bank Indonesia adopted the credit ceiling policy and an administered interest rate regime, operational target for base money and intermediate target for narrow money. Bank Indonesia has adopted base money targeting to ensure the liquidity support of monetary expansion during the crisis. However, the Rupiah begins to depreciate and the business failed to operate well caused a huge number of unemployed workers. The economy activities were reduced due to the lost confidence in the Rupiah during the crisis. The Bank Indonesia then adopted the inflation targeting framework to achieving and maintaining the stability of the Rupiah after the crisis and officially adopt it in July 2005 by using the interest rate to achieve the operational target. This framework has successfully controlled the inflation rate by adjusting the interest rate which is the Bank Indonesia Rate (BI rate) and money market rate. By controlling the interest rate, the monetary aggregates can be controlled easily. The interest rate and inflation rate are always correlated where the interest rate can work effectively if the people expectations are forward-looking (Bank Indonesia, 2015). Moreover, Bank Indonesia has supervised

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the microeconomic and macroeconomic conditions, inflation target and monetary policy response in every quarterly meeting of the board for the monetary policy in order to achieve the inflation target.

Despite using inflation targeting, Bank Indonesia can use monetary targeting regime to control the monetary aggregates. The interest rate can be the instrument to control the monetary aggregates. In the long run, it will be able to overcome the high inflation problem in Indonesia by having a suitable money supply to the residents. The monetary aggregates can be the intermediate tools to control inflation through the interest rate. The interest rate is able to react together with the changes in economic activities when used to predict the money demand. Hence, the monetary targeting regime has a huge potential to maintain the value of the Rupiah through controlling inflation in the long run.

The real effective exchange rate of the model has a substitute effect since it shows a positive relationship with the money demand. Through the exchange rate, the Rupiah will be able to manipulate the money demand. When the currency is depreciated, the value of the Rupiah is decreased, this will decrease the money demand. To encourage residents of Indonesia to use more money to consume at goods and services, the currency must be appreciating. To increase the value of the currency, the Bank of Indonesia must attract more foreign investment and gain confident of them on the Rupiah. The EUI components, which are the exchange rate, interest rate, money market rate, stock market and the short-run interest rate has a significant impact on the demand of money in Indonesia. Therefore, the Bank of Indonesia can consider the elements in the policymaking regarding the money

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demand. The money demand M1 is stable and suitable to use as the indicator in doing monetary policy.

5.3 Limitations of the Study

In this study, some limitations are found that might have some affection for the accuracy of the model. First, the unavailable of the money demand M1 data after the first quarter of 2013 in Rupiah. This data sources are not available in all database website including the CEIC database and IMF database. Due to this reason, the money demand M1 data have to employ in the US dollar form since it is the only source available. Also, the availability of interest rate types is limited in the database, hence the lending rate is used instead of the saving deposit rate. This might affect the accuracy of the results obtained in this study. In the future study, the available of data and the accurate of data must be confirmed so that the results obtained are more reliable and useful for the policymaker.

Moreover, Bank Indonesia also prefer to use inflation targeting framework which is easily understood by the public. This is because the base money target is hard to be targeted and understand by the public. The inflation rate is easy to figure out by the public in making daily purchase than the amount of money hold. Hence, this model is a bit hard to be employed in the policymaking. More effort should be carried out by Bank Indonesia to ensure the possibilities in adopting the better and suitable monetary policy so that it can enhance the economic circumstance and position of Indonesia in global.

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