DETERMINANTS OF EXCHANGE RATE VOLATILITY IN ASIAN COUNTRIES

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DECLARATION

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(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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EU	European Union
US	United State
BOP	Balance of Payment
ER	Exchange Rate
UMPT	Unemployment
CPI	Consumer Price Index
FDI	Foreign Direct Investment
IR	Interest Rate
T	Terms of Trade
GDP	Gross Domestic Product
PPP	Purchasing Power Parity
IFE	International Fisher Effect
IRP	Interest Rate Parity
VIF	Variance Inflation Factors
TOL	Tolerance Factors
JB	Jarque-Bera
OLS	Ordinary Least Square
FEM	Fixed-Effect Model
REM	Random-Effect Model

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PREFACE

This research topic “determinants of exchange rate volatility in Asian countries” is conducted as there still have a limited number of research studies about the several factors influenced the exchange rate volatility in Asian countries. Besides, this research is prepared for the referees to acquire more information and details on the movement of exchange rate volatility in Asian countries which will influenced by some macroeconomic factors. The factors were included the unemployment rate, consumer price index, foreign direct investment, interest rate and terms of trade. The outcome of the research has been done and this research will give the referees have a clear and precise view of the actual impact of macroeconomics factors towards the exchange rate volatility. The result showed in this research have been carried out through the E-view software. Hence, the referees are allowed to determine the exchange rate volatility in Asian countries. To prevent the economic problems and care of the public interest, this research could be advantageous for the referees to understand specifically about the factors that will influence the exchange rate volatility.

ABSTRACT

The intention of this research is to determine the relationship between the exchange rate volatility and the independent variables which includes unemployment rate, consumer price index, foreign direct investment, interest rate and terms of trade in Asian countries. Secondary data is the sourced data used within the period of year 2007 to 2016 which data obtained from the World Bank Data sources. On the other hand, the techniques that implemented to estimate the model was the Ordinary Least Square (OLS). The result shows that the exchange rate volatility was being influenced by the unemployment rate, consumer price index, foreign direct investment, interest rate and terms of trade. However, the results show it has a direct and statistically significant relationship but there is an insignificant relationship and mix result between the exchange rate volatility and the independents variables. In addition, a diagnostic checking is conducted by using the E-view 11 software to run out the collected data within 10 years in 5 different Asian countries. According to the literature review, the researcher studies shows different results which includes positively and significant relationship, negatively and insignificant relationship as well as mix result between the exchange rate volatility and independent variables. Although this research experienced and occurred some limitation, hence the recommendation has been suggested to enhance for the future researchers.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Chapter one provides an outline of the topic of this research. In this chapter, research background, problem statement, significance of study will be involved in it. Furthermore, the main goals of this analysis are listed down in this particular chapter.

The aims of this research are concerned to explore the determinants of the exchange rate volatility in Asian countries. Independent variables selected are consumer price index, interest rate, unemployment rate, foreign direct investment and term of trade.

1.1 Background of Study

Foreign exchange, or FOREX means changing from home currency to foreign country's currency. In a free economy, rate of currency normally influenced by the market forces such as supply and demand. In other words, single currency is value against several currencies of other countries with distinct weightings, such as U.S. dollar. The value of a country's currency can also be set by its government or policymakers.

There are daily volume ranging in trillions of dollars involve in the global foreign exchange market. Therefore, it creates the largest financial market and brings along emerging of international trade in the world. The currency that are most frequent to be used in international market is called hard currency. It is including currency of United States and Japan.

System of exchange rate is separated into four exchange rate regimes. These four regimes are fixed exchange rate, freely floating exchange rate, managed float

exchange rate and pegged exchange rate. The most common exchange rate regime are fixed exchange rate and freely floating exchange rate. Fixed exchange rate is the currency rates in a country are held constant and fixed. According to Santana-Gallego and Pérez-Rodríguez (2019), under this regime, country or trading companies that export goods and services may benefit since they will have lower risk and transactions cost involved. It is because the exchange rates are fixed and it makes the companies depends on export and import to take advantage on it where the currency will not experience sudden depreciation and make the companies who need to receive or make payments in other currencies suffer from great lost. For freely floating exchange rate, it refers to that currency rate can vary and determined solely by supply and demand without government intervention (Santana-Gallego & Pérez-Rodríguez, 2019). It is obvious that this regime brings greater uncertainty to international trade because the always fluctuating exchange rates are difficult for future plan. The international trader might not know that when the currency will appreciate or depreciate and in this case what the trader depends on is just expectation towards the exchange rate.

The alteration of currency rate's movements leads to the formation of exchange rate volatility. Volatility defines as the magnitude of a variable change over time. Under fixed exchange rate, the currency not supposed to change, it is known as zero volatility. However, under freely floating exchange rate, the larger the degree of change of currency over time, the more quickly it changes, the larger the volatility. The exchange rate volatility give rise to the currency risk among international trade and it makes all the international trader exposed to high exchange rate risk (Broll &Hansen-Averlant, 2010; Doehring, 2008).

A country 's exchange rate is vulnerable to financial crisis either of its own country or other foreign country. During the European Sovereign debt crisis, the euro exchange rate has been very volatile against other currency. The extreme depreciation of the euro against Swiss franc has led to the decision by the Swiss National Bank to set the minimum exchange1rate to CHF1.20 per euro. It is often debatable and causing public controversy on the remedy solution of the regulator whether it is an effective solution to decrease the exchange rate volatility to a

normal level (Michael Ehrmann, Chiara Osbat, Jan Strasky & Lenno Uusküla, 2013).

1.2 Problem Statement

A few major economic crises had been seen to take place in most of the developed country. One of them was a financial crisis happened in European Union at the end of year 2009. This crisis was named as European sovereign debt crisis. This crisis was lasted for many years and experienced their peak in year between 2010 and 2012. The economy of the involved European countries started to recover in 2014. It is obvious that the impact of this calamity bring will within a long period but not in short term. This debt crisis was mainly due to several European countries were experienced deficits and thus unable to make payments to their government debts.

Before this crisis occurred, there was a worldwide financial crisis took place in 2008 and of course it gave rise to devastated impact of the economy all over the world. This case became a contributing factor to the explosion of European debt crisis. It triggered that the investors lost confidence towards the huge external deficits of these countries and the investors re-evaluate the rapid credit growth on their sustainability (Lane, 2012). In late 2009, a lot of difficulties had been raised in the banking system of Europe. The national banking system faced two major hardships, which were increment in loan losses and insufficient of liquidity fund in financial markets (Lane, 2012). Therefore, collapse of banking system and the economy recession plus the changing of investors' attitude to become risk adverse in investing lead to a combined effect of the break out debt crisis.

Although this debt crisis was mainly happened in European countries, however the effect that it might bring along shouldn't be underestimated as the international trade and economic growth impact are worldwide. Changes in the factors supply and investment demand will affect the global trade. After the broke out of this crisis, global economy met a sharp decline of 0.65%. Export and import trade faced serious drop and make United States and China to suffer more in this circumstance. When

the whole world economy was in depression, exchange rate will be in large fluctuation and depreciated in value. It is because government spending, consumption demand and investment demand of every countries will encounter adjustments (Li, Shi & Huang, 2013).

This study is to find out what are the determinants of the exchange rate volatility in Asian countries which are Malaysia, Thailand, Indonesia, Iran and India.

Malaysia

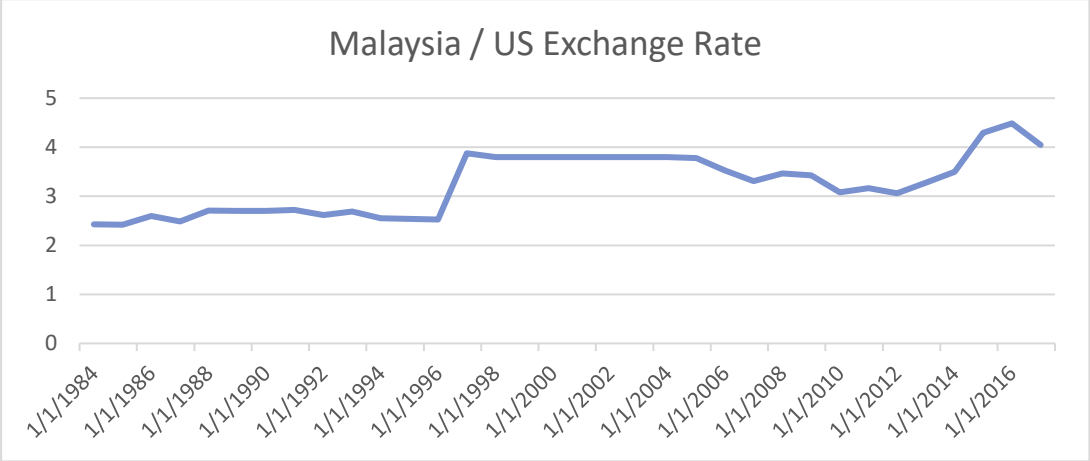

Figure 1.2.1 : Malaysia/ US Exchange Rate from FRED sources

From year 1984, the exchange rate was quite steady until there is a steep increase in the year 1997. Throughout the year 1998 to 2004, the exchange rate was remained constant around 3.8 RM/USD due to the government policy during the Asian financial crisis. The exchange rate then experience a few minor fluctuations until it increases gradually to its peak in 2016. In the following year there is a significant drop in the exchange rate.

Thailand

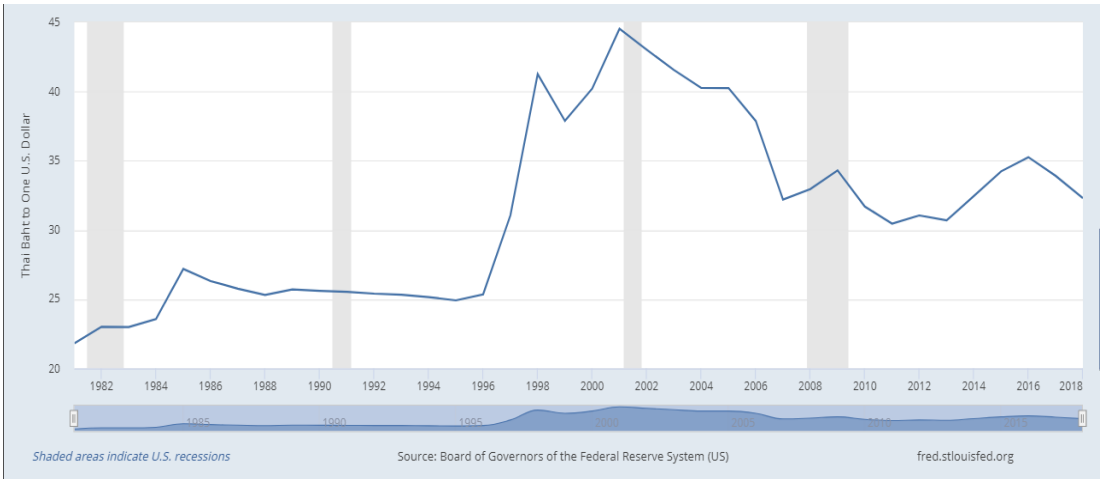

Figure 1.2.2 : Thailand/ US Exchange Rate from FRED sources

Thailand's exchange rate only experiences a major increase in 1996 after having low exchange rates throughout several years. The exchange rate reaches its peak at 2001 and then continue to fall until 2007. Since then there are a few minor fluctuations which is considered that the value of the currency is more stabilize.

Indonesia

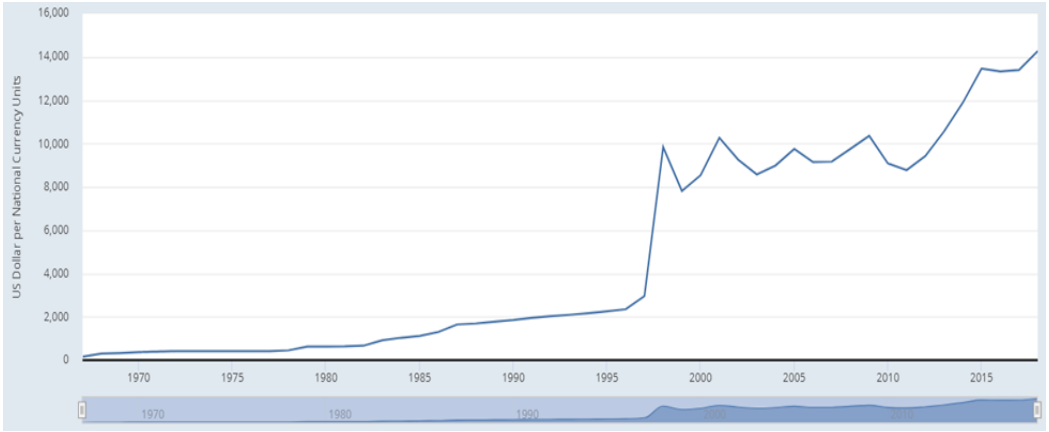

Figure 1.2.3 : Indonesia/ US Exchange Rate from FRED sources

Indonesia's exchange rate remains almost constant from 1967 to 1978 and slowly rise until 1997. It then experiences a steep increase in 1997 and since then there

were a few ups and downs in the exchange rate. From 2011 onwards, the exchange rate increases gradually until 2015. Then the exchange rate rose slightly in 2017 after 2 years of minor decline.

Iran

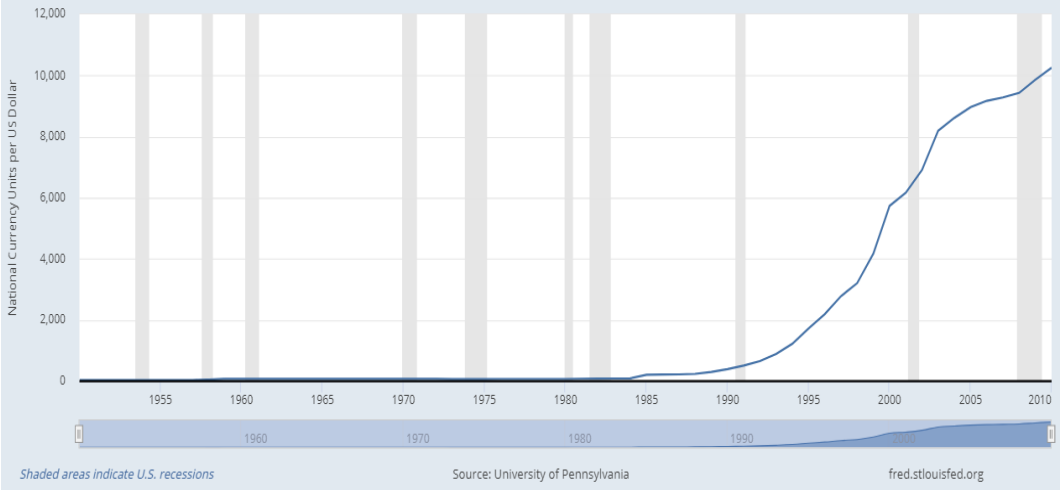

Figure 1.2.4 : Iran/ US Exchange Rate from FRED sources

For Iran, the exchange rate was extremely low from 1955 until 1984 and had only very minor fluctuations. The exchange rate of Iran shows improvement from 1985 and was rising steadily since then until 2010.

India

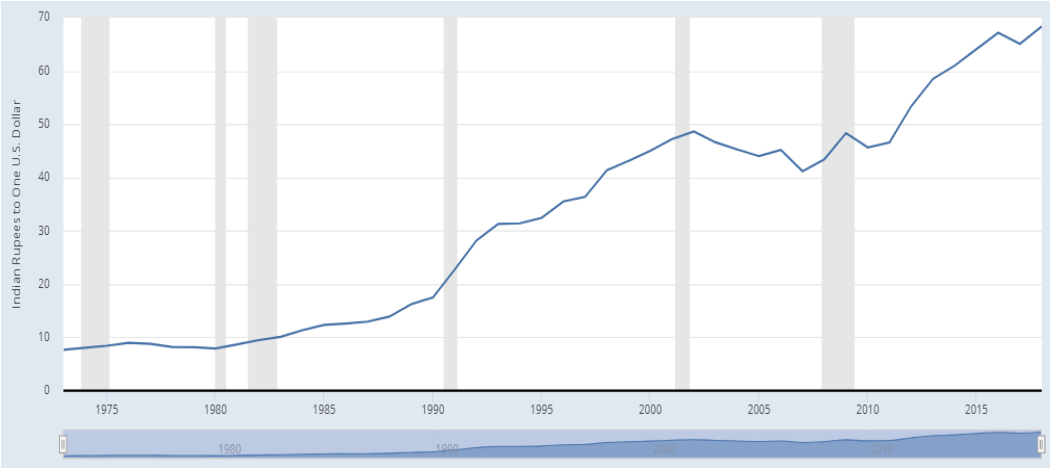

Figure 1.2.5 : India/ US Exchange Rate from FRED sources

The exchange rate of India was increasing in a very slow rate from 1974 to 1990. In 1990 there is a steep rise in the exchange rate, and it continue rising at a slower pace until 2002. The exchange rate experiences a decline which was followed by a few fluctuations until it increases gradually in 2011. Then, the exchange rate experiences a slight drop before rising back in 2018.

This crisis arised and will bring a great impact on a country's economy. Exchange rate variation will cause changes in inflation rate. According to Kandil, exchange rate depreciation may cause an increment in prices of imported goods and services. It is because when the currency become weaker, the price of foreign goods imported from other country will be higher than local goods. The cost of import raises when we want to import foreign goods which in fact become more expensive. However, the net exports will relatively turn out to be higher since local goods are cheaper and export to other countries in a lower price. The products may easier to sell oversea in this situation. The cost of productions in producing local goods will be higher since import price declines.

Apart from this, currency depreciation make technology transfer from foreign countries to local firms would not able to carry out appropriately. The industrial diversification will inhibit and thus make agricultural export development affected (Mesagan, Alimi, & Yusuf, 2018). Furthermore, currency depreciation will influence the economic performance by weaken the banks and reducing the ownership of private assets in the countries. (Fang, Lai, & Miller 2005; Fidelis 2014) It will cause the citizens to have lower income and wealth level. At the same time, employment problem will be caused when the country's gross domestic product (GDP) is performing badly. Investors from the oversea will not put money into that country or investors that already invested in that country will instead cancel their investments.

Exchange rate volatility is very sensitive to global financial crisis. Therefore, it is important to study the pattern of exchange rate volatility and the factors that will affect it to find out the best solution that can effectively solve the high exchange

rate volatility problem. In this case, the exchange rate volatility and its factors during the European sovereign debt crisis is being studied.

During the period of sovereign debt crisis in European Union which start occurred in 2009 and the effect was carried forward to 2010. The macroeconomic become imbalances which reflected in the rise in unemployment and a reduction in terms of private economic actor's credit. In or der to bail out the company that suffer the loss in this crisis, austerity measures are taken strictly which decline the economic growth. Hence, an increase unemployment rate due to cutting the number of employees for lowering the expenditure of wages pays out. According to Misbah Tanveer Choudhry, Enrico Marelli and Marcello Signorelli (2010), young people are much more influenced by the employment crisis than older people; younger people lose job in a long period of time can be detrimental and can be led to "disheartened workers". In addition, the global unemployment rate has increased by 1.81% as the average annual growth rate of the global economy has declined by 0.65% during the Euro sovereign debt crisis (Na, Minjun & Wen, 2012). According to Simeon Karafolas (2015), the result is shown that the unemployment rate is influenced significantly by the Euro crisis in Greek.

Price stability represents the purchasing power of currency which indicates that the value of money can be used to purchase goods and services while the stability of price is break when inflation occurred, CPI is to measure the price level of goods and services. However, CPI maybe affected during the sovereign debt crisis in European Union. According to (Prof. Leila Simona Talani, n.d), it is stated that the impact of inflation (CPI) on the competitiveness of neighboring countries in the euro area that is unable to be denied or disputed.

A decisive indicator that needs to take into consideration when evaluating the exposure of countries hits harder by poverty to global shocks such as European sovereign debt crisis is their reliance on foreign direct investment. Undeniably, group of countries and countries which rely massively on FDI will increase their exposure to an interference and unexpected shrinkage of such flows. From the consideration of risk side, the value of the international reserves will be deteriorated quickly because of the euro sovereign crisis and the significant turmoil in exchanger

rate (dollar and euro) risks. On the other hand, Euro debt crisis will generate uncertainty in the exchange rate market and minimize the private capital flows. These two effects will become a pose critical threats to the countries in the coming future (Massa, Keane, & Kennan, 2012).

European debt sovereign debt crisis happened because there was lack of effective common institution to absorb shocks in the eurozone. Besides, the lack of an effective institutions or mechanisms to avoid the of macro-economic and fiscal imbalances in some countries. There were some significant rising cases in public sector indebtedness and primarily private sector because of the low borrowing costs ensuing the entry into the euro area which causes large capital flows in the intra-eurozone in peripheral member states. This is mainly in the form of bank loans (Wijffelaars & Loman, 2015). Interest rate has declined because of the introduction of euro in year 2001 where high inflation is expected and hold interest rate high earlier. Many countries discovered that the borrowing costs were lower because of the optimism of the successes of euro. At the same time, real interest rate declined to negative value in some countries. Countries that are facing high interest rates was expected that they are able to borrow at a much lower rates in the coming future. On the contrary, greater public and private borrowings will increase because of lower real interest rates. This will help to boost up the economic growth of the country. Countries with lower real interest rates will affect the price levels to increase piercingly because of the catalyst to economy activities. As a result, this created a balance sheet recession and an extravagant public and private borrowing in which expansionary monetary policy has had limited success (Wickens, 2016). From this incident, the exchange rate also become volatile and weakening in its value.

The European countries accomplished the crash in financial crisis due to large debt that lead to European sovereign debt crisis. This crisis directly brings a serious suffering and corruption towards growth of the global economic as well as international trade. As the crisis occur, the growth rate of global economic declined and thus, this will affect the global trade become worsen. The trade growth reduced as the growth rate declined. Trade growth which includes export and import transaction also affected. When the international trading corrupted, the export and

import trade suffered losses as the Euro countries affected to those countries in United Stated and China. The economy growth in China dropped up to 0.37 percent which more severe than United Stated or other countries that may related (Li, Shi & Huang, 2013). Exporting the raw materials and manufacturing materials or importing the materials will suffer losses because of the crisis occur.

1.3 Research Question

- How does the relationship between unemployment rate and the exchange rate volatility in Asian countries?
- How does the relationship between consumer price index (CPI) and the exchange rate volatility in Asian countries?
- How does the relationship between interest rate and the exchange rate volatility in Asian countries?
- How does the relationship between foreign direct investment (FDI) and the exchange rate volatility in Asian countries?
- How does the relationship between terms of trade and the exchange rate volatility in Asian countries?

1.4 Research Objective

- To determine the relationship between unemployment rate and the exchange rate volatility in Asian countries.
- To investigate the relationship between consumer price index (CPI) and the exchange rate volatility in Asian countries.
- To study the relationship between interest rate and the exchange rate volatility in Asian countries.
- To examine the relationship between foreign direct investment (FDI) and the exchange rate volatility in Asian countries.
- To identify the relationship between terms of trade and the exchange rate volatility in Asian countries.

1.5 Significant of Study

Exchange rate volatility is the magnitude of a currency changes over time. This investigation is focusing on how unemployment rate, consumer price index (CPI), terms of trade, foreign direct investment and interest rate bring impact towards exchange rate volatility of five Asian countries, including Malaysia, India, Indonesia, Iran and Thailand. Thus, this research is beneficial to few parties since exchange rate volatility is playing a vital role in giving rise to a series of evolution in whole economy structure.

This research will make the future researchers more advantageous. It is because the research topic about exchange rate volatility had been done before, however this study is specifically in investigating five Asian countries, involving Malaysia, Thailand, Iran, India and Indonesia which are the countries that rarely done by the previous research. These five countries experiencing the similar trend, which are the downward trend in their exchange rate volatility. Therefore, this research may help in providing more proof or as a reference to future researchers who wish to study in this field.

Next, investors also will gain some benefits through this research. Investors would try to maximize their profit by investing their money in countries where their investment can get high return. In contrast, investors will avoid investing in countries where they can only earn a low return or even a loss. To manage the risk of their investment internationally, it is important for them to study the pattern of every country's current trade trend and their responses to different economy incidents. For example, while some country suffers a loss in international trade from the impact of the China- United States trade war, some countries may benefit from it. Therefore, studying how a country's exchange rate can be affected can help investors to reduce risk and make better investment decisions.

Moreover, this study is also useful for the policy makers. Policy makers often play a significant role in a country's economy especially in case of serious economic incidents. This is because policy makers have the authority to decide a solution to

the economic incidents when necessary. Therefore, it is important for them to make the right decision for the revival and growth of the country's economy. By studying the factors that affect exchange volatility that will further impact the country's international trade and economy, policy makers will authorize the most effective policy depending on the country's current condition with the aim of maximizing its economic growth.

1.6 Chapter Layout

Chapter 1: Research Overview

First chapter elaborate the synopsis of the study of the determinants of exchange rate volatility in Asian countries. It comprises of background, problem statement, research objectives, questions, hypothesis and significance of the research.

Chapter 2: Literature Review

Second chapter reviewed about the significant relationship between the independent variables with the dependent variable. Literature reviews will be further discussed in this chapter to identify what are the relationship between the dependent and independent variables. This chapter will also deliver some of the facts to support the arguments of the study.

Chapter 3: Methodology

Third chapter discussed about how the method, techniques and data collection will be carried out in this research which included research design, sampling techniques, data method and analysis tools.

Chapter 4: Data Analysis

For this chapter, the analysis testing will be carried out to show the findings and the result of the study. This chapter will also include the significant relationship between the independent variables and exchange rate volatility.

Chapter 5: Discussion, Conclusion and Implication

Last chapter will summarize the overall study from the beginning until the end of the research which has been carried out through the findings and implication of the study. Besides, there are some limitations and recommendation of the study will be stated in this chapter.

1.7 Conclusion

In conclusion, specific introduction and research background are included in chapter 1 which focus on justifying the background of exchange rate system. Problem statement has stated the issue that mainly give inspiration on deciding the title of this study. The objectives of this study and hypotheses were formed and listed down to examine the interconnection between the respond variable and explanatory variables. Significant of study also included in chapter 1.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Chapter 2 discusses several theories and ideas that to reinforce the relationship among the factors and exchange rate volatility. Apart from that, this chapter also study the theories applied on each factor and investigate the gap and conceptual framework of this research.

2.1 Literature Review of Variables

2.1.1 Exchange rate volatility

According to Adamu Hassan, Mika'ilu Abubakar and Yusuf Umar Dantama (2017), exchange rate volatility can be used as a measurement of a country's economy performance. A country which has stable exchange rate shows that it has a strong economy, while a country which has a weak exchange rate shows that it has a weak economy. This is because a higher volatility in exchange rate will result in a higher degree of uncertainty. The result of the study shows that net foreign asset and interest rate can positively impact exchange rate volatility. On the other hand, the study also found that fiscal balance, economic openness, oil price and nominal GDP is insignificant in determining exchange rate volatility.

Aye Aye Khin, Chiow Yet Yee, Ler Su Seng, Chan Mei Wan, Goh Qi Xian (2017) has studied the relationship between exchange rate volatility and macroeconomic determinants in Malaysia. From the result of the study, it was found that money supply has a negative relationship with exchange rate volatility while CPI has a positive relationship with exchange rate volatility.

This can be explained by the human behaviors such as not holding more domestic currency when a depreciation is expected in the future and decreasing consumer spending when the currency is unstable. In this study, interest rate was found to be insignificant to impact exchange rate volatility.

Exchange rate volatility was found be able to significantly impact international trade over the past few years. In the study of Chit, Myint Moe, Rizzov, Maarian and Willenbockel, Dirk (2010), the relationship between exchange rate volatility and real exports were studied based on 5 emerging East Asian countries and 13 industrialized countries. The result of the study shows that there is a negative relationship between exchange rate volatility and exports. It is also found that not only absolute volatility but relative volatility can negatively impact bilateral exports between the East Asian countries tested. Abdur Chowdhury (1993) also have the same result on the exports on G-7 countries where exchange rate volatility and exports have a negative relationship. The result is explained by the risk averse participants in the market that will reduce their activities including exports when there is a significant level of volatility in exchange rate to reduce their exposure to the risk. While there were several previous studies that shows an insignificant relationship between exports and exchange rate volatility, it is believed that the results are inaccurate due to insufficient attention to the vague properties of the time series data.

According to Harald Hau (2002), countries with more open economies will tend to have lower exchange rate volatility. This theory is based on the fact that when a country has more imported goods there will be a medium for instant adaption of the domestic aggregate price level. It can help to reduce the temporary effect of a money supply shock and thus the exchange rate. Conversely, a closed economy is not able to transfer the impact of aggregate price changes and it will be reflected in the real exchange rate which causes a higher exchange rate volatility. These theories are supported by the result of the study which are based on forty-eight countries which proves that openness and exchange rate volatility have a negative relationship.

Central bank of several countries has practices of implementing policies to intervene the market to impact the exchange rate volatility when they think it is necessary. (M. Dominguez, 1998). The study shows that in general, intervention operations of central banks will cause a rise in the exchange rate volatility. The exchange rate volatility also increases even if the intervention is done secretly without informing the public. However, it is found that interventions in the mid-1980s are somehow successful in lowering the exchange rate volatility. In other times, it is proven that interventions that were supposed to lower the exchange rate volatility will increase the volatility instead.

2.1.2 Unemployment Rate

There are some empirical studies is provided the hypothesis which unemployment may influence by the undulation of exchange rate while the effect may rely on the labor market characteristics.

Similarly, if bargaining position of workers is improving by labor market rigidities and hence rising in wages as well as reducing the net profit of organizations, higher fluctuations of exchange rate could lead to delay enterprise to create jobs (Belke & Kaas, 2004). Referring to Kaur (2014), this study dissect the interrelationship between unemployment, exchange rate, Growth rate and inflation rate from period 1990-2013 by employing of simple linear regression analysis. It founds that inflation rate and exchange rate on unemployment is negatively significant while GPD affect the unemployment is insignnificant.

In addition, in a series of research paper, Belke and his collaborators studied the effects of exchange rate wave motion on the Common Market of the South region (Belke & Gros, 2002a), in central and eastern Europe (Belke, 2005), within the 1EU (Belke & Gros, 2001) and between Euroland and the US (Belke & Gros, 2002b). They found that wave motion in exchange

rate will be influenced adversely to unemployment, large wave motion in exchange rate increases unemployment (Stirböck & Buscher, 2000). Based on the results was analyzed by Feldmann (2011), it is a statistically significant correlation between undulation of exchange rate and unemployment. When exchange rate rises by one unit, on average, the unemployment will rise in between 0.21 and 0.36 percentage points, holding other variables constant.

The several empirical studies have mentioned above are stated that the fluctuations of exchange rate will be influenced the unemployment whereas Feldmann (2011) also examine the possibility of reverse causality. They have four regressions which contain the unemployment rate as an independent variable and fluctuations of exchange rate as the dependent variable. The unemployment is used as the only explanatory variable in regression 1, while other independent variables that may also affect the fluctuations of exchange rate are used in regressions 2 to 4.

The result of regression 1 and 2 shows an inverse association between unemployment and fluctuations of exchange rate and it is significant in the fixed effects regressions model; regression 4 also shows the inverse association between unemployment and exchange rate volatility but it is significant in random effects regression model. Nevertheless, result of regression 3 shows a parallel association between unemployment and exchange rate volatility with adding few other variables and it is significant in the fixed effects regressions model.

Moreover, there are another few empirical studies are said that the unemployment is influenced the undulation of exchange rate. For instance, Belke (2005) found that there is a significant relationship between undulation of exchange rate and unemployment rate in his result. Based on the monthly sample taken from 1990 to 2001, undulation of exchange rate is affected negatively on the unemployment rate which indicated that when exchange rate decreases by one unit, on average, unemployment rate will be decreased by a number of percentage point with holding other variables

constant. According to Hatemi-J and Irandoust (2006), they are examined the long-term relationship between unemployment and undulation of exchange rate in France. They have discovered that the appreciation of the real exchange rate is related to the decrease in manufacturing employment in all industries.

2.1.3 Consumer Price Index (CPI)

CPI is to measure the change in average price over time that consumers purchased a basket of commodity and services. Thus, researchers suspect that CPI and inflation is associated with each other. In essence, it attempts to quantify the total price level of an economy, thereby measuring the purchasing power in a currency unit of the country.

The doctrine of Purchasing power parity (PPP) is stated that as the domestic purchasing power of one currency is equal to another, the exchange rate between the currencies is in equilibrium. When the inflation rate in two countries is increased which indicated that increased in price of goods and service will affect the exchange rate between two countries.

According to Cassel's Theory, A and B which is two countries that is given a normal freedom of trade between them, an exchange rate will be established between them. In the condition of smaller fluctuations apart, the rate of exchange will stay constantly as long as the purchasing power of either currency is made with no alteration and no special obstruction are forced upon the trade. However, it is another story when inflation happens. Inflation is the factors that influence the price level and hence affect the purchase power of a country's currency. The value level of money of the commodity and services will be increased when inflation is taken place in country A, purchasing power of country A will be diminished (assume that income level of country A remain unchanged). Therefore, the value of the A-money in B must necessarily be declined in the same percentage when

two currencies have been magnified the new normal rate of exchange will be equal to the old rate multiplied by the quotient between the degrees of inflation of both countries.

For instance, assume that the prices for every commodity in each country are unanimous on January 2005. Hence, a crispy chip that costs $5 in Texas; costs RM5 in Malaysia. $1 must be worth RM1 if purchasing power parity holds. Otherwise, there is an opportunity to get a risk-free profit by purchasing crispy chips in a market and selling it in another. Thus, purchasing power parity here is required one to one exchange rate. However, now assume that Malaysia has a 50% inflation rate in 2006 and the inflation impacts every good equally whereas Texas has no inflation whatsoever. The price of crispy chips in Malaysia will be RM7.50 on May 2006 while the price of crispy chips in Texas still is $5 due to zero inflation in Texas. If purchasing power parity holds, people unable to make money from purchasing crispy chips in one country and selling them in the other country then RM7.50 must now be worth $5. If RM7.50 = $5, RM1.50 must equal to $1. Therefore, the RM-to-$ exchange rate is 1.5 which indicate that it costs RM1.50 to purchase $1 on foreign exchange markets. In a simple word, Ringgit Malaysia is depreciated against U.S dollar due to rise in inflation rate was happened in Malaysia.

In addition, the term Purchasing Power Parity is applying to many relevant but quite different perspectives in international trade theory. Gailliot (1970) also stated that the first interpretation is claim that certain percentage of prices will exactly determine the equilibrium rate of exchange. The second variation on the theory claims that relative price change is the solely variable in determining rates of exchange. The third and most general interpretation assigns price change as the primary determinant of the exchange rate but allows for important secondary factors such as tariffs and other trade hindrances, transport costs, capital flows, and expectation. Gailliot (1970) has proved that changes in prices are not the sole determinant of exchange rates, but they certainly account for the largest part of the changes in

exchange rates which are matched with the Cassel's theory in his study.

Moreover, based on Ronald Macdonald and Cezary Wojcik (2003), it is pointed out that regulated prices play an important role in determining relative prices and real exchange rates in these economies and do know that price movement has a significant effect on exchange rate. For instance, the real effective exchange rate of Naira is expected to be influenced by the fluctuation of petroleum price (Adetiloye, 2010). However, the result getting from Adetiloye (2010) is shown an asthenic relationship between CPI and exchange rate, it is totally opposite side to result of Henry J. Gailliot (1970).

Furthermore, consumer price and exchange rate are correlated with each other in the European transition economies; an exchange rate is appreciated as decline in consumer price. Nevertheless, there is different response pattern in both floating exchange rate regime and pegged exchange rate regime. The overall kinetics and endurance of the consumer price reaction for the counties that with pegged exchange rate regime was generally low (Mirdala, 2014).

On the other point of view, according to the study of Winkelried (2011) has stated that the price of goods was making higher or expensive when an increase in exchange1rate (local currency unit per US dollar) due to importer will intend to adjust their price in local currency in order to maintain their mark-up, hence consumers end up pay more money to purchase the same goods and hence inflation. It demonstrates that the consumer price and exchange rate are causality relationship; a rise in price of goods will then lead to exchange rate depreciate based PPP theory whereas increase in exchange rate making the price of goods higher (Winkelried, 2011). For instance, in first situation denotes to PPP theory the price of goods is the cause while the exchange rate is the effect; the second situation denotes to Winkelried (2011) the exchange rate is the cause while the price of goods is the effect. Both of them are highlighted out a similar point from different

point of views which is price of goods and exchange rate is correlated with each other. This study is adapting the PPP theory which the CPI gives an impact on exchange rate.

2.1.4 Foreign Direct Investment (FDI)

Foreign direct investment (FDI) acts as an important factor that helps to boost the economic growth of every nation. Foreign direct investment is substantially an international investment which allows the investor to obtain significant influence in the management of an entity outside the investor's origin country. Vertical FDI flow can be defined as firms shift to manufacture outside their country of origin to enjoy a lower production cost abroad as an advantage, instead of get access to consumers of the regional foreign market. According to Agénor (2003), real exchange rate volatility can be reduced by having greater foreign direct investment by enhancing productivity, increasing liquidity and maintaining investment spending and domestic consumption through international risk-sharing. Strengthen foreign direct investments enable a nation to lower down their fluctuations in consumer's demand and also allow the country to lend in good times and borrow in bad times.

Lartey (2007) discovered that a foreign direct investment has positive influence on exchange rate volatility. FDI was one of the determinants that help to strengthen the value of the currencies during the period between 1980 and 2000 in the sub-Saharan African countries. Nevertheless, the impact of the inflows that help on the appreciation of local exchange was greater than the influence on appreciation of exchange rate from FDI inflows into sub-Saharan African countries from year 1980 to 2000. Besides, Saborowski (2009) recommended that the appreciation of exchange rate effect of FDI inflows is indeed attenuated when capital and financial markets are more active and larger. Thus, foreign direct investment could lead to real exchange rate to appreciate in developing countries. Liu (2010)

indicated there is a positive relationship between foreign direct investment and exchange rate volatility when he revealed a study on the FDI inflows to China from 18 major sources nations during year 1986 to 2006. In fact, this study also mentioned that most of the MNEs from Taiwan and Hong Kong have invest in China to obtain cheaper labor costs.

Furthermore, the result of Biswas and Dasgupta (2012) indicated that foreign direct investment is inversely related to exchange rate volatility. FDI can help to enhance productivity in the traded good sector by attracting new technologies, management skills, marketing techniques and bring much-need capital. Therefore, it reduces real exchange rate volatility by equalizing the relative prices of non-traded goods. FDI inflows induce to the real exchange rate to appreciate by increasing the capital stock of the home country. FDI increases existing capital stock and lead technology to spread. FDI will lead to real exchange rate depreciates when there are technology spill overs which can cause production increases and lower price of non-tradeable goods. In addition, FDI displays a statistically significant negative1relationship on exchange rate volatility. The result can be explained by lower foreign investments available in the economy over the period 1978-2012 (Jayasekara, 2016). Moreover, Al-Abri and Baghestani (2015) found that when there is a greater stock of foreign liability, the exchange rate volatility will decrease for India, Singapore, China and South Korea, but an opposite trend was observed for exchange rate volatility was seen for Indonesia, Thailand and Philippines for the studies of eight emerging Asian economies from period 1980 to 2011.

Besides, Athukoraka and Rajapatirana (2003) revealed a mix result for the foreign direct investment. They found that total capital flows have effect on strengthen real exchange rate. At the same time, the same study further acknowledged that when foreign direct investment inflow increases, it will cause the real exchange rate becomes weaken in Latin American and Asian countries. Other than that, Abri and Baghestani (2015) revealed a mix result that the exchange rate of volatility in Malaysia, India, China, Singapore and South Korea reduced due to foreign direct investment inflows. The same

research further revealed that on the contrary the FDI inflows increased the exchange rate volatility in Thailand, Indonesia and Philippines. In addition, Lily, Kogid, Mulok, Lim, & Asid (2014) discovered that there are still mixed empirical supports even though the exchange rate and FDI hypothesis has been comprehensively studied since the formation of the theory. This argument inspires this research on the comparative relationship between FDI inflows and exchange rate in Singapore, Malaysia, Thailand and Philippines because of the empirical evidences is still not yet thoroughly developed.

On the other hand, Amuedo-Dorantes and Pozo (2001) revealed that there is no any statistically significant correlation between exchange rate volatility and FDI when they tried to test the response of FDI inflows for both volatility and its level of exchange rate and for the period 1976 to 1998 in the US. In addition, Chaudhary, Shah and Bagram (2012) discovered that almost half of countries in their study has no any significant relationship between FDI and exchange rate volatility when they conducted their investigation for these two variables for main areas of Asia.

2.1.5 Interest Rate

The deposits of home currency will rise because of the interest rate of domestic currency increases. Higher return will be generated when the interest rate quoted is higher, it will lead to the inquiry of national currency increases. Therefore, the local currency will appreciate relative to foreign country. The performance of external sector especially imports, trade balance and exports will be influenced by the interest rates and exchange rates. According to Engel (2016), found that higher interest rates in a nation can contribute its foreign exchange rate to appreciate in two reasons. It could be the bank pay a higher interest rate for deposits and have lower risk.

Sargent and Wallance (1981) argue that inquiry of currency will decrease and price level increase when a high interest rate policy is released. This can be explained by rising in interest rate indicates that government debt will also increase. Seigniorage, earnings generated by the government by printing bank notes will be used to finance the government debts when government debts increase. As a result, depreciation of exchange rate will occur. On the contrary, rising in interest rate will lead to exchange rate depreciate. It can be further elaborated by the future export performance may be adversely affected by the increasing in interest rate which would lead to expected flow of foreign exchange reserves decline (Furman & Stiglitz, 1998).

Hacker, Karlsson and Månsson (2009) discovered that interest rate differential has the positive impact on exchange rate by using an exchange rate determination model in the flexible-price monetary tradition. Interest rates and exchange rates are linked by the uncovered interest rate parity (IRP). This can be explained by when there is a rising domestic interest rate, real exchange rate will increase. These two countries are expected to adjust the available interest rate because of potential interest rate arbitrage has been eliminated. Therefore, risk neutral investor will be uninterested among the available interest rates among these two nations. According to Capasso, Napolitano and Jiménez (2019), the effect of interest rate differentials on the exchange rate specifically relevant over the short run. For example, a country will experience a positive financial capital inflow and an increasing pressure through the balance of payments on the exchange rate when the domestic interest rate is higher than the one prevailing on the international markets, and it will lead to the appreciation of the domestic currency.

Higher interest rate illustrates that a country's currency is more valuable. As for an investor, investing or saving in that country is more likely to have higher return. Therefore, the inquiry for the country's currency will increase. When the demand of a currency increases, the value will go up and appreciates. It is good news for importer and bad news for exporters when currency strengthen. The imports will become more expensive and exports

will be more competitive if currency weakens. It is also leading to economy-wide inflation in the country. The purchasing power of the currency decreases when inflation increases. Therefore, domestic interest rates increase, and the borrowing become more expensive. Consumers tend to save more as returns are higher when interest rate increases. The economy will slow down and inflation decrease when less disposal income being spent as a result of rising in interest rates. It indicates that inflation and interest rates are negative correlated.

Gümüş (2002) discovered interest rates has inverse correlation with exchange rates. There is a critical longstanding effect of undervaluing the nominal exchange rate in discrepancy with common belief when interest rate increases by applying an error correction model (VECM) and high frequency (weekly) data set. Akçağlayan (2008) identified that an increase in the interest rate will affect the domestic currency to decline in value when she tried to investigate the effects of implementation of interest rate policy on the exchange rate using Toda-Yamamoto method and error correction model during the 2001 crisis. Furthermore, interest rates move inversely with exchange rate under the assumption of sticky prices. Some sticky-price models depend on the exchange rate to retain a zero balance of payments when confronted with incipient capital inflows caused by interest rate differentials. The development of global financial system committed to the emerging of such a mechanism through carry-trade operations. It allows the investors to lend in the terms of the currency paying higher interest and borrow in terms of the currency having lower interest rate (Şen, Kaya, Kaptan & Cömert, 2020).

Chinn and Meredith (2004) discovered a mixed result. They found out that interest rate and exchange rates have inverse correlation when using short term data for G7 countries namely Canada, France, Germany, Japan, United Kingdom, United States and Italy, but on the contrary happened when using long-term data. Other than that, interest and exchange rates display a positive relation when they are contractionary and negative correlation when depreciates are expansionary in reaction to an adverse risk premium

shock (Sanchez, 2008). His findings also exhibit there is an exclusive interest in the connection between interest rates and exchange rates in both developing and advanced countries by using identified vector autoregressions (IVAR) for couple of periods of financial turmoil of Brazil (1999 and 2002-2003) and some Asian EMEs at the time of Asian financial crisis (1997-1998). According to Thomas (2012), he stated that the difference in the interest rate in two nations should be able to clarify the exchange value of currencies. In fact, when interest rates are low, domestic currency's exchange value in relation to international currencies will decrease in its value. On the contrary, an increase in a country's interest rate will lead to a depreciation of the home currency when relative interest rates level exists.

Goldfajin and Baig (1998) found out that real interest rate and real exchange rate have no strong relationship when they conducted a research targeting to discover a relationship between these two variables by using Vector Autoregression model. The data was collected based on the routine interest rates and exchange rates from July 1997-1998 in Asian countries. In addition. Kraay (2000) was unsuccessful to find a very strong positive or negative relationship between the increment of interest rate and the result of the speculative attacks when he tried to test the applicability of higher interest rate across speculative attacks. Erdoğan et al. (2013) did not identify the relationship between interest rates and exchange rate directly, but they found out that there is only one-way causality relationship between these two variables. This indicated that interest rate affects the financial and real sector through exchange rates.

2.1.6 Terms of Trade

There are number of empirical reviews of studies the correlation between terms of trade with the exchange rate. According to Bunescu (2014), when the surplus in the countries of current trade, there will be the appreciation in

the currency whereas the countries current trade is in deficit, there will be the depreciation in the currency. Therefore, the current trade and exchange rate shows positive correlation between them. As the fluctuation of exchange rate may lead international relative prices changing and these will be improved from the imbalance of trade of the countries' currency. Similarity, Nicita (2013) respond in the empirical review that the impact of the relative import prices due to the misalignment of currency as well as the international trade. In reason of export subsidy and the import taxes that affect the misalignment of the currency in price and it can conclude that due to the changes in relative prices in the trade flow will affecting the fluctuation the exchange rate (Nicita, 2013).

Based on the Bahmani-Oskooee and Ratha (2004), the research shows positive relationship between trade balance with exchange rate as depending on the bilateral or mutual trade data in the long run. Whereas due to the depreciation of any currency in short run, it does not show any specific movement in trade balance. There is the prove based on the result as the currency depreciation that lead to the dropping in trade of export and import due to the price effect in short run. For the long run, there is the rising in trade of export and import due to the volume effect. The depreciation of the currency due to the import greater than export as the economic less demanding. It may lead to the price fall of the currency. In empirical theory explain that the export become cheaper and import become expensive as will affect the depreciation of the home currency value as well as the real currency depreciate.

In addition, Glick and Hutchison (2011) stated that greater trade integration tends to lower country's likelihood in experiencing crisis of currency. Rising of openness ratio will decrease the likelihood of sharp reversals in capital flow as the country could have more ability to service its external obligations. It shows a negative1correlation whereby high level of openness to trade may lower the chances of approaching the crisis of exchange rate.

In another situation, the empirical review explains by the Ito and Rose (2011), the relationship between exchange rate volatility with distant between the trading partner in which distance of intensity on the relationship such as trade shows there is a strong relationship among them. The empirical review explains that this bilateral model being used to estimate the correlation among the trade and exchange rate. It shows the rising in distance within countries will significantly growth the bilateral exchange rate volatility through the effect of the trade. Thus, when one percent of the gross domestic product (GDP) is larger than median trade relationship that will bring the impact to the trading which is 12 percent of intense smaller than the less intense partner of the volatility in bilateral real exchange rate. The result shows when there is increasing by 10 percent in the trade may reduce by 0.3 percent of exchange rate volatility.

According to Iavorschi (2014), the economic theory stated that the balance of payment all the outflow and inflow that determined by the financial transaction in the given time of period of the country to the other countries. This balance of payment is the result for the capital account and the current account. Edwards (1998) resulting that there is a parallel correlation between capital inflow and real exchange rate which means that when there is the increase in the capital inflow may affect the real exchange rate become appreciate (Kodongo & Ojah, 2013). In addition, the empirical review that proved by the Iavorschi (2014) stated that when the increasing in the current account of the balance in payment will bring impact of increasing in the rate of exchange as the export and import elasticity is higher which consider as the appreciate would improve the trade balance.

2.2 Theoretical Review

2.2.1 Purchasing Power Parity (PPP) Theory

This theory talks about the equality of the spending power of two currencies will influence the real exchange rate. PPP normally does not apply in short term due to existing of few factors like trade obstacles, tariff, allowances from government and imperfect competition. Nonetheless, PPP is assumed to be applied in long term since the arbitrage transactions are gradually decreasing in the global goods market. (Dilem, 2017) Therefore, exchange rate requires a long period to return in constant equilibrium. In this case, purchasing power plays a vital part to stimulate the exchange rate volatility where exchange rate movement is driven by the differences in price between domestic and foreign. (Bekő, Kavkler & Boršič, 2012)

If the local buy power of both countries is the identical, then it will give rise to their value on the foreign exchange markets to become alike. Country will in earning position given that their local buy power is not identical as they are using stronger currency to spend at the country with weaker currency. (Terborgh, 1926) Purchasing power parity refers to the proportion of internal buying power between two currencies. This is also the foundational ratio which verify the exchange rates. Holmes (2001) had stated that PPP is used for forecasting the exchange rate and determining whether the exchange rate of certain country is undervalued or overvalued. As a matter of fact, the ratio of exchange rate is the function of ratio of internal purchasing power, and this amounts the same thing to the reciprocal of general price levels ratio. Any movements in both countries currency will correspondingly make changes to exchange rates.

2.2.2 Balance of Payments (BOP) Theory

This concept stated that the currency exchange rate in a country is affected by balance of payments position of that country. The deficit and surplus position in balance of payments will give rise to a series of evolution in the economy structure. If the economy is suffering from deficit position, the country may not able to provide export that are equivalent to the amount of national currency existing abroad (Mihaela, 2014). Currency holder will sell the currency on the currency market, it creates a situation where supply of home currency exceeds the demand of home currency and it finally leads to depreciation in the home currency.

For the surplus case, this implies that supply of foreign currency is excessive when compared with the demand of foreign currency. The foreign currencies play a role in purchasing goods and services from abroad (Mihaela, 2014). It makes the foreign currency depreciates while the home currency appreciates where the currency demand is higher than currency supply. Krueger (1969) also studied that a deficit in balance of payments indicate that the citizens in a country are spending more than their income level. In this case, the people need to make excess payments to foreigners and thus they are actually purchasing the foreign currency. Request for foreign currency rises and give rise to gain in value for foreign currency. Raise in competitiveness of exports and change a country's ratio of income elasticities for demand of export and import will help in reaching currency devaluation (Missio &Jayme, 2012).

2.2.3 International Fisher Effect (IFE) Theory

The International Fisher Effect (IFE) Theory suggests that the appreciation or depreciation of currency prices is proportionally related to the nominal interest rate differential. This theory explains changes in exchange rate to interest rate differentials instead of inflation rate differentials of the

Purchasing Power Parity (PPP) theory. Under this theory, a country of a relatively higher interest rate will experience a depreciation of their currency because a high nominal interest rates reflects an expected inflation. Conversely, the country with a lower nominal interest rate will experience a currency appreciation. Therefore, investors in both currencies will get the same average return after all. This is because an investor who earns a lower interest rate will gain from the appreciation of the currency while an investor who earns a higher interest rate will loss from the depreciation of the currency (Maurice, 2012).

However, several short-term factors are found to cause the IFE to be unpredictable in the short term while it appears to be slightly better in the long term. Hence, although it will be unrealistic to apply IFE in daily currency transactions, IFE is still useful in demonstrating the expected relationship between interest rates, inflation and exchange rates. The application of the theory also can be found useful in evaluating the competitiveness of foreign imports prices and in finding potential export opportunities for countries (Maurice, 2012).

2.2.4 Interest Rate Parity (IRP) Theory

The Interest Rate Parity (IRP) Theory suggests that if a country's interest rate is higher than another, the country's currency will be sold at a discount in the forward market. This means that interest rate differentials and forward-spot exchange rate differentials are supposed to offset each other. In that case, there will not be any profit earned from the covered interest arbitrage unless the profits are huge enough to cover transaction costs and other market frictions such as the regulatory and political barriers (Bahram, Kambiz & Todd, 2007).

However, according to Bahram, Kambiz and Todd (2007), the findings of their study is in contradict with the uncovered interest parity theory.

Uncovered interest parity states that the expected rate of appreciation of the spot exchange value. The contradiction may be due to the inefficiency of the currency markets in the countries. Hence, arbitrage opportunities exist and can be predicted by designing a good econometric model (Bahram, Kambiz & Todd, 2007).

2.3 Proposed Theoretical/Conceptual Framework

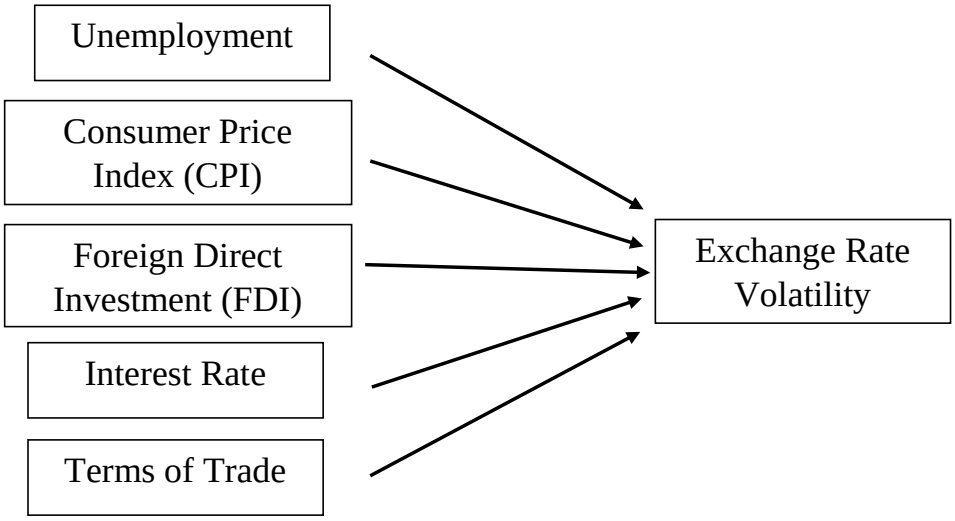

Figure 2.3 Proposed Conceptual Framework

The framework above shows the theoretical framework as our foundation of this study. This study is the purpose to investigate on how the independent variables which are unemployment rate, consumer price index (CPI), interest rate, foreign direct investment (FDI) and terms of trade that affect the dependent variable which is exchange rate volatility in Asian countries. The factors that have been stated as the independent variables in research study are based on the research of multiple journals and articles sources that found in online research.

Most of the journals were studied about FDI and interest rate is stated that the FDI and interest rate have an impact on exchange rate (FDI) and interest rate are effect, exchange rate is cause). For instance, the result of Biswas and Dasgupta (2012) indicated that foreign direct investment is inversely related to exchange rate volatility while Jayasekara (2016) also have the same explanation which FDI statistically significant negative relationship on exchange rate volatility; based on Engel (2016) and Hacker, Karlsson and Månsson (2012) discovered that interest rate differential has the positive impact on exchange rate by using an exchange rate determination model in the flexible-price monetary tradition.

However, there are some journals of CPI, unemployment and trade has different point of views. For example, the study of Winkelried (2011) has stated that the price of goods was making higher or expensive when an increase in exchange rate (local currency unit per US dollar) due to importer will intend to adjust their price in local currency in order to maintain their mark-up, hence consumers end up pay more money to purchase the same goods. The point of Winkelried (2011) is different with Purchasing Power Parity theory (PPP) which he narrated that the rise in exchange rate is the cause of making goods price increase and hence inflation whereas PPP is explained that exchange rate depreciates due to rise in inflation rate was happened in country.

In addition, same situation was happened on unemployment and trade which there is some previous journals narrated that wave motion in exchange rate will be influenced adversely to unemployment, large wave motion in exchange rate increases unemployment (Stirböck & Buscher, 2000); researcher of Bunescu (2014) stated that fluctuation of the exchange rate could affect international relatively price changing and therefore, it will affect the trade of countries' currency. Nevertheless, the journals of CPI that have found and used in this study are mostly support the PPP theory. According to Adetiloye (2010); Mirdala (2014); Cezary Wojcik (2003); Henry J. Gailliot (1970), CPI is influenced the exchange rate; the journals of unemployment that have found and used in this study are mostly explained that unemployment is given an impact on exchange rate. (Feldmann, H. (2011); Hatemi-J and Irandoust (2006)); the journals of trade that have found and used in this study are mostly stated that the trade will be the cause while exchange

rate will be the effect. Based on Bunescu (2014), when the surplus in the countries of current trade, there will be the appreciation in the currency whereas the countries current trade is in deficit, there will be the depreciation in the currency. Therefore, this study is adapted from the all of the journals that have founded and the form the Proposed Conceptual Framework.

2.4 Hypothesis Development

The purpose in the hypothesis of this study is1to identify and examine the determinant of exchange rate volatility in Asian countries. Exchange rate volatility is the dependent variables in which to investigate how the exchange rate variables being affected by other factors which includes unemployment rate, consumer price index (CPI), foreign direct investment (FDI), interest rate and terms of trade. In this hypothesis is to test how the significant interconnection between dependent variable and independent variables is.

H_0 : There is no relationship between the unemployment rate and the exchange rate volatility in Asian countries
H_1 : There is a relationship between the unemployment rate and the exchange rate volatility in Asian countries

H_0 : There is no relationship between the interest rate and the exchange rate volatility in Asian countries
H_1 : There is a relationship between the interest rate and the exchange rate volatility in Asian countries

H_0 : There is no relationship between the foreign direct investment (FDI) and the exchange rate volatility in Asian countries
H_1 : There is a relationship between the foreign direct investment (FDI) and the exchange rate volatility in Asian countries

H_0 : There is no relationship between the consumer price index (CPI) and the exchange rate volatility in Asian countries

H_1 : There is a relationship between the consumer price index (CPI) and the exchange rate volatility in Asian countries

H_0 : There is no relationship between the terms of trade and the exchange rate volatility in Asian countries

H_1 : There is a relationship between the terms of trade and the exchange rate volatility in Asian countries

2.5 Conclusion

In conclusion, this chapter has examined and analyze about each of the independent variables in the research that may affect the exchange rate volatility. There are some conceptual frameworks that could explain the relationship between the independent variables with the exchange rate volatility. From the previous researcher had been used and explained the theoretical framework which includes purchasing power parity theory, balance of payment theory, international fisher effect theory and interest rate parity theory. The following chapter will be further review on research design, methodology, method and tools used for testing the data model.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter review about the methodology in conducting this research. Research design, theoretical model and data collection method will be constructed. Purpose data analysis tool also will be justified in this chapter.

3.1 Research Design

In this study, the purpose on conducting this research is to determine the factor affecting the exchange rate volatility on Asian countries. The factors affecting the exchange rate which include consumer price index (CPI), interest rate, unemployment rate, foreign direct investment (FDI) and terms of trade. All the variables which involve dependent variable and independent variables that used in this study are qualitative research.

Qualitative is the research being used to understand the underlying of opinion, suggestion and reason as there is a question that need to be investigate and describe in depth. This qualitative research helps in develop the ideas or hypotheses of the potential of qualitative research. Qualitative research in collecting the data using the method of the semi-structure or unstructured techniques which includes in-depth interview, participation observation and focus group discussion. In depth of research design, conclusive research design being used in the study.

Under conclusive research design, the casual research or can be called as explanatory research is conducted to identify the extent and nature of cause-and-effect relationships as well as used to understand which variables are causes (independent), and which variables are effect (dependent) in the research. These casual studies focus on identify and analyze the situation of the specific problem in order to explain what the pattern relationship between the variables in the research.

3.2 Theoretical Model

3.2.1. Economic Function

ERt = Exchange Rate at period t

UMPTt = Unemployment rate at period t

CPIt = Consumer Price Index at period t

FDIt = Foreign Direct Investment at period t

IRt = Interest Rate at period t

Tt = Trade at period t

εt = Error Term at period t

3.2.2 Econometric Model

This research investigates the relationship between exchange rate volatility, unemployment rate, consumer price index, foreign direct investment, interest rate and terms of trade. Exchange rate volatility will be the dependent variable while unemployment rate, consumer price index, foreign direct investment, interest rate and terms of trade will be the independent variables.

Linear regression model:

$$\mathbf{ERt = \beta 0 + \beta 1UMPT1t + \beta 2CPI2t + \beta 3FDI3t + \beta 4IR4t + \beta 5T5t + \varepsilon t}$$

Where

ERt = Exchange Rate at period t in constant LCU

UMPTt = Unemployment rate at period t in percentage (%)

CPIt = Consumer Price Index at period t in percentage (%)

FDIt = Foreign Direct Investment at period t

IRt = Interest Rate at period t in percentage (%)

Tt = Trade at period t in percentage (%)

εt = Error Term at period t

t= 2007, 2008, 2009, … 2016 (from year 2007 to 2016)

3.3 Sampling Design

3.3.1 Sampling Techniques

For the sampling techniques, it has divided into two categories of sampling techniques which are probability sampling and non-probability sampling. Probability sampling or can be recalled as random sampling is the sampling technique that being used in this study. This probability sampling is the sampling that generalize of the findings derive from the sample to the general population in which describe the procedure being used in selecting the elements from the population.

For this research, E-view 11, the econometric software program has been chosen to be the main analysis tool in conducting the hypothesis testing in the study.

E-view is the tool that helps in developing the statistical relation based on data and analyze the analysis of the collection data which is panel data in order to explain the correlation between the dependent variable with the independent variables in this research.

3.3.2 Sampling Size

Sampling size is the amount of the observation in the research data that has been collected. Sample size is based on the smaller or larger of the size that give the differences of population that bring impact in statistically significance of the research. In this study, it has been collected 50 observations in the sample size of the data. All the data that carried annually that consists of 10 years data in which from the year 2007 to year 2016 for 5 different countries in the Asian countries which includes Malaysia, Indonesia, Thailand, India and Iran Republic.

3.4 Data Collection Method

Secondary data is the main source of data that being used on this study in which not using the method in collecting the data from the survey or interview conducted by ourselves. Secondary data is the existing data or is the past data that already being collected by others researcher. All the data can be collected from sources of government publication, journal, article, book, online resources etc. Besides, panel data has been taken as a method to test and identify how the independent variables affecting the exchange rate volatility. This panel data consists of the combination on cross-sectional data and time series data in which panel data able to control the

heterogeneity of the multiple countries. But for the cross-sectional data and time series data unable in controlling the heterogeneity as it will run to a risk of biased result in the study.

The data collected consists of 10 years data in which from the year 2007 to year 2016 for 5 different countries in the Asian countries which includes Malaysia, Indonesia, Thailand, India and Iran Republic. 50 observations that being used to identify and analyze how this observation will affect the exchange rate volatility in this study. World Bank Data is the one of the online resources method way that used in collecting the existing data of the dependent variable and independents variables to carry out the research.

3.5 Proposed Data Analysis Tool

Data analysis means the procedure on analyze and assess the data through statistical method and tools in testing the hypothesis in this study. There are few ways in testing the hypothesis.

3.5.1 Descriptive Statistic

Descriptive statistics refer to the brief descriptive coefficient of the collection figures that summarize and organized the data as it is easy to see the correlation between the variables in the study. There are two categories on measuring the descriptive statistics which includes central tendency and measure of variability. Central tendency is to measure all the set of data that has been summarize which are mean, median, and mode. Calculations for variability (spread) are to summarize all set of data such as standard deviation, variance, skewness and the correlation of the model.

3.5.2 Multicollinearity Testing

Multicollinearity is an economical problem that exists when the independent variables in a regression model related to each other. It also means that one independent1variable will influence the other independent variables and lead to biased coefficient estimation and a loss of power. (Correlation (X1, X2) $\neq$ 0). This phenomenon will give rise to an issue as the independent variables must be independent. Connections among independent variables become higher will bring along serious impact when come to the interpretation of final outcomes. Thus, the conclusion may not be as accurate as possible.

If independent variables do not link to each other, it is known as orthogonal. However, it is very seldom to find orthogonal in most regression analysis. Multicollinearity can be noticed especially when there are some alteration of independent variables and make estimated coefficients affected and when a data point is changed and lead to changes in coefficients (Daoud, 2017). Multicollinearity may exist if the t-values is small but with huge standard errors and the algebraic signs of the estimated coefficients do not meet with previous expectation. This problem will bring serious impact to whole regression where it led to incorrect conclusion on the model. Some independent variables that are supposed to be significant are going to be found as insignificant on the model. It is because of the high standard errors of the coefficients. (Daoud, 2017)

When multicollinearity problem is diagnosed in certain model, Variance Inflation Factors (VIF) and Tolerance Factors (TOL) is the common tool used to measure how much the variance is inflated. In general, VIF more than 10 indicates that correlation among independent variables is high where multicollinearity problem is a concern for researcher. Below shown is the formula for VIF where R2 is concerned to how well the sample figures suitable with the distribution from a population. Besides, for TOL less than 0.20 is treated as multicollinearity.

VIF Formula: $\frac{1}{1-R^2}$

TOL Formula: $\frac{1}{VIF}$

3.5.3 Normality Testing

This test is about the numerical procedure in ascertaining whether the sample or group data that is fit to the normal distribution. Statistical error is very common to happen where even some of the published articles will have one. Therefore, normality test needs to be conducted since assumption of normality is important for a model and need to be checked for a series of statistical procedures, as the validity relies on it. (Ghasemi & Zahediasl, 2012)

This normal distribution can be either displayed via mathematics or graphics. Ordinarily Jarque-Bera (JB) test will be applied in most of the normality testings. Jarque- Bera test includes skewness and kurtosis in its formula, to test that whether the sample data have the skewness and kurtosis in matching with normal distribution. The Jaeque-Bera test's formula is shown below

Jarque-Bera Formula: $\frac{n-k}{6}\ [S^2 + \frac{1}{4}\ (K - 3)^2]$

Jarque-Bera Formula: $\frac{n-k}{6}\ [S^2 + \frac{1}{4}\ (K - 3)^2]$
Hypothesis for Normality Test:
H_0: The error term is normally distributed.
H_1: The error term is not normally distributed.
Significance value: 5%/10%
Decision rule: Reject H_0 if p-value is less than 0.05/ 0.10. Otherwise, do not reject H_0.

3.5.4 T-statistical hypothesis test (t-test)

A t-test is one of the standard tests by researchers to compare the means between two groups. A t-test is employed in assessing the relationship between output variable and input variables individually. If the conclusion is significant indicate that the explanatory variables is strongly influenced the respond variable and vice versa. Conducting t-test is to investigate whether all independent variables are individually statistically significant at level of significance.

There are two types of statistical inference, which including parametric and non-parametric ways. T-test is classified under parametric method, where parametric method is about defining the probability distribution of probability variables and make inferences according to the parameters of the distribution. (Tae, 2015) T-test also called Student's t-test where William Sealy Grosset develop this statistical analysis technique in 1908. The outcome of t-test produces a t-value, while the t-value will need to be compared with the T-Distribution Table in order to gain the critical value. The T-Distribution Table is available in one-tail and two-tails format.

Hypothesis for t-test:
H_0: $\beta=0$
H_1: $\beta\neq0$
Significance value: 5% / 10%
Decision rule: Reject H_0 if p-value is less than 0.05/0.10. Otherwise, do not reject H_0.

3.5.5 F-statistical Hypothesis Test (F-test)

F-test is a type of statistical hypothesis test where its test statistic is expected to have F probability distribution. This test is usually linked with analysis of variance (ANOVA) and widely used in testing the null hypothesis that

the means of normally distributed groups are similar, even if it can be used to test a series of different hypotheses. Analysis of variance is one of the most widely used models to test the homogeneity of the means from different groups (Abidoye, Jolayemi, Sanni & Oyejola, 2016). The F-test (as the T-test) can be used also for small data sets in contrast to the large sample chi-square tests (and large sample Z-tests) but require additional assumptions of normally distributed data (or error terms). Besides t-test, F-test is conducted to detect the significance of the model. If conclusion is significant indicates that all independent variables are strongly influenced the dependent variable and vice versa.

For this research, panel data are employed, where the data consists of combination between cross-sectional data and time series data. It means that there will be time dimensions as well as space. Panel data will be analyzed by researchers usually by fixed-effect model or fixed random model. The fixed effect model is assumed to be time-invariant and the unobservable factors will either solved by dummy variables or eliminated through time demeaning (Frondel & Vance, 2010). In the contrary, random effect models' unobservable factors will be considered as part of the disturbances. Under these two models, different F tests will be used in detecting model significance like restricted F test.

Hypothesis for F test:
H_0: $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=0$
H_1: At least one of the $\beta_i \neq 0$, where $i=1,2,3,4,5$
Significance value = 5% or 10%
Decision rule: Reject H_0 if p-value less than 0.05/0.10 value. Otherwise, do not reject H_0

3.5.6 Hausman Specification Test

This test is a general specification test proposed by Hausman. This test is asymptotic chi-square test according to the quadratic form. (Holly, 1982) The distinction between consistent estimator under alternative hypothesis and efficient estimator under null hypothesis form this quadratic form. This test sometimes also known as a test for model specification. The Hausman test normally applied in panel data analysis. It is because panel data generally applies either two principal approaches, which are fixed- or random effect estimators. Hausman's (1978) specification test is widely equipped to study that whether either fixed- or random effect model is more suitable under this case. (Frondel & Vance, 2010) It is related to the idea of coefficient estimates derived from fixed-effect model should not differ systematically to the set of coefficient estimates under random-effect estimation.

Hypothesis of Hausman Specification Test:
H_0 : Random-effect model is consistent and efficient.
H_1: Random-effect model is inconsistent and inefficient. Significance value: 5% or 10%
Decision rule: Reject H_0 if p-value is less than 0.05/ 0.10. Otherwise, do not reject H_0.

3.6 CONCLUSION

In this chapter, economic model had been constructed and sources of data had been clarified. Besides, method selected to identify and analyze the relationship between dependent variables of exchange rate volatility and independent variables which are unemployment, consumer price index, foreign direct investment, interest rate and terms of trade that had been defined, along with the diagnosis checking tests for econometric model's problems.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Based on the research of methodology, this research will discuss about the determinants of exchange rate volatility in Asian countries, and exchange rate is the dependent variable. The factors affecting the exchange rate includes unemployment, consumer price index, foreign direct investment, interest rate and terms of trade will be the independent variables in the model.

This study had conducted by using 5 different countries in Asian with the 10 years collected data for the five variables, which is from year 2007 to 2016. All the variables' data were collected from World Bank Data. E-view, the electronic software method was being used in conducting the hypothesis testing in the model.

In this chapter, Ordinary Least Square (OLS) in multiple linear regressions model will be used to run the data analysis. The results between the independent variables and dependent variable will be shown and elaborate detailly. Diagnostic testing will be carried out to identify the existence of multicollinearity, autocorrelation and heteroscedasticity problems.

4.1 Descriptive Statistics

	ER	UMPT	CPI	FDI	IR	T
Mean	5445.928	4.711920	119.6274	1.42E+10	2.381974	85.38954
Median	50.92125	3.170000	107.0187	9.59E+09	3.340998	53.60618
Maximum	30914.85	13.52000	306.4938	4.45E+10	16.13351	192.4661
Minimum	3.060003	0.489000	63.78633	1.15E+08	-18.12194	37.42134
Std. Dev.	7960.209	3.870532	47.51682	1.22E+10	6.114649	48.43895
Skewness	1.559817	1.004271	2.529462	1.071117	-0.862645	0.584804
Kurtosis	5.060357	2.688771	9.355462	3.176329	4.830981	1.691705
Jarque-Bera	29.11915	8.606470	137.4679	9.625542	13.18566	6.415869
Probability	0.000000	0.013525	0.000000	0.008125	0.001370	0.040440
Sum	272296.4	235.5960	5981.372	7.08E+11	119.0987	4269.477
Sum Sq. Dev.	3.10E+09	734.0700	110634.6	7.31E+21	1832.057	114970.2
Observations	50	50	50	50	50	50

Figure 4.1 Descriptive Statistics from E-view output

The table below denotes that the descriptive statistics of dependent variable of exchange rate (ER) and independent variables. Unemployment (UMPT), consumer price index (CPI), foreign direct investment (FDI), interest rate (IR) and trade (T) are the independent variables selected in this study.

By referring to the result, the mean value from year 2007 to 2016 of ER is 5445.928 which is the highest among others variables. For the independent variables, the mean for CPI is 119.6274 which it is the highest among other independent variables of UMPT, FDI, IR and T which are 4.7119, 1.42E+10, 2.3820 and 85.3895 respectively.

Based on the result, the median value from year 2007 to 2016 of ER is 50.9212. For the independent variables, the median of CPI is 107.0187 which is the highest among the other independent variables UMPT, FDI, IR and T which are 3.17, 9.59E+09, 3.3410 and 53.6062 respectively.

The maximum value is referring to the largest value in the data of the model whereas the minimum value is referring to the smallest value in the data of the model. Based on the data result, the maximum value of ER is 30914.85 whereas for the minimum value of the ER will be 3.06. For the independent variables, the minimum value of variables UMPT, CPI, FDI, IR and T are 13.52, 306.49, 4.45E+10, 16.13, and 192.47 respectively. The minimum value of UMPT, CPI, FDI, IR and T are 0.49, 63.79, 1.15E+08, -18.12, and 37.42 respectively.

Standard deviation is the degree of the dispersion of the value in the data. Based on the result obtained above, the standard deviation of the ER is 7960.21. Whereas for the independent variables of the UMPT, CPI, FDI, IR and T which are 3.87, 47.52, 1.22E+10, 6.11 and 48.43 respectively.

4.2 Inferential Analyses

4.2.1 Model Estimation

First of all, Ordinary Least Square (OLS) is one of the multiple regression methods that is being used to analyze and identify the interconnection between the ER with the UMPT, CPI, FDI, IR and T. The OLS model estimation stated below:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_t$$

$$ER_t = \beta_0 + \beta_1 UMPT_{1t} + \beta_2 CPI_{2t} + \beta_3 FDI_{3t} + \beta_4 IR_{4t} + \beta_5 T_{5t} + \varepsilon_t$$

Model 1

Whereby,

ERt = Exchange Rate at period t

β_0 = Constant Coefficient at period t

$\beta_1 UMPT_{1t}$ = Unemployment at period t

β_2**CPI**$_{2t}$ = Consumer Price Index at period t

β_3**FDI**$_{3t}$ = Foreign Direct Investment at period t

β_4**IR**$_{4t}$ = Interest Rate at period t

β_5**T**$_{5t}$ = Trade at period t

$\boldsymbol{\varepsilon t}$ = Error Term at period t

Significant level of 1%, 5% and 10% for estimating the model 1 as below

1% = * (first level)
5% = ** (second level)
10% = *** (third level)

4.2.2 Multicollinearity Testing

Multicollinearity testing is used to test if there any of independent variables are highly correlated with each other. In order to detect whether there is a multicollinearity problem in the model, Pair-Wise Correlation Testing and Variance Inflation Factors (VIF) will be used to test the multicollinearity problem.

	UMPT	CPI	FDI	IR	T
UMPT	1.000000	0.421112	-0.417329	-0.286837	-0.546054
CPI	0.421112	1.000000	-0.119206	0.255358	-0.303877
FDI	-0.417329	-0.119206	1.000000	0.232987	-0.315480
IR	-0.286837	0.255358	0.232987	1.000000	-0.026025
T	-0.546054	-0.303877	-0.315480	-0.026025	1.000000

Figure 4.2.2 Pair-Wise Correlation Test from E-view output

Based on the result of Pair-Wise Correlation Test, UMPT, CPI, FDI, IR and T shows that there is a low collinearity with each other as the value of covariance analysis for each pair of variables are lower than 0.80. Therefore, there is no multicollinearity problem in the model.

Independent Variables	VIF
UMPT	3.9139
CPI	1.4966
FDI	2.4746
IR	1.4045
T	3.0184

Table 4.2.2 Variance Inflation Factors (VIF)

Based on the VIF calculation, the result shows all the independent variables have no serious multicollinearity problem which the value of VIF are less than the max value (10). In conclusion, there is no1multicollinearity problem in the model.

4.2.3 T-Statistical Hypothesis Test (T-test)

This research will use the T-test to test whether there is sufficient evidence to conclude the significance of independent and dependent variables. The summary of the result was generated below:

Independent Variables	P-value	Level of Significant, α	Result
UMPT	0.0027	0.05 (**)	Significant Relationship
CPI	0.0000	0.05 (**)	Significant Relationship
FDI	0.0209	0.05 (**)	Significant Relationship
IR	0.0055	0.05 (**)	Significant Relationship
T	0.1144	0.10 (***)	Insignificant Relationship

Table 4.2.3 Summarize of T-Test result from E-view output

From the table above, it included the value of the probability (p-value), level of significant of 5% and 10% and the significance relationship of the variables. For the null hypothesis (H_0) of t-test, it will be no significant correlated between ER with other independent variables. Thus, this study will reject the H_0 if the p-value is less than the level of significant (0.05).

From the result generated, it shows the UMPT, CPI, FDI and IR the p-value is less than the level of significant (0.05). Therefore, this study will reject the H0 since the p-value is less that level of significant (0.05). Besides, the result shows that the p-value for T is greater than the level of significant (0.10). Thus, this study does not reject H_0 since p-value is larger than level of significant (0.10). Explanatory variables such as UMPT, CPI, FDI and IR have significant interconnection with dependent variable of exchange rate whereas T show an insignificant result.

4.2.4 F-Statistical Hypothesis Test (F-test)

F-test being used to test whether statistics model is fit with the data set in the model. This F-test will determine the equality of the variances in the model. Therefore, we will summarize the result into the table below.

F statistics	157.9903
Probability (F-statistics)	0.0000

Table 4.2.4 Summarize of F-test result from E-view output

Table 4.2.4 denotes the result of F-statistics and probability of F-statistic in the model. The H_0 of1f-test is indicate that no interrelationship between ER and other explanatory variables. Thus, this research will reject H_0 if the p-value is below than the level of significant (0.10). Depends on the result, it shows that the p-value of F-test is less than the level of significant (0.10). Therefore, this research will reject H_0 and the independents variables are significantly affecting the dependent variables. There is enough evidence to conclude that at least one of the explanatory variables are significantly affecting the ER.

4.2.5 Normality Testing

Normality testing is conducted in this research which is to examine the normally distribution of error term in this model. Therefore, the Jarque-Bera test will be accomplished to identify the normality distribution of the error term in the model.

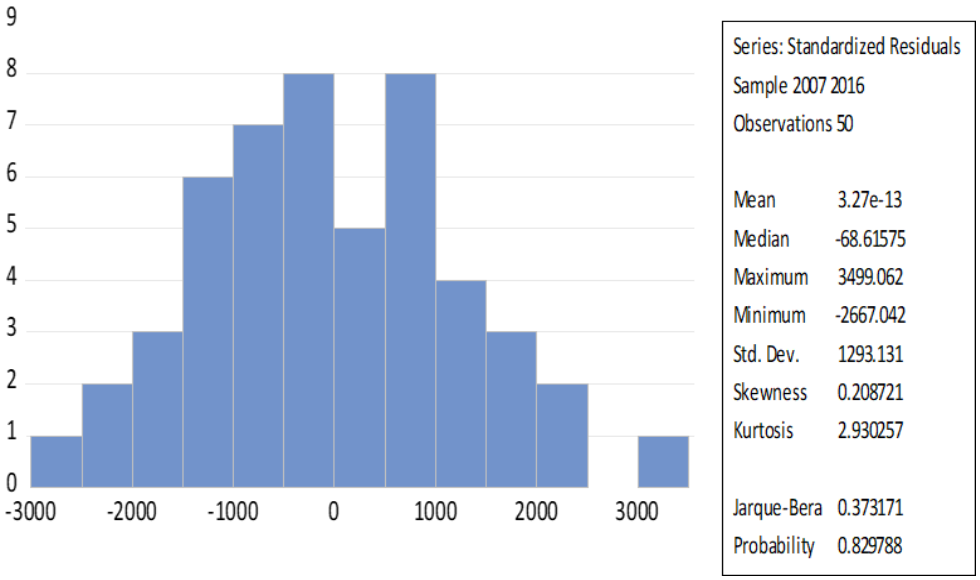

Figure 4.2.5 Histogram Normality Graph of Jarque-Bera Test

According to the result above, it denotes that histogram statistics is normality distributed. In this normality testing, the H_0 will be the error term is normally distributed. Reject H_0 if the p-value is lower than the1significant value of 0.10, otherwise do not reject the H_0. Based on the result shows that1the probability is 0.8298 which is greater than the level of significant 0.05. Therefore, this study does not reject H_0 and thus, the error term is normally distributed in the model.

4.2.6 Hausman Specification Test

Test Summary	Probability
Period Random	0.0010

Table 4.2.6 : Empirical review of Hausman Test from E-view output

This research has conducted the Hausman Test to determine whether we need to use the Fixed Effect Model (FEM) or Random Effect Model (REM) is consistence and efficient to perform better. In this research is used the p-value to make a comparison with the significant level of 0.10. According to the study, the H_0 will be REM is consistent and efficient than FEM and reject H_0 if p-value is less than significant level. The result shows that this research will reject the H_0 since p-value (0.0010) is lower than significant level of 0.05. Therefore, there is insufficient evidence to conclude that REM is consistence and efficient to perform better. Thus, the FEM is consistence and efficient perform better in the model.

4.3 Interpretation

First and foremost, the coefficient of determination of R2 in the estimated model result is 0.9892 which determined that about 98.92% of variation in ER can be explained by UMPT, CPI, FDI, IR and T. The probability of F-statistics in the final estimation result based on FEM will be 0.0000 which lesser than alpha (0.05). Therefore, there is enough evidence to conclude that this model is significant at alpha (0.05).

This research has examined each explanatory variable by using the p-value approach. First of all, the t-test of UMPT (X1t) in final estimated model is 0.0027 which is lesser than significant level (0.05), so that there is sufficient evidence to conclude that the correlation between ER (Yt) and UMPT is significant at alpha (0.05). If the EMPT increases by one percent, on average, the ER drops up to 706.18 LCU per US$, ceteris paribus. Therefore, there is an inverse relationship between UMPT and ER.

Besides, p-value of the t-test for CPI (X2t) in final estimated model is 0.0000 which is lower than significant level of 0.05, so that there is sufficient evidence in concluding the interconnection between ER (Yt) and CPI is significant at alpha

equal to 0.05. If CPI is increasing by one percent, on average, ER will boost up to 100.09 LCU per US$, ceteris paribus. Thus, CPI and ER have a positive relationship.

P-value of t-test for FDI (X3t) in final estimated model is 0.0209 which lower than significant level of 0.05, and therefore there is an enough evidence to conclude that the interconnection between ER (Yt) and FDI is significant at 0.05 significant level. If FDI increase by one BOP current USD, on average, ER will decline by 7.42E-08 LCU per US$, ceteris paribus. Thus, FDI and ER have an inverse relationship.

Furthermore, p-value of t-test for IR (X4t) in final estimated model is 0.0055 which is lesser than significant level of 0.05, so that there is sufficient evidence to conclude that the correlation between ER (Yt) and IR is significant at 0.05 significant level. If IR is increased one percent, on average, ER will growth by 113.77 LCU per US$, ceteris paribus. Thus, IR and ER have a parallel relationship.

Lastly, the p-value of the t-test for T (X5t) in final estimated model is 0.1144 which is greater than significant level of 0.10, so that there is insufficient evidence to conclude that the correlation between ER (Yt) and T is significant at 0.05 significant level. Therefore, it shows the insignificant correlation between T and ER. If T increased by one percent, on average, ER will decrease by 35.45 LCU per US$, ceteris paribus. Thus, T and ER have an inverse relationship.

4.4 Conclusion

In the nutshell, the result conducted through E-view output shows that all the independent variables which includes UMPT, CPI, FDI, IR and T that are significantly affect the dependent variable of ER. Besides, we have run a few diagnostic tests such as Multicollinearity testing, Normality testing and Hausman testing and so on to examine and identify the problem in the model. Based on the result, it denotes that there is no multicollinearity problem and the normality testing is normally distributed of the model. However, some variables show that the result

not equivalent with the expected relationship. Further explanation of the result will be explained in upcoming chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

The final chapter will explain and discuss the overall conclusion in this research. Chapter 5 comprises of discussions of major findings together with summary result of hypothesis testing, implication of study, limitation of study and recommendation of the study.

5.1 Summary of Statistics Analyses

No	Diagnostic Testing	Analysis	Decision Making	Result
1	Multicollinearity	Pair-Wise Correlation and Variance Inflation Factor (VIF)	Value of correlation between each of the independent variables are less than 0.8 and the VIF are less than maximum value of 10	There is no multicollinearity problem
2	Significant level of independent variables	T-test	Reject H_0 if p-value is less than level of significant, 0.05 and 0.10	All the independent variables are significant except the trade.

3	Significant level of independent variables	F-test	Reject H_0 if p-value is less than level of significant, 0.05 and 0.10	At least one of the independent variables are significantly affect the exchange rate
4	Normality	Jarque-Bera Test	Reject H_0 if p-value is less than level of significant, 0.05	The error terms are normally distributed
5	Fixed-Effect Model (FEM) and Random-Effect Model (REM)	Hausman Test	Reject H_0 if p-value is less than level of significant, 0.05	FEM is more consistent and efficient to perform better

Table 5.1: Summarize of Statistic Analysis Result

5.2 Findings

This research studies about the factors of exchange rate volatility in Asian countries involving Malaysia, Thailand, Indonesia, Iran and India. 5 independent variables are chosen for this study, which are unemployment rate, consumer price index (CPI), interest rate, foreign direct investment (FDI) and terms of trade in order to investigate their relationship with exchange rate volatility. In chapter 4, data analysis had been conducted by running through all the test such as Multicollinearity testing, Normality testing, and Hausman testing.

5.2.1 Unemployment Rate

According to result in chapter 4, negative significant relationship is determined between unemployment and exchange rate. It means increment

in unemployment will make exchange rate declines as well. This result is consistent with Belke (2005) point of view. This researcher agrees that unemployment rate and exchange rate volatility are negatively correlated. When a country's unemployment rate is showing an increment, most of the companies will choose to cut the number of employees hired to reduce the wages expenditure. It will affect the country's Gross Domestic Product (GDP) and lead to poor performance of that country's economy. Exchange rate will be influenced and might depreciate in value by the country's economy depression. However, Hatemi - J and Irandoust (2006) have adverse opinion on this study.

They argue that the interrelation between that two variables should be positively correlated. Nevertheless, Feldmann (2011) discovers mix results through the four regressions where 3 regressions show negative relationship but 1 regression shows positive relationship between these two variables.

5.2.2 Consumer Price Index

Besides, consumer price index also indicates a positive significant relationship with exchange rate as reported by the result in chapter 4. This is contrasted with Henry J. Gailliot (1970) point of view where this researcher states that higher inflation will bring on a country's currency to experience depreciation. Henry J. Gailliot (1970) introduce a theory called Cassel's Theory to explain Purchasing Power Parity Theory in detail and prove inflation is moving in reverse direction with exchange rate, where inflation and consumer price index are said to be in a linear relationship according to Park (1978).

5.2.3 Foreign Direct Investment

Apart from that, foreign direct investment (FDI) is significant to exchange rate but negatively influencing it. According to Agénor (2003), Biswas and Dasgupta (2012), and Jayasekara (2016), all of these researchers also discovered negative interconnection between foreign direct investment and exchange rate. Larger foreign direct investment inflow may help in strengthening productivity in traded good sector and reducing fluctuations in consumer's demand. Nonetheless, Lartey (2007) and Saborowski (2009) recommend a positive correlation between foreign direct investment and exchange rate. Furthermore, Athukoraka and Rajapatirana (2003) and Abri and Baghestani (2015) both stated a mix result for this study where they found that FDI inflow may boost the changes in movements of exchange rate in some countries but simultaneously exchange rate volatility might be weakened in other countries.

5.2.4 Interest Rate

In addition, interest rate is found to own positive significant relationship with exchange rate volatility. This is supported by Engel (2016) and Hacker, Karlsson and Månsson (2012) where higher interest rates will contribute to appreciation in exchange rate. High interest rates will definitely attract investors to invest and put money in that particular country and thus increase the demand for that country's money. Gümüş (2002) and Akçağlayan (2008) argue that the relationship between interest rate and exchange rate volatility should in reverse direction. Under sterilized intervention, central bank will increase their reserves through purchasing foreign bonds with the purpose of strengthening their currency. The increment of money supply in that country will lead to decline in interest rate. However, if under unsterilized intervention, central bank will not involve in offsetting the transaction. Chinn and Meredith (2004) discover that the relationship changes when

different maturity data are used. Goldfajin and Baig (1998) and Kraay (2003) even fail to find a significant1relationship between1these1two variables.

5.2.5 Terms of Trade

For terms of trade, the relationship of trade and exchange rate is strong negative relationship. This result conflicts with most of the researchers in chapter 2. Bunescu (2014), Bahmani-Oskooee and Ratha (2018), Ito and Rose (2011), Edward (1998), Kodongo & Ojah (2013) and Iavorschi (2014) reveal a positive relationship between the trade balance and exchange rate. Surplus in the countries' current trade will make exchange rate increase in value while in deficit case, of course exchange rate decreases in value.

5.3 Implications of Study

According to the findings of our study, it has been found that all independent variables except trade is significant to influence the exchange rate volatility. Hence, in order to influence the exchange rate to a favorable level that is in the best interest of the country, the government as a policy maker plays a very important role. The government must have sufficient understanding on the factors that can influence the exchange1rate volatility. This is to make sure that when there is a need for government intervention due to unfavorable level of exchange rate volatility, the government is able to choose the most effective and suitable policy as the solution. The government should also do more research before implementing policies to avoid negatively impacting the exchange rate unintentionally. For example, the government can implement several projects to create more jobs for the people to improve the unemployment problem and also to attract more foreign investment.

Besides that, the government can also influence the factors such as the interest rate and foreign direct investment by intervening in the market through the treasury department or central bank. There are a many possible ways of implementing

central bank intervention. It can be mainly classified into sterilized intervention and unsterilized intervention which includes influencing the money supply and demand in the market. Sterilized intervention is purchasing domestic currency by selling foreign assets while unsterilized intervention is through the buying and selling of their own currency. The findings of our research show that interest rates can influence the exchange rate. However, it is still arguable that central bank intervention can effectively lower the exchange rate volatility to achieve a more stable exchange rate. Intervention signals that are deemed uncreditable by majority of the market participants or an inefficient exchange market of the involved assets may cause the intervention to have an adverse effect which increases the exchange1rate volatility instead (Kathryn M. D., 1998). Therefore, further research has to be done in detail to make sure the intervention policy does not create negative effects on the exchange rate which cause the exchange volatility to increase.

From our study, international trade which includes exports and imports also can impact the exchange rate volatility. Hence, the government should have sufficient study on the relationship between trade and exchange rate volatility. To influence the exchange rate volatility, several policies can be made to control the trade volume with foreign countries. Associations between countries especially among the Southeast Asia countries that are active trade partners can also implement several trade agreements to influence the trade volume in the interest of the exchange rate volatility of the participating countries (Richard P. & Victor P., 2013).

5.4 Limitations

There are some limitations have encountered in this study. First of all, this study does not have large sample size to run the regression model. In order to use panel data for a study, large sample size is required to have a more accurate and reliable result. Basically, the expected sample size that considered large enough is at least 300 observations and above but does not limit the number of observations; the higher the number of observations, the more accurate in final result as long as the source of data and the data itself is reliable. It has been proved by Mohamad Adam

Bujang (2017) in their study which is to examine the minimun number of sample size requirement for multiple regression model. Based on the study, they discovered that a sample size of at least 300 are able to generate the sample estimate that are probably precise to the population parameters estimate. Unfortunately, the sample size generated in our study is only 50 observations due to Iran and Thailand do not have the latest data and some data is not recorded.

Besides, we have restricted from obtaining the data from different sources because we can only adopt the data from one source which is 'World Bank Database'. However, this database does not provide large and complete data. It is time consuming when we are looking for the data for our regression model. Other than that, lack of available and reliable data will restrict the scope of our analysis and the sample size

5.5 Recommendation

The limitations stated in this research has generated some recommendations which could further enhance the studies of determinants of foreign exchange rate in Asian countries.

During the research period, the researchers found out that the sample size is the major concern to make sure the accuracy and level of the regression model. Thus, the recommendation provided is to increase the sample size of the model. This is because large sample size can include more information and details and improve the accuracy and reliability of the model. It has a higher tendency to eliminate the autocorrelation, multicollinearity and heteroscedasticity problems from the model. Therefore, the future researchers should increase the sample size for the study in order to get a more accurate and reliable results.

Other than that, future researchers are encourage to adopt data and information from different sources available in the internet. For this study, World Bank data is the only source for running the regression model. Therefore, future researchers are

encouraged to get the data from different data banks such as International Monetary Fund (IMF), Bloomberg, CEIC data and others.

5.6 Conclusion

For this chapter is discussed about the impact of the study and summarize the statistics analysis of the study. The main purpose for this research is to determine the factors that affecting the exchange rate volatility in Asian countries with the period of 2007 until 2016. The factors which includes unemployment, consumer price index, foreign direct investment, interest rate and terms of trade. Throughout the research, some independent variables (consumer price index and interest rate) shows positive relationship towards exchange rate whereas some independent variables (unemployment, foreign direct investment and trade) may have negative relationship with exchange rate.

Besides, there are some limitations that being faced throughout this research. There are some recommendations provided for the future researcher to analyze out based on the study.

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APPENDICES

Dependent Variable: ER
Method: Panel Least Squares
Date: 02/18/20 Time: 21:31
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	530.0654	192.9257	2.747511	0.0087
CPI	72.85755	9.717795	7.497334	0.0000
FDI	-2.38E-07	4.86E-08	-4.895181	0.0000
IR	142.2407	73.15956	1.944253	0.0583
T	-67.39544	13.53877	-4.977958	0.0000
C	3016.439	2635.443	1.144566	0.2586

R-squared	0.901067	Mean dependent var	5445.928
Adjusted R-squared	0.889825	S.D. dependent var	7960.209
S.E. of regression	2642.205	Akaike info criterion	18.70878
Sum squared resid	3.07E+08	Schwarz criterion	18.93822
Log likelihood	-461.7195	Hannan-Quinn criter.	18.79616
F-statistic	80.14919	Durbin-Watson stat	0.773992
Prob(F-statistic)	0.000000		

Appendix 1.1: Result of Ordinary Least Square from E-view Output

	ER	UMPT	CPI	FDI	IR	T
Mean	5445.928	4.711920	119.6274	1.42E+10	2.381974	85.38954
Median	50.92125	3.170000	107.0187	9.59E+09	3.340998	53.60618
Maximum	30914.85	13.52000	306.4938	4.45E+10	16.13351	192.4661
Minimum	3.060003	0.489000	63.78633	1.15E+08	-18.12194	37.42134
Std. Dev.	7960.209	3.870532	47.51682	1.22E+10	6.114649	48.43895
Skewness	1.559817	1.004271	2.529462	1.071117	-0.862645	0.584804
Kurtosis	5.060357	2.688771	9.355462	3.176329	4.830981	1.691705
Jarque-Bera	29.11915	8.606470	137.4679	9.625542	13.18566	6.415869
Probability	0.000000	0.013525	0.000000	0.008125	0.001370	0.040440
Sum	272296.4	235.5960	5981.372	7.08E+11	119.0987	4269.477
Sum Sq. Dev.	3.10E+09	734.0700	110634.6	7.31E+21	1832.057	114970.2
Observations	50	50	50	50	50	50

Appendix 1.2: Result of Descriptive Statistics from E-view Output

	UMPT	CPI	FDI	IR	T
UMPT	1.000000	0.421112	-0.417329	-0.286837	-0.546054
CPI	0.421112	1.000000	-0.119206	0.255358	-0.303877
FDI	-0.417329	-0.119206	1.000000	0.232987	-0.315480
IR	-0.286837	0.255358	0.232987	1.000000	-0.026025
T	-0.546054	-0.303877	-0.315480	-0.026025	1.000000

Appendix 1.3: Result of Pair-Wise Correlation from E-view Result

Dependent Variable: UMPT
Method: Panel Least Squares
Date: 02/18/20 Time: 21:33
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	0.017518	0.007040	2.488394	0.0166
FDI	-1.73E-10	2.73E-11	-6.325192	0.0000
IR	-0.146728	0.052126	-2.814849	0.0072
T	-0.052645	0.006917	-7.610575	0.0000
C	9.907502	1.401968	7.066855	0.0000

R-squared	0.744485	Mean dependent var	4.711920
Adjusted R-squared	0.721773	S.D. dependent var	3.870532
S.E. of regression	2.041598	Akaike info criterion	4.359982
Sum squared resid	187.5656	Schwarz criterion	4.551185
Log likelihood	-103.9996	Hannan-Quinn criter.	4.432793
F-statistic	32.77881	Durbin-Watson stat	0.637948
Prob(F-statistic)	0.000000		

Appendix 1.4.1: Result of OLS (Unemployment) from E-view Output

Dependent Variable: CPI
Method: Panel Least Squares
Date: 02/18/20 Time: 21:34
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	6.904623	2.774730	2.488394	0.0166
FDI	1.04E-10	7.46E-10	0.139894	0.8894
IR	3.194016	1.016259	3.142915	0.0030
T	0.021965	0.207659	0.105775	0.9162
C	76.13364	38.80201	1.962106	0.0560

R-squared	0.331800	Mean dependent var	119.6274
Adjusted R-squared	0.272404	S.D. dependent var	47.51682
S.E. of regression	40.53149	Akaike info criterion	10.33667
Sum squared resid	73926.07	Schwarz criterion	10.52788
Log likelihood	-253.4169	Hannan-Quinn criter.	10.40949
F-statistic	5.586264	Durbin-Watson stat	0.412922
Prob(F-statistic)	0.000973		

Appendix 1.4.2: Result of OLS (Consumer Price Index) from E-view Output

Dependent Variable: FDI
Method: Panel Least Squares
Date: 02/18/20 Time: 21:37
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	-2.72E+09	4.30E+08	-6.325192	0.0000
CPI	4167939.	29793528	0.139894	0.8894
IR	-77866693	2.24E+08	-0.347547	0.7298
T	-1.97E+08	29292622	-6.737697	0.0000
C	4.35E+10	4.82E+09	9.031204	0.0000

R-squared	0.595930	Mean dependent var	1.42E+10
Adjusted R-squared	0.560013	S.D. dependent var	1.22E+10
S.E. of regression	8.10E+09	Akaike info criterion	48.56338
Sum squared resid	2.95E+21	Schwarz criterion	48.75458
Log likelihood	-1209.084	Hannan-Quinn criter.	48.63619
F-statistic	16.59172	Durbin-Watson stat	0.828886
Prob(F-statistic)	0.000000		

Appendix 1.4.3: Result of OLS (Consumer Price Index) from E-view Output

Dependent Variable: IR
Method: Panel Least Squares
Date: 02/18/20 Time: 21:38
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	-1.020352	0.362489	-2.814849	0.0072
CPI	0.056355	0.017931	3.142915	0.0030
FDI	-3.44E-11	9.89E-11	-0.347547	0.7298
T	-0.033742	0.027124	-1.243976	0.2199
C	3.816005	5.339809	0.714633	0.4785

R-squared	0.288046	Mean dependent var	2.381974
Adjusted R-squared	0.224761	S.D. dependent var	6.114649
S.E. of regression	5.383804	Akaike info criterion	6.299307
Sum squared resid	1304.340	Schwarz criterion	6.490509
Log likelihood	-152.4827	Hannan-Quinn criter.	6.372118
F-statistic	4.551586	Durbin-Watson stat	1.544073
Prob(F-statistic)	0.003582		

Appendix 1.4.4: Result of OLS (Interest Rate) from E-view Output

Dependent Variable: T
Method: Panel Least Squares
Date: 02/18/20 Time: 21:39
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	-10.68997	1.404620	-7.610575	0.0000
CPI	0.011316	0.106986	0.105775	0.9162
FDI	-2.54E-09	3.78E-10	-6.737697	0.0000
IR	-0.985271	0.792034	-1.243976	0.2199
C	172.7643	13.37043	12.92137	0.0000

R-squared	0.668725	Mean dependent var	85.38954
Adjusted R-squared	0.639278	S.D. dependent var	48.43895
S.E. of regression	29.09249	Akaike info criterion	9.673477
Sum squared resid	38086.80	Schwarz criterion	9.864679
Log likelihood	-236.8369	Hannan-Quinn criter.	9.746288
F-statistic	22.70967	Durbin-Watson stat	0.501583
Prob(F-statistic)	0.000000		

Appendix 1.4.5: Result of OLS (Trade) from E-view Output

Dependent Variable: ER
Method: Panel EGLS (Period random effects)
Date: 02/27/20 Time: 16:44
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	-499.8800	208.8631	-2.393339	0.0215
CPI	85.24712	4.872829	17.49438	0.0000
FDI	-8.57E-08	2.94E-08	-2.912857	0.0058
IR	114.9722	34.53859	3.328803	0.0019
T	16.23111	17.89718	0.906908	0.3699
C	-2844.063	1968.551	-1.444750	0.1563

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	560.4009	0.2253
Idiosyncratic random	1039.242	0.7747

Weighted Statistics

Root MSE	1094.192	R-squared	0.979968
Mean dependent var	5445.928	Adjusted R-squared	0.975461
S.D. dependent var	7809.472	S.E. of regression	1223.343
Sum squared resid	59862771	F-statistic	217.4263
Durbin-Watson stat	0.677763	Prob(F-statistic)	0.000000

Unweighted Statistics

R-squared	0.973610	Mean dependent var	5445.928
Sum squared resid	81937201	Durbin-Watson stat	0.642984

Appendix 1.5: Result of Random-Effect Model (REM) from E-view Output

Dependent Variable: ER
Method: Panel Least Squares
Date: 02/27/20 Time: 16:48
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UMPT	-706.1761	216.4180	-3.263019	0.0027
CPI	100.0899	6.000004	16.68165	0.0000
FDI	-7.42E-08	3.05E-08	-2.433131	0.0209
IR	113.7691	38.11615	2.984800	0.0055
T	-35.45127	21.82370	-1.624438	0.1144
C	605.8903	2149.714	0.281847	0.7799

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

Root MSE	818.3002	R-squared	0.989217
Mean dependent var	5445.928	Adjusted R-squared	0.982955
S.D. dependent var	7960.209	S.E. of regression	1039.242
Akaike info criterion	17.01234	Sum squared resid	33480762
Schwarz criterion	17.73890	Log likelihood	-406.3084
Hannan-Quinn criter.	17.28902	F-statistic	157.9903
Durbin-Watson stat	0.907990	Prob(F-statistic)	0.000000

Appendix 1.6: Result of Fixed-Effect Model (FEM) from E-view Output

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	20.427230	5	0.0010

Period random effects test comparisons:

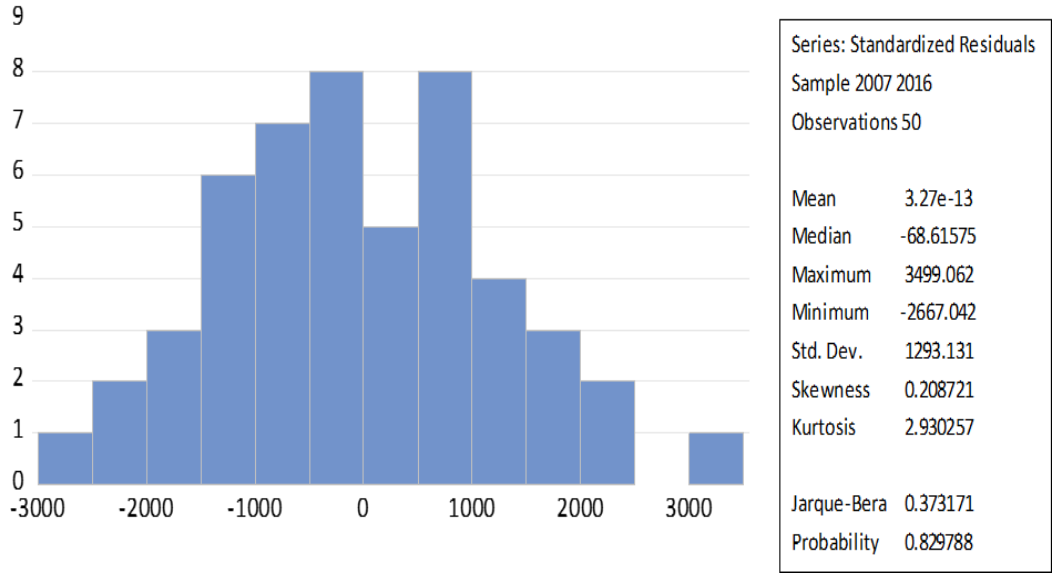
Variable	Fixed	Random	Var(Diff.)	Prob.
UMPT	706.176132	-499.880024	3212.985465	0.0003
CPI	100.089938	85.247125	12.255579	0.0000
FDI	-0.000000	-0.000000	0.000000	0.1533
IR	113.769083	114.972188	259.926163	0.9405
T	-35.451265	16.231106	155.964904	0.0000

Period random effects test equation:
Dependent Variable: ER
Method: Panel Least Squares
Date: 02/27/20 Time: 16:46
Sample: 2007 2016
Periods included: 10
Cross-sections included: 5
Total panel (balanced) observations: 50

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	605.8903	2149.714	0.281847	0.7799
UMPT	-706.1761	216.4180	-3.263019	0.0027
CPI	100.0899	6.000004	16.68165	0.0000
FDI	-7.42E-08	3.05E-08	-2.433131	0.0209
IR	113.7691	38.11615	2.984800	0.0055
T	-35.45127	21.82370	-1.624438	0.1144

Effects Specification

Appendix 1.7: Result of Hausman Test from E-view Result



Appendix 1.8: Normality Histogram Graph from E-view Output