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EXCHANGE RATE DETERMINATIONS: EVIDENCE FROM PARITY AND NON-PARITY METHOD FOR SELECTED ASIAN 6 COUNTRIES

BY

LEE JIA HUI
LIM MOOI MOOI
LOH YAN FANG
TAN LI YI
TAN WEI CHEN

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project 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.

(3) Equal contribution has been made by each group member in completing the research project.

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Name of Student:	Student ID:	Signature:
1. LEE JIA HUI	13ABB07187	_____
2. LIM MOOI MOOI	13ABB07129	_____
3. LOH YAN FANG	13ABB08024	_____
4. TAN LI YI	13ABB08006	_____
5. TAN WEI CHEN	13ABB07673	_____

Date: _____

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LIST OF ABBREVIATIONS

BOP	Balance of Payments
CPI	Consumer Price Index
DEBT	External Debt
ECM	Error Correction Model
EXC	Exchange Rate
FDI	Foreign Direct Investment
FDIIN	Foreign Direct Investment Inflow
FDIOUT	Foreign Direct Investment Outflow
FE	Fixed Effect
FPI	Foreign Portfolio Investment
GDP	Gross Domestic Product
GLS	Generalized Least Squares
IFE	International Fisher Effect
INTR	Interest Rate
LSDV	Least Square Dummy Variable
OLS	Ordinary Least Square
PPP	Purchasing Power Parity
PORTASSET	Portfolio Investment Asset
PORTLIA	Portfolio Investment Liabilities
RE	Random Effect
U.S	United States
TradeB	Trade Balance
VIF	Variance Inflation Factors

ABSTRACT

Exchange rate movement is a concerning issue for consumers, investors, multinational firms and government. In recent, most researchers argued that Purchasing Power Parity (PPP) and International Fisher Effect (IFE) only hold in theory but not the practical tools to forecast the exchange rate movement. However, another group of researchers argued that PPP and IFE hold on determinants of the exchange rate in the one year observations but not three month observations. Therefore, this study provides another point of view on exchange rate determinants by including non-parity variables to show that PPP and IFE still hold in three month observations determination. This study also attempts to narrow down the argument from previous studies. Furthermore, this study used different time interval from quarterly to yearly intervals. The sample data used are quarterly (2010Q1 – 2014Q4 period) and annually (2004 - 2014) data of Asian-6 countries, namely Malaysia, Thailand, Singapore, Philippines, Indonesia and China. A test is conducted on determine whether the model is Pooled OLS model. The major findings showed that parity variables which are interest rate are significant in both three months and one year observations but inflation is only held in the one year observations. Non-parity variables are held as control variables although some of the variables showed insignificant. This study result indicated that only foreign portfolio investment liabilities and external debt are held in both three month and one year observations. Foreign portfolio investment asset, foreign direct investment inflow and balance of payment that show significant only in the one year observations. On the other hand, foreign direct investment outflow show significant only in the three month observations. Future researchers are suggested to use a wider group of countries and include more relevance non-parity variables in the model.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Research Background

Exchange market is the largest trading market in the world. In this market, it involved two parties which are the buyers and sellers include individuals, cooperation, foreign exchange broker, commercial banks and the central bank. Exchange market is necessary to transfer purchasing power between the countries, to get or provides credit for international trade transactions as well as to minimize exposure to the risk of exchange rate changes. In this case, exchange rate acts as one of the most important elements in the exchange market.

Generally, the rate that one nation's currency can be exchanged for another nation's currency is called exchange rate. The four major types of exchange rate systems are fixed exchange rate system, flexible exchange rate system, managed floating rate system and pegged exchange rate system. Fixed exchange rate system is a system in which the exchange rate of the currency is fixed by the government. Next, flexible exchange rate system refers to a system in which forces of demand and supply of different currencies in the foreign exchange market used to determine the exchange rate. Managed floating rate system indicates a system in which foreign exchange rate is affected by demand and supply of the market. In order to influence the currency value, central bank attempt to intervene in the foreign exchange market. Furthermore, pegged exchange rate system refers to a home currency's value which is pegged to a foreign currency or to some unit of account and then moves in line with that currency against other currencies.

Exchange rates are important as it affects the trade balance of a country. Let's take an example. When Ringgit Malaysia depreciates, the price of foreign products will become more expensive compared to the domestic products. As a result, the demand for imported cars will move down while the demand for local cars will move up. On the other hand, the supply of local cars will increase because foreign citizens had higher purchasing power since the value of their currency is growing. In this sense, export is more than import in Malaysia which result in the surplus of trade

balance. For an international trading, the exchange rate is necessary because the exporter may require the importer to make payment in a different currency such as US Dollar or respective country local currency. In order to pay these payments, the business needs to exchange to the respective currency.

Furthermore, countries with a strong government, dynamic economies and stable currencies will tend to attract more foreign capital flow. In order to increase the foreign investment capital, a country needs to have a relatively stable currency. Otherwise, the depreciation of domestic currency will discourage the investment by foreign investor as they expect losses will be incurred. Capital flow consists of foreign direct investment (FDI) and foreign portfolio investment (FPI). FDI is foreign investors who take stakes in the existing companies or build new facilities overseas while FPI is foreign investors who invest in overseas securities. In government's perspective, FDI is more favorable compared to FPI as investors involved in FPI are mainly focused on the three month observations profit. Thus, FPI is considered as "hot money" due to investors will probably pull out their capital when there is a bad news arose which may bring negative impact to domestic currency's value.

Besides, the company's earnings are significantly affected by the exchange rate movements. The major changes in the profitability level of multinational corporations would be clearly shown because foreign exchange rates may lead to the appreciation of the home currency. The fluctuation of foreign exchange rate may affect the local companies' production costs, or lost their capability to compete in the international market since they cannot export their goods to other countries at competitive prices.

Previously, there are also some researchers discussed whether exchange rate could be forecast by investigation of the economic variables in both three month and one year observations because both three month and one year observations will reflect different response on the exchange rate. However, there are a lot of results shown that some economic variable could not forecast exchange rate in the three month observations, especially parity variables. Previous researchers stated that Purchasing Power Parity (PPP) and International Fisher Effect (IFE) could only

hold the parity variable in the one year observations but not three month observations. Some of the studies stated the reason of it does not forecast exchange rate in the three month observations is due to the sticky price. Somehow there are also other researchers discussed that PPP and IFE affect exchange rate only in theoretical but not in practically. The purpose of this study is to show that the importance of adding in non-parity variables into the determination of exchange rate to investigate whether PPP and IFE affect exchange rate in both one year and three month observations.

This study mainly focuses on six trade-linked countries. These countries are China, Indonesia, Malaysia, Philippines, Singapore and Thailand. The reason is because these are developing and developed country that involves in a high volume of import activity as well as export activity. In order to complete trading and transaction among countries, exchange market plays an important role. Exchange market plays a major role Exchange rate act as an element that will affect the exchange market, its high volatilities may bring a lot of impact on these countries such as income or cost for the international trading transaction, the living standards of people and the competitiveness of country across the world.

It is important to include trade-linked countries into the model because the trade decision of one country to another is directly affected by the fluctuation of exchange rate. It was being ignored by earlier researchers about trade linkages which may impact the result accuracy. Therefore, trade-linked countries could take into consideration in this study in order to have more accurate and integrity model to investigate exchange rate.

The final result of this study will mainly use to improve the argument between previous researches. Some of the studies stated that the PPP and IFE only hold in theoretically but not practically to forecast exchange rate movement while some of the researchers said that PPP and IFE could only hold in the one year observations but not three month observations. This study also shows the importance of non-parity variables as a practical tool to improve the integrity of the model in the determination of exchange rate.

1.1 Problem Statement

There are a lot of researchers had investigated the determinant of exchange rate in three month and one year observations separately. It is not an integrity investigation since both three month and one year observations effect could bring a very different impact on exchange rate. Either one of them cannot be ignored. It is important for the policy maker and government to implement the best strategy and to do the better control on exchange rate by understanding the effect of variables on the exchange rate in both three month and one year observations.

Previously, a group of the researchers argued that PPP and IFE can only hold in theoretical but not practical in forecasting the exchange rate movement. Haidar (2011) stated that there was evidence showed that PPP cannot hold in either short or long run.

However, previous results showed parity factors which are inflation and interest rate are insignificant to the exchange rate movement over the three month observations. The researchers found out that it is due to the PPP and sticky price. Taylor and Taylor (2004) stated that although PPP seems to hold more closely for countries experiencing relatively high inflation, but it cannot hold perfectly and continuously in the three month observations. Moreover, Shiller and Taylor (as cited in Al-Zyoud, 2015) stated that there are well-known problems with the applicability of PPP theory over short time period. According to Saeed, Awan, Sial and Sher (2012), in carrying a negative sign as stated from the sticky price monetary model, interest rate and the determination of exchange rate do not have a significant relationship in the three month observations. Ho and Ariff (2009) also suggested that the variables in the short-run are insignificant due to the sticky prices. In addition, Kia (2013) stated that interest rate has an insignificantly negative impact on the real exchange rate over short run.

However, there are some arguments by several researchers where another group of researchers found that parity factors are significant in the result of determining the exchange rate movement in the three month observations. Ho and Ariff (2014) concluded that there is support for short effects on exchange rates in the three month observations from inflation and interest rates by a new approach.

The purpose of this study is to provide another point of view on exchange rate determinants by including non-parity variables to show that the PPP and IFE will still hold in both one year and three month observations. Since a lot of the earlier researchers have not success to prove that IFE and PPP have an immediate impact on the exchange rate in either one year observations or three month observations. The non-parity variables that add into are foreign portfolio investment asset, foreign portfolio investment liabilities, foreign direct investment inflow, foreign direct investment outflow, balance of payment, trade balance and external debt. These non-parity variables are fluctuating daily which has the impact on the supply and demand of money could bring the immediate effect on the exchange rate. The increase of non-parity variables in the three month observations could bring either positive or negative impact on exchange rate immediately.

1.2 Research Objective

The general objective in this study is to investigate the determinants of foreign exchange rate in three month and one year observations.

1.2.1 Specific Objective

1. To specify whether Purchasing Power Parity (PPP) and International Fisher Effect (IFE) would affect foreign exchange rate movement in both three month and one year observations.

2. To prove that non-parity variables should be included to forecast exchange rate in both three month and one year observations to improve the accuracy of the research result.

1.3 Significance of Study

This study is used to improve the study of previous researchers on the argument on the determinants of exchange rate. Some researchers suggested that PPP and IFE only hold in theory but not realistic somehow other researchers suggested that PPP and IFE could hold in the one year observations but not the three month observations. The researchers failed to explain the movement of exchange rate by using parity variables because they focus on testing the theory which had did not consider the other potential non-parity factors. However, there are some researchers successfully stated that PPP and IFE hold in both one year and three month observations. So, this study attempt to reduce these gap by including potential non-parity variables together with the parity variables to prove that PPP and IFE could hold in the three month and one year observations.

1.4 Conclusion

This chapter clearly explains the definition of exchange rate, motives of the exchange rate and the contribution of the exchange rate. Besides that, the variables of this study and the research objectives have also been explained. The significance of this study has also been stated in this chapter. The next section divided into three part to discuss the review of previous literature on exchange rate, inflation and interest rate.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Previous researches that related to the determinants of exchange rate will be discuss to have a better understanding about the characteristic of exchange rate, inflation rate, interest rate, foreign portfolio investment asset, foreign portfolio investment liabilities, foreign direct investment inflow, foreign direct investment outflow, external debt, balance of payment and trade balance. Lastly, new proposed framework for this study is formulated by the assists of previous researches models.

2.1 Review of Literature

2.1.1 Exchange Rate

A country's currency rate which used to exchange for another country's currency is known as exchange rate. Exchange rate systems can be categorized into four types which are managed floating rate system, pegged exchange rate system, fixed exchange rate system and flexible exchange rate system. Based on study by Rodriguez (2016), the decision in determine the exchange rate regime include the economic, political and institutional factors. Bergvall (2005) made an investigation on the exchange rate regime for macroeconomic stability in Sweden. The researcher found that the actual exchange rate regime is similar with the hypothetical floating exchange rate regime which also indicate that under floating exchange rate regime, real exchange rate is able to stabilize the output. A decision on the selection of exchange rate regime is an important consideration for a country as the decision will affect the economy of a country.

Exchange rate is important because it will determine the volume of import and export. When the value of home currency increase against foreign

currency, the imported products' price would drop in the local country and those domestic companies would find that customers more interested in foreign competitor's goods. A strong currency will increase the price of goods in the international market and causes the lost in competitiveness (Urrutia, Olfindo & Tampis, 2015). Generally, countries that have stable politic and economies and strong currencies will have more foreign capital inflow. A stable currency is necessary for a country to pull in foreign investment capital. Otherwise, devaluation of currency will result in the expectation of exchange losses which may distract the investment from foreign investors. There are two type of capital flow which are foreign direct investment and foreign portfolio investment. FDI is more preferable by government compared to FPI because FPI are generally known as "hot money" which may harm the nation when the process is not going well. This situation is known as "capital flight" which is triggered by the adverse event like expected depreciation of the currency (Marcovici, 2013). Furthermore, the earning of a company will influenced by the fluctuation of the exchange rate. Foreign exchange rate will increase the value of the home currency and cause the profitability of multinational corporations to change substantially. However, the fluctuation of exchange will also bring an impact toward domestic companies because it will significantly change their material costs. It may determine the price of goods sold in overseas by local business.

On the other hand, according to Kurihara (2012), exchange rates are influenced by various macroeconomic factors. From the research, it stated exchange rate movement will be taken into consideration in conducting monetary policies. Money supplies and interest rate are the critical factors that affect exchange rate volatility. Besides, Yu (2006) stated that inflation also has a significant impact towards the movement of real effective exchange rate. According to the research done by Ho and Ariff (2014), portfolio inflow, portfolio outflow, foreign direct investment inflow, foreign direct investment outflow, balance of payment, trade balance and external debt are the control variables that determine the exchange rate movements.

2.1.2 Inflation

Inflation is the rate of increase in prices for goods and services. The value of a nation's currency and the foreign exchange rate which the nation has with the currencies of other country is significantly affected by the inflation rate. Thaddeus, B and Ebiringa (2014) had undergone a study to evaluate the relationship between exchange rate, interest rate and inflation in both short run and long run in Nigeria. The results indicated that exchange rate and inflation variables were revealed as important proxies for explaining variations in exchange rate levels in Nigeria.

Some arguments are showing that there is unidirectional between inflation and exchange rate. The results from the study of Lado (2015) revealed that there had been a unidirectional link running from exchange rate to consumer price index (CPI) which used to measure inflation in the country. This result means that the exchange rate has the information about changes in CPI in the country but not the other way round. Moreover, Madesha, Chidoko and Zivanomoyo (2013) had investigated the causal relationship between inflation and exchange rate using annual data in Zimbabwe. Although their empirical analysis does not support that exchange rate has a significant impact on inflation, but the results confirmed a unidirectional causality between inflation and exchange rate. Another study from Inyiama and Ekwe (2014) stated that the rising of exchange rate would rise the inflation and in the same direction just when other macroeconomic indices deepens.

Purchasing power parity commonly used in global to compare the expenditure and income level in different nations. PPP is developed by Cassel (1918). It is determined based on its relative cost of living and inflation rates in each of the countries. PPP assumes that the common goods and service would be ensured identical prices across the countries in the world under the law of one price theory. The law of one price relates to exchange rate to the price of individual goods in different countries. However, the law of one price cannot hold in a certain case. This is due to the transportation cost that moved the products internationally had limited

the possible revenue by the buy and sell the same products at a different price. Moreover, tariffs and other impediments drive a wedge between the same products price to trade potentially in a different country (Hakkio, 1992).

Absolute PPP expands the law of one price to general price levels. Under absolute PPP, the price of the goods and services supposed to be the same in every country when measuring in the common currency. Absolute PPP should also hold in the case of the law of one price holds and price index in different countries construct in the same way. Absolute PPP may use to measure exchange rate where it equate the overall price level ratio in two countries. However, absolute PPP failed to appeal as one of the theory of exchange rate because the law of one price cannot hold in all the time and price level in different nations are computed using distinct year based imperfect price index. According to the studies from Al-Zyoud (2015) shows that the observed exchange rate do not has any long term relationship with the PPP rate, and the result shows absolute PPP does not hold. According to Hakkio (1992), PPP could explain the actual exchange rate significantly but the study shows that PPP does not hold exactly. Relative PPP has shown as a more preferably measurement of exchange rate where it predicates that the changes of exchange rate is depend on the different in inflation rate. Under relative PPP, the currency's exchange value inclines to fall or rise at a rate equal to the different between domestic and foreign inflation rate. Since the absolute PPP holds, the relative PPP will also hold, the relative PPP follows completely from absolute PPP. However, the relative PPP may hold even if the absolute PPP does not hold. Hakkio (1992) suggested that most economists prefer to use relative PPP instead of absolute PPP in their studies since relative PPP is more probably to hold.

There are some academic and business economists use the concept of PPP to predict the foreign exchange value of a dollar as PPP is also a measure of dollar equilibrium's value. But Haidar (2011) stated that there was evidence showed that PPP does not hold in either short or long run. The reason of price differential does not relate to the currency value. Suppose PPP theory has followed the law of one price; however the result shows that although

in the same country, the price of Big Mac sandwich in U.S. is not consistent. One of the reason is exchange rate change quickly by respond to the exactly new information and macroeconomic factor but price do not. Also, the study of Zubaidi and Ariff (1997) showed that the PPP condition for Malaysia was rejected.

According to Alba and Papell (2005), a lot of researchers stated that PPP expected to hold only in the long run but not short run. The short run analysis naturally ignores by the researcher. Sarno and Taylor (2002) assert that in the earlier relevant literature, as to differentiate between the effects of short term and long term, the researchers did not introduce in such a way which carry on dynamics in the estimated equation, even if it was admitted by researchers which PPP is only expected to hold in the long run. According to Hakkio (1992), the exchange rate fluctuates minute by minute in the financial market but the price levels, in contrast, are sticky and adjust slowly. This different rise the deviation from PPP and PPP cannot hold in the short run. Jayaraman and Chong (2014) also ignore the short run effect in the study as both the researchers note that deviations from PPP occur in the short-run. Thus, the finding is that the theory is valid only in the long run. Same as the study of Hock (2013), the researcher only used annual data to investigate whether the variables are significant in determining the exchange rate. There is still lack of research on the investigation of the parity and non-parity variables in determining the exchange rate in three month observations based on quarterly data. According to the studies of Ocal (2013) showed that PPP does not holds in Romania for the period of 1991-2012. The studies used the Zivot-Andrews test to examine whether PPP hold in Romania for a long time by taking a structural break into account. Zheng (2014) had carried out the studies on whether PPP holds for the German-US real exchange rate. The result showed that during the period examined, PPP does not hold exactly. However, even though the rate wanders away over time, the real exchange rate is relatively stable during a short period.

However, most of those issues had been solved by Ho and Ariff (2014). He stated that the PPP could be held in both short and long run in determination of exchange rate. Most of the other study shows three month observations

PPP do not hold due to the missing elements of non-parity variable to the exchange rate determination. To have a better determination of exchange rate, the both three months and one year observation and parity & non-parity variable should take into account. In addition, according to the studies from Alba and Papell (2005), the research result found out that PPP could hold stronger with the nations that have lower inflation rate, are more open to trade and are closer to the United States. Besides that, PPP could also hold strongly for nations that have moderate nominal exchange rate volatility and have the per capita real GDP's growth rates which is similar to the United States.

2.1.3 Interest Rate

Interest rate is the important economic indicator which measures how stable of the economy of the country is. It is also one of the most vital factors of the foreign exchange market. Generally, countries' central bank fix interest rate as a policy strategy to manage the economy in order to promote economy growth and curb inflation. The interest rate that set by the central bank is called basic interest rate. When the commercial bank borrows money from the central bank, the commercial bank has to pay the basic interest rate to the central bank. At the same time, the commercial bank lends money to the consumers and other bank in the form of loans which they are required to pay the cost of borrowing with the minimum base interest to the commercial bank. It means that the changes of base interest rate set by the central bank will directly impact the commercial bank and consumer.

When central bank increases the interest rate, the cost of borrowing increase, the consumer has to pay higher interest rate on their mortgage. This causes the expenditure of the consumer on goods and service decrease. The demand for the products and services decrease will force the manufacturer to reduce the prices of goods to equilibrium with the demand from consumers. Therefore, the rises in the interest rate would curve the economy by decrease the demand for the products and services which will reduce inflation rate.

However, when the economy is not doing so well, the central bank will decrease the interest rate. It will lead to the consumer pay less interest on their mortgage and has more money to pay for their needs and wants, for example, a luxury car. The increase in the demand for goods and services could increase production. Therefore, the decrease in the interest rate could help to stimulate overall economy.

In addition, when one country has higher interest rate compared to another country, the investors of the country with lower interest rate will invest their money in those country that has a higher interest rate. This is because higher interest rate indicates a strong economy the country has. To invest into the strong country to gain a higher return, the country with lower interest rate needs to exchange their currency at a higher rate. It had led to an appreciation of currency of the country with higher interest rate. Therefore, higher interest rate increases the demand for a country' currency and it appreciates in value.

Interest rate is an important variable on the determinant of the exchange rate. There are a lot of previous studies examine how changes in interest rate could bring impact to the exchange rate. According to Dekle, Hsiao and Wang (2002), the impact of interest rate on exchange rate could either negatively or positively. It depends on the traditional views or revisionist view applied. In the traditional view, the higher real interest rate in a country would attract the foreign investor to invest in the financial asset, increase the demand for the local currency and lead to the appreciation of local currency. There is a contrast that argued by the revisionist view which a higher interest rate a country could reduce the demand for local currency, cause the currency to be depreciated. It claims that it is due to the weaker financial position, high default probability and high exchange rate risk premium.

Shalishali and Ho (2002) had conducted a test of International Fisher Effect (IFE) theory which stated that a country's currency with a comparatively higher interest rate would depreciate. This is because the high nominal interest rates reflected the expected inflation. And the results showed that

the inflation is not the only one to affect the determination of exchange rate. Furthermore, Asari, Baharuddin, Jusoh, Mohamad, Shamsudin and Jusoff (2011) stated that by using Granger-cause test, the result shows the interest rate is affected by inflation rate. Concurrently, result from Granger-cause test also shows that the interest rate will influences the exchange rate.

The researchers are using the International Fisher Effect to test the impact of interest rate on the exchange rate. International Fisher Effect is an exchange rate model designed to predict and understand present and future spot currency price movement. It indicates that value of country's currency will decrease when the interest rate is relatively high. This is because high nominal interest rate tends to have a high inflation rate (Shalishali, 2012).

International Fisher Effect theory which developed by Fisher (1930) is used as this research theoretical basis. The movement of the exchange rate is measured by the domestic ratio to foreign interest rate.

$$\frac{E_{t+1}}{Et} = \left(\frac{1+i_t^d}{1+i_t^f} \right)$$ ----------Model 1

The model 1 presented the equation of IFE where Et is the exchange rate, i^d indicate as the domestic interest rate while i^f is the foreign interest rate. According to the equation, IFE suggested that the difference between domestic and foreign countries can forecast the future spot exchange rate (Alizadeh, Nassir & Masoudi, 2014).

IFE theory states that the value in percentage of interest rate differential should be equivalent to the value in the percentage of change in exchange rate (Mionel, 2012). However, Ahmad (2010) tested the relationship between inflation rates and interest rates in long run for four developing countries and two oil-producing countries. The study concluded that most of the countries do not hold IFE in strict form. Yaya (2015) selected ten African countries to test for the justifiability Fisher effect in the long run. They used unit root and co-integration tests and annual data to conduct the studies. The result shows that there is no evidence of relationship between inflation rate and nominal interest rates in the long run. According to Yaya

(2015), the reason behind might be due to the rise in inflation will lead to decline in real money balance and it result in decline in wealth leads to increase savings bringing downward pressure on interest rate.

According to the Ho and Ariff (2014), the exchange rate markets expect interest differences hence these differences able to offset the fluctuation in the exchange rate in the long run has been proven. The empirical investigation conducted by Obi, Nurudeen and Wafure (2009), the result showed that nominal interest rate has a long run Fisher Effect in Nigeria.

A strong IFE indicated that a significant relationship between the level of inflation and interest rate. The changes in interest rate are related to changes in expected inflation. However, an empirical evidence found that there was rejecting the short run IFE (Mishkin, 1992). Based on the empirical studies conducted by Shalishali (2012), it is not appropriate to use IFE to predict the movement of currency in short run. Exchange rate is not primarily determine alone by inflation but also have to include other psychological factors. Edirisinghe1, Sivarajasingham and Nigel (2015) have conducted a study to investigate the IFE in short run and long run in Sri Lanka. They used Error Correction Model (ECM) as their studies technique and they found that there is a significant relationship between nominal interest rate and expected inflation. However, in short run, these variables have an insignificant relationship. Puci and Mansaku (2016) tested the validity of International Fisher Effect for currencies of US and China in long run using Engle - Granger and Johansen co-integration techniques and monthly data from 2002 – 2014. The outcome proved that IFE cannot predict the exchange rate movement in the short run. Another study by Koustasa and Serletis (1999) stated that the quarterly data used in determining the relationship between inflation and short-term interest rate are not supported the IFE. On the other hand, since the short term interest rate is linked with insignificant vary in expected inflation, the monthly data showed no existence of the IFE (Fahmy & Kandil, 2003). Besides that, IFE is not supported in a journal which took a quarterly data on short run inflation rate and interest rate collected from Singapore, Japan, Australia and Malaysia. This refers to interest rate do not react to changes in expected inflation rate

(Hatemi & Irandoust, 2008). A study regarding the investigation on IFE in the United States, The Unites Kingdom, Japan, Germany and Canada is taken by Yuhn (1995). According to the results, it showed that only Germany is significant in the short run, however, the other four countries showed IFE is insignificant in short run. The cause is that the nominal interest rate in Germany has strongly reflect changes in expected inflation rather than real interest rate. In the case that nominal and real interest rate is not close linked, the variables cannot hold.

The three month observations impact of interest rate is an important variable on exchange rate. The three month observations interest rate should be used to investigate in order to understand the immediate effect on the exchange rate. Hsing (2015) and Khan (2014) stated that interest rate plays a significant role in exchange rate movements in short run. According to Kia (2013), the study showed an adverse effect on the growth of exchange rate in the short run. In contrast, Dekle, Hsiao and Wang (2002) conclude that the consequence increase of interest rate is positively stabilizing the exchange rate at least in the short run. Besides, Andrea and Rodrigo (2015) stated that a contrasting of the International Fisher effect with monthly temporality in variables was conducted as the exchange rate is a very volatile variable. However, Wallace (2012) had conducted a study by using the monthly data and nonlinear least squares from the period from January 1934 to May 2011 to study the nonlinear Fisher relationship in US economy. The result indicates that the presence of the Fisher effect which supported by the stationary of US real interest rate by using the data on actual inflation rate and three-month Treasury bills rate. International Fisher Effect (IFE) stated that relative interest rate differences would cause the fluctuation in exchange rate.

There are researchers concluded that both one year and three month observations investigations are vital for the policy maker to do a better implementation, either one could not be ignored. The rises in interest rates will attract foreign trading into the country. Thus, it will increase the monetary investment flows. As a result, the currency will appreciate in short run and it should depreciate in long run to move back to equilibrium level

(Ho & Ariff, 2014). In contrast, the difference between real interest rate and nominal interest rate does not determine the value of expected inflation rate of the country. Therefore, researchers can retort the theory of IFE. The limitation of IFE may cause difficulty in applying the IFE in practice. Limitation include difference between real interest rate and nominal interest rate in every country is empirically proved that it does not measure expected inflation country (Alizadeh, Nassir & Masoudi, 2014).

2.2 Conclusion

Overall of this chapter is discussing the types of the exchange rate, the importance of understanding the factors affect exchange rate and two theories which are Purchasing Power Parity (PPP) and International Fisher Effect (IFE). PPP theory is used to explain the inflation rate whereas IFE theory is used to explain the interest rate. Two groups of researchers argued whether PPP holds in both three month and one year observations in determining the exchange rate. But then, there is also different views by researchers to accept that IFE to hold in both the three month and one year observations in this study. The following chapter will proceed with the data description, econometric model and econometric method.

CHAPTER 3: METHODOLOGY

3.0 Introduction

There are three parts in this chapter which describe the methodology applied in this study, developed an economic model and discussed the econometric model. This chapter discussed the test that had been used to determine whether the parity variables and the non-parity variables would affect exchange rate in both three month and one year observations. In this study, panel data will be employed to analyze the determinants of exchange rate. Panel data model can be divided into three models which are pooled OLS model, fixed effect model and random effect model. Three of the models capture different effects. Pooled OLS model does not consider individual specific effect and time effect. For fixed effect model it assumes that differences in intercept parameter captures all individual differences. Fixed effect model consider individual effect then random effect model assumes that all individual differences are captured by the intercept parameters but individual differences treated as random rather than fixed. Random effect model consider time effect and Breusch and Pagan LM test used to verify whether the model in this study is pooled OLS model or random effect model. On the other hand, fixed effect model and random effect model are tested by using Hausman specification test.

3.1 Data Description

The exchange rate used in this study is US dollar rate against all the respective countries. All the foreign units were measured at the end observation periods but not as averages. The International Financial Statistics (IFS) data source from International Monetary Fund and Bloomberg database are the major source of these data. Data and statistic from all the respective countries' Central Bank and Department of Statistic also one of the data source for this study. Six trade linked countries namely China, Indonesia, Malaysia, Philippines, Singapore, and Thailand

have included in this study. Furthermore, this study used different time interval from quarterly to yearly intervals. The sample period is from the year 2004 to 2014 with 594 annual data period and from year 2010 to 2014 with 1080 quarterly data period. In order to enable the test to be extended from three months observations to one year observations, the data series had been grouped using quarterly data series and annually series. There was total of 1080 quarterly data in these six countries from 2010 quarter 1 to 2014 quarter 4.

3.2 Econometric Model

The model for estimation in this study is proposed by Ho and Ariff (2014):

$$\ln EXC_{it} = C_{it} + \beta_1 \text{In}\left(\frac{CPI}{CPI*}\right)_{it} + \beta_2\left(\frac{INTR}{INTR*}\right)_{it} + \beta_3\left(\frac{TradeB}{GDP}\right)_{it} + \beta_4\left(\frac{BOP}{GDP}\right)_{it}$$
$$+ \beta_5\left(\frac{FDIIN}{GDP}\right)_{it} + \beta_6\left(\frac{FDIOUT}{GDP}\right)_{it} + \beta_7\left(\frac{PORTLIA}{GDP}\right)_{it} + \beta_8\left(\frac{PORTASSET}{GDP}\right)_{it}$$
$$+ \beta_9 \text{In}\left(\frac{DEBT}{GDP}\right)_{it} + u_{it} \quad \text{---------- Model 2}$$

Where *i* denotes as country, *t* denotes as time periods in the sample. C denotes as intercept whereas *u* denotes as an error term. InEXC represents the log difference of exchange rate over time periods in the direct quote. InCPI is the log difference of prices over time periods in the direct quote, where domestic consumer price index (CPI) divided by US consumer price index (CPI*). INTR is the interest rate present in the direct quote, where domestic interest rate (INTR) divided by US interest rate (INTR*) and GDP is gross domestic product. TradeB is the trade balance which derived from the export minus import and BOP is balance of payment. FDIIN and FDIOUT are the inflows of foreign direct investment and outflows of foreign direct investment respectively whereas PORTASSET and PORTLIA are the foreign portfolio investment asset and foreign portfolio investment liabilities respectively. DEBT is the external debt which also known as international debt. Regime represents as exchange regime. Log transformation is used as it could lessen the unnecessary variances in data which may give an error results.

3.3 Econometric Method

This study used panel data to analyze the determinants of exchange rate. Pooled OLS model, fixed effect (FE) model and random effect (RE) model are included in the panel data.

3.3.1 Panel Data Analysis

Panel data analysis examines time effects, individual specific effects or both in order to control the individual effect or the heterogeneity that may or may not be observed (Gujarati & Porter, 2009). It becomes more popular to be used as longitudinal data analysis among recent researchers. In this study, it is used to determine the exchange rate affected by the parity and non-parity factors. It was chosen as combining both time-series and cross-sectional data, and the resulting estimates could robust. The deficiencies can be solved by permitting cross-sectional variation or heterogeneity to affect parameter estimation (Ho & Ariff, 2014). According to Baltagi's research (as cited in Hussin & Saidin, 2012), there are few benefits in using panel data. Panel data could enhance the analysis by taking cross-sectional heterogeneity explicitly for every micro unit. Furthermore, collinearity problem could be reduced and it is simple in determining and measuring effects. There is three model used in panel data which are pooled OLS model, fixed effect (FE) model and random effect (RE) model.

3.3.2 Pooled OLS Model

Pooled OLS model suggested joint estimation procedure is better than separates least squares estimation with the assumption that error term across the equations with same period are correlated.

$COV(e_{IND,t}, e_{MSIA,t}, e_{PHIL,t}, e_{SG,t}, e_{THAI,t}, e_{CN,t}) = \sigma_{IND,MSIA,PHIL,SG,THAI,CN}$

where t = years

This type of correlation is known as contemporaneous correlation. The reason of why $e_{IND,t}$, $e_{MSIA,t}$, $e_{PHIL,t}$, $e_{SG,t}$, $e_{THAI,t}$, $e_{CN,t}$ are correlated is because these errors contain the influence on the exchange rate that has been omitted from the equation. Such factors include inflation, interest rate, trade balance, balance of payment, external debt, foreign direct investment inflows, foreign direct investment outflows, foreign portfolio investment asset and foreign portfolio investment liabilities. It is likely that the effects of the omitted factors on exchange rate are same among these countries, since the selected six countries are about the same in many respects. The contemporaneous assumption has the effects of extra information that not included in the separate least square estimation.

Pooled OLS model estimation is a generalized least squares estimation procedure which used to enhance the precision of the dummy variable model. In order to implement the pooled OLS model estimation procedure, we must first estimate each of the unknown variances and the contemporaneous covariance.

Econometric software includes commands for pooled OLS model that carry out the following steps:

1. Use least squares to estimate the equations separately.
2. Determine $\sigma^2_{IND,}$ $\sigma^2_{MSIA,}$ $\sigma^2_{PHIL,}$ $\sigma^2_{SG,}$ σ^2_{THAI}, σ^2_{CN} and $\sigma_{IND,MSIA,PHIL,SG,THAI,CN}$ by using the least squares residual from step one.
3. Estimate the two equations jointly within the generalized least squares framework by using the estimate from step two.

Since pooled OLS model technique is more precise than the least square estimation procedure, since it utilizes the information on the correlation between the error terms. This is because the standard errors of the pooled OLS model estimate are lower than least square estimates. When making judgement regarding exactness on the basis of standard error which are

themselves estimate in any one sample, it is possible for a standard error for pooled OLS model to be greater than a corresponding least squares standard error even when pooled OLS model is a better estimator than least square (Hill, Griffiths & Lim, 2007).

3.3.3 Fixed Effect Model

Fixed effect model refers to a method for pooling time-series and cross-section data. It assumes that the intercept parameter differential captured the differences of individual. Besides that, it examines if intercepts change across group or time periods. It is useful as it could include an intercept dummy variable for every country. Besides that, it could insert with any number of individual, cross-sectional observations. One of the advantages of fixed effect model is it allowed us to hold constant individual country-specific differences, which enable us to concentrate on the marginal consequences of the included independent variables (Hill, Griffiths & Lim, 2007). It provides a stronger foundation by removing time-invariant origin of errors (Gunasekara, Richardson, Carter & Blakely, 2013).

Fixed effects model assumed that there is a correlation between unobservable individual specific effects and exchange rate determinants. It assumes same slope and constant variance, for all individuals and in all time periods (Fitrianto & Musakkal, 2016). It is estimated by least square dummy variable (LSDV) regression when the individual is small and by within effect estimation methods when the individual is large. LSDV permit for heterogeneity among subjects. The model consists of an overall constant term, five dummy variables should be included since there are six countries in this study to avoid falling into dummy variable trap. A dummy variable should not be specified for one country as it will treat the intercept as the base country. On the other hand, within effect estimation method is the transformation of each variable by subtracting the individual mean. Ordinary least square is used to measure the data (Stock & Watson, 2006).

According to Gujarati and Porter (2009), in macroeconomics panel the number of observations is different for each individual is leading to an unbalanced panel. The fixed effect model is unable to include variables that are constant for each individual across time. According to the studied by Bollen and Brand (2010), Hausman tests is apparently used to support fixed effect model.

3.3.4 Random Effect Model

In statistics, random effect model refers to a type of hierarchical linear model that used to assume that the dataset being analyzed consists of a hierarchy of different populations whose differences relate to that hierarchy. It assumes that intercept parameters used to capture the all individual difference. However, the individual in research sample was selected randomly, therefore as fixed effects dummy variable model has been done, the individual differences treated as random effect model rather than fixed effect model. The advantage of random effect model is there are fewer estimators in random effect model compared to the fixed effects model and able for the independent variable that shares the same value for all the observations from the same group. The main disadvantage of this method is if the unobservable individual effects are correlated with the exchange rate determinants will lead to biased and inconsistent estimators

The random effects model has zero expectation and a constant variance. This is because a particular type of serial correlation which the errors for every cross-sectional unit are inter-correlated with correlation. Under this assumption, the least squares estimator is unbiased and consistent, but it does not have minimum variance. The usual least squares standard errors are incorrect also. A generalization of White's heteroscedasticity correction can applied to "clusters" of observations, which are the groups of T observations on each individual. Cluster corrected standard errors allow for any type of heteroscedasticity across individuals and general inter-correlation among the observation on the individual. The minimum variance

estimator for the random effects model is known as the generalized least squares (GLS) estimator. When there is heteroscedasticity or autocorrelation problem, by applying least squares to a transformed model the GLS estimator can be obtained in the random effects model (Hill, Griffiths & Lim, 2007).

3.3.5 Breusch and Pagan LM Test

This test is used to test the random effect model against the Pooled OLS model. It tests the null hypothesis that σ_{ϵ}^2=0, which indicate that OLS is applicable when the individual effects do not exist. For example, if the variance of the individual effect is zero, the random effect model reduces to the Pooled OLS model (Gujarati & Porter, 2009).

3.3.6 Hausman Specification Test

This test is used to differentiate between fixed effects model and random effects model in panel data. Due to high efficiency, random effects model is null hypothesis, while fixed effects model is at least consistent and thus preferred under the alternative hypothesis (Gujarati & Porter, 2009).

3.4 Conclusion

In this chapter, the econometric model has developed and data collected from various sources had processed by using Stata to detect the significance of independent variables, whether the model is normality, the absence of multicollinearity problem, homoscedasticity, autocorrelation and Pooled OLS model or random effect model. The following chapter will proceed with the interpretation and discussion of the results.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

The highlight of chapter four is the analysis of the data on exchange rate of six selected countries in the three month and one year observations. Variance Inflation Factors (VIF) is used to detect the existence of multicollinearity while white's test is used to test heteroscedasticity problem. Besides, the test on whether the model's error term is normally distributed is conducted by using Jarque-Bera test. The autocorrelation is tested by Wooldridge test. In chapter three, Breusch and Pagan LM test is examined for the purpose of detecting whether Pooled OLS model is more suitable or random effect model is more appropriate. According to study's statistical result, Pooled OLS is found to be more appropriate in this study. The impact of independent variables on the exchange rate is shown. There are two main parts which are interpretation and major findings of the results that obtain from Stata software.

4.1 Interpretation of Result

Table 4.1: The Summary of Test on Panel Data (Annually)

Independent variable	Pooled OLS	Random Effect
CONSTANT	5.533***	5.533***
LNCPI	-8.360**	-8.360**
INTR	0.044***	0.044***
PORTASSET	-0.596**	-0.596**
PORTLIA	-2.031**	-2.031**
FDIIN	6.220*	6.220*
FDIOUT	0.115	0.115
LNDEBT	1.798***	1.798***
BOP	-7.683***	-7.683***
TRADEB	1.835	1.835
Sigma_e	-	1.489
R-square	0.732	0.732
F-statistic	17.01***	40.24***
Multicollinearity	8.870	7.982
Heteroscedasticity	64.000	72.520
Normality	2.528	2.034
Autocorrelation	4.167	6.247
Breusch and Pagan LM test	1.000	1.000

Note:

*, ** and *** represent statistical significance at 10%, 5% and 1% level. Variance Inflation Factors (VIF) is used to reflect the presence of multicollinearity. The null hypothesis is no multicollinearity. White's test is used to detect heteroscedasticity problem, and the null hypothesis is homoscedasticity. Jarque-Bera test is used to detect the normality, and the null hypothesis is not normally distributed. Wooldridge test is used to detect the autocorrelation, and the null hypothesis is no autocorrelation problem. For the Breusch and Pagan LM test, the null hypothesis is Pooled OLS Model.

Table 4.2: The Summary of Test on Panel Data (Quarterly)

Independent variable	Pooled OLS	Random Effect
CONSTANT	-1.805***	-1.805***
LNCPI	1.904	1.904
INTR	0.188***	0.188***
PORTASSET	0.335	0.335
PORTLIA	-7.547***	-7.547***
FDIIN	-0.123	-0.123
FDIOUT	-1.749***	-1.749***
LNDEBT	0.765***	0.765***
BOP	-5.999	-5.999
TRADEB	1.887	1.887
Sigma_e	-	1.065
R-square	0.872	0.872
F-statistic	83.5***	153.01***
Multicollinearity	3.050	4.284
Heteroscedasticity	2.800	2.940
Normality	4.083	4.894
Autocorrelation	3.875	4.258
Breusch and Pagan LM test	1.000	1.000

Note:

*, ** and *** represent statistical significance at 10%, 5% and 1% level. Variance Inflation Factors (VIF) is used to reflect the presence of multicollinearity. The null hypothesis is no multicollinearity. White's test is used to detect heteroscedasticity problem, and the null hypothesis is homoscedasticity. Jarque-Bera test is used to detect the normality, and the null hypothesis is not normally distributed. Wooldridge test is used to detect the autocorrelation, and the null hypothesis is no autocorrelation problem. For the Breusch and Pagan LM test, the null hypothesis is Pooled OLS Model.

Breusch and Pagan LM test had been used to determine whether the model in this study is either Pooled OLS model or Random Effect model. Pooled OLS model is found to be more appropriate based on the results. The following discussion is about the interpretation of Pooled OLS model test result.

In the one year observations, the Pooled OLS model result showed that interest rate, external debt and balance of payment are statistically significant at 10%, 5% and 1% significance level. At 10% and 5% level of significance, consumer price index, foreign portfolio investment asset and foreign portfolio investment liabilities are statistically appeared as a significant variables. At 10% level of significance, inflow of foreign direct investment is statistically appeared as a significant variable. Besides that, outflow of foreign direct investment and trade balance are insignificant at 10%, 5% and 1% level of significant.

In the three month observations, the result showed that interest rate, foreign portfolio investment liabilities, outflow of foreign direct investment and external debt are statistically significant at 10%, 5% and 1% significance level. At 10%, 5% and 1% significance level, consumer price index and inflow of the foreign direct investment are found insignificant as well as foreign portfolio investment asset, balance of payment and trade balance.

By increasing 1% of the consumer price index (CPI), there is 8.360% decrease in the rate of exchange in one year observations, on average, holding other variables unchanged. It is a positive and insignificant relationship between CPI and exchange rate with a coefficient of 1.904 in short period. If interest rate increase by 1 unit, on average, the exchange rate will increase by 0.044% in one year observations and 0.188% in three month observations ceteris paribus.

In the one year observations, if foreign portfolio investment asset is increased by 1 unit, on average, the exchange rate will decrease by 0.596% ceteris paribus. Foreign portfolio investment asset is positive and insignificant related to exchange rate with a coefficient of 0.335 in short period. If foreign portfolio investment liabilities increase by 1 unit, on average, the exchange rate will decrease by 2.031% in one year observations and 7.547% in three month observations ceteris paribus. In one year observations, the inflow of foreign direct investment is positively insignificant to the rate of exchange with coefficient of 6.220. In three month observations, the inflow of foreign direct investment is negatively insignificant with coefficient of –0.123 ceteris paribus. Foreign direct investment outflow is positive and insignificant related to exchange rate with coefficient of 0.115 in one year observations. In the three month observations, if the outflow of foreign direct investment is increased

by 1 unit, on average, the exchange rate will decrease by 1.749% ceteris paribus. By increasing 1% of the external debt, in one year and three month observations, there are 1.798% and 0.765% increase in rate of exchange respectively, on average, holding other variables constant. By increasing 1 unit of the balance of payment, the one year observations rate of exchange is 7.683% decrease, on average, ceteris paribus. In the three month observations, balance of payment is found to be negatively insignificant to exchange rate with a coefficient of –5.999. Trade balance is positive and insignificant related to the rate of exchange in long and three month observations with coefficient of 1.835 and 1.887 respectively.

Multicollinearity is used to test whether each of the independent variables has a linear relationship with other independent variables (Kumari, 2008). Its presence is figured out through the test of Variance Inflation Factor (VIF). There is no multicollinearity problem exist in this model since both mean VIF in the one year and three month observations are less than 10 which are 8.87 and 3.05 respectively.

Besides, a test has been conducted to detect the existence of heteroscedasticity problem. The null hypothesis is that homoscedasticity exists. In the one year observations, the hypothesis is accepted as null since the p-value is more than 10%, 5% and 1% significance level. In the three month observations, the null hypothesis is accepted since p-value is more than 10% and 5% significance level. Therefore, heteroscedasticity problem does not exist in this model.

Normality of error term is tested using Jarque-Bera test. It is an acceptance on the null hypothesis since the error term is normally distributed either in short or l one year observations because both p-values are more than 10%, 5% and 1% significance level.

Wooldridge test used to detect the presence of autocorrelation. The null hypothesis is that there is no autocorrelation problem. It is an acceptance on the null hypothesis either in the long or three month observations since p-value is more than 5% and 1% significance level. Thus, this model does not have autocorrelation problem.

Furthermore, this study carried out Breusch and Pagan LM test. The purpose of the test is mainly used in detecting either Pooled OLS model or random effect model is more appropriate. The null hypothesis is Pooled OLS model otherwise random

effect model will be selected. The hypothesis that Pooled OLS model is accepted because the p-value is larger than 10%, 5% and 1% significance level in one year observations. In the three month observations, the null hypothesis is accepted since p-value is larger than 5% and 1% significance level. Hence, Pooled OLS model is appropriate.

4.2 Discussion of Major Finding

4.2.1 Inflation

This study results showed that inflation rate appeared to be significant and negative related to the exchange rate in one year observations. The result is consistent with the PPP theory where it stated that the value of a currency is expected to depreciate when the country is experiencing an increase in inflation. The study by Mohammed (2015) indicated that PPP holds in determine Algerian exchange rate in long run. Oriavwote and Eshenake (2012) carried out a study where the result showed rate of exchange is sensitive to the changes in the rate of inflation in the long run. PPP is held when the interventions of central bank, barriers in trading, costs of transactions and taxes are absent (Haidar, 2011). In the long run, by holding the price of foreign goods constant, when domestic country experiences an inflation, the price of domestic goods rise and causes the demand for imported goods increase while the demand for domestic goods decrease. This situation brings to the growth in the supply of domestic currency. As a result, domestic currency depreciates (Mishkin & Eakins, 2014).

However, PPP has been found out that it is not supported in this study in three month observations. Many researchers argued that PPP is only supported in long term but not in short term although it remains in the progress of investigation (Cheung & Chinn, 2001). This may be due to several reasons such as imperfect information, long term contracts and marketing costs which could slow down the response of traders to the deviation of the cost of trading between countries. Some investors do not

react to the changes of securities price which lead to imperfect information. Apart from that, certain investors have tied to the long term contract. Another reason is the prices of goods and services do not fully respond to the macroeconomic factors. Al-Zyoud (2014) undergoes a close test on the monthly data and found that the output prices changes slowly. These factors caused the price to be sticky in the three month observations and against PPP. This study result showed discrepancy with the research conducted by Ho and Ariff (2014). His short and long term result are supported PPP. However, this research result showed PPP hold only in one year observation.

4.2.2 Interest Rate

Furthermore, interest rate is significant and positive related to exchange rate in both three months and one year observations. The result is in contrast with previous studies that showed interest rate parity does not hold but consistent to Ho and Ariff (2014) studies' result. The difference of interest rate between two nations affect the exchange rate. In the case that inflation rate rise, nominal interest rate increase cause the rate of exchange to increase with the rise in the home country price index, which refers to domestic currency will depreciate against the foreign currency (Akhtar, Mujahid, Zuberi & Shazib, 2014). The result shows equivalent to International Fisher Effect (IFE) theory which implied the value of country's currency declined in the event of interest rate increase as it reflected high inflation rate (Shalishali, 2012). A high interest rate increases the country risk and real demand for money and negatively affect the investment spending and consumption expenditure. Consequently, depreciation occurred (Yu, 2006).

4.2.3 External Debt

At significant level of 5%, the result showed that external debt is significant positive related to exchange rate in both three months and one year

observations. Therefore, the higher the level of external debt, the value of currency will decrease. The finding is consistent with the result in Lin (1994) which stated that, in long term, external debt is significant related to real exchange rate. The production technologies influence the effect of government debt on long term real rate of exchange. Besides, Fida, Khan and Sohail (2012) had stated that the rate of exchange is co-integration related to external debt in long term. The research showed that the exchange rate variation would be influence by raising of external debt via the risk premium. Hence, depreciation occurred.

Furthermore, the result in the studies of Saheed, Sani and Idakwoji (2015) showed that external debt is positively significant to the exchange rate in Nigeria. Majority borrowing will include interest which lead to debt servicing. Debt servicing will influence the currency of a nation due to the involvement of demand for foreign currency. Thus, the rise in external debt will increase the demand for foreign currency and cause depreciation.

4.2.4 Trade Balance

According to the finding of Ho and Ariff (2014), trade balance is an important exchange rates determinants. The result showed that long term relationship is established. When trade balance improves, currency value is improved. Abbas and Raza (2013) stated that in Pakistan, trade deficit is significant positive related to the exchange rate. When government fails to handle the payment of trade balance, the imported goods are more expensive and leads to the appreciation of the oversea currency and depreciation of local currency. Another study from Nazeer, Shafi, Idrees and Liu (2015) found that the trade balance significantly influence the exchange rate. Trade balance will cause the currency to depreciate and hence the country's purchasing power will decrease. Furthermore, in the study from Yaya and Lu (2012), the causality between effective rate of exchange and trade balance in China is examined by using Granger-Causality test. The result shows that in the short term, trade balance will influence the effective

exchange rate. Trade surplus will raise the foreign currency in the local economy which causes the home currency to appreciate. The result showed a positive coefficients in short term which showed that trade performance shock is positively related to the fluctuation in exchange rate. However, the finding indicates that both three month and one year observations, trade balance is insignificant related to exchange rate.

4.2.5 Balance of Payment

The finding shows that in one year observations, exchange rate is significant negatively affect by balance of payment. The result is consistent with the finding in Sandu (2015) who stated that since the economics condition can be explained by the balance, thus, the variation in exchange rate is able to interpret by balance of payment. The variation in exchange rate is influencing by the account balance of payment which is determining by the market forces on the forecasting of costs. A depreciation on home currency would occurred when there is a negative balance of payment as it will increase the demand for forecasting of costs. Ramasamy and Abar (2015) stated that balance of payment should influence the exchange rate positively as per theory, but the results show the opposite. Another study from Jimoh (2004) stated that using monetary method to explain determinants of exchange rate is that anything that causes the balance of payment deficit at a fixed rate would cause exchange rate decline in value under floating rates. Additionally, anything that creates a positive balance of payment would cause the value of exchange rate to rise under flexible rates. In the three month observations, the finding shows that balance of payment is insignificant related to exchange rate.

4.2.6 Foreign Portfolio Investment

This study result suggests that both foreign portfolio investment asset and foreign portfolio investment liabilities are negatively significant in the one year observations while only foreign portfolio investment liabilities negatively significant in the three month observations. It shows that the increase of the foreign portfolio investment asset and liabilities will lead to the appreciation of the currency of a country.

The foreign investors invest in the domestic securities to earn for higher profit. It would bring the injection of capital into the domestic businesses for their development. These capital supplies create expansion opportunities of businesses and also increase the demand for domestic money which appreciates the currency of the domestic country. As the foreign portfolio is a short term and high liquidity investment which allows the immediate withdrawal, the impact of the increase or decrease in foreign portfolio investment in the short run is also very sensitive respond to the rate of exchange in the three month observations. The result of this study suggests a significant negative relationship between foreign portfolio liabilities and rate of exchange in both one year and three month observations. It means that the increase in the foreign portfolio investment liabilities would increase the domestic money's demand which will cause the rise in value of the currency of the domestic country in both three month and one year observations. Combes, Kinda and Plane (2010) also mentioned that inflow of private capital underlines the effect of appreciation in portfolio investments, which have higher volatility and the highest effect of appreciation.

The domestic investor who tries to seek a higher return investment will tend to expand their investment abroad to foreign countries. The relative higher return that the domestic investor earn in the foreign countries would then transfer back from those foreign countries into domestic country. It brings back more capital and increases the money demand of own currency. It would indirectly increase the value of the domestic currency. This study result suggests that the foreign portfolio asset is significant negative related

to rate of exchange in the one year observations. It means that the increase in the foreign portfolio investment asset would bring appreciation to the domestic country. Ho and Ariff (2011) also stated that the portfolio outflow provides high degree of explanation on exchange rate change in the region of G-10 countries in the long run.

4.2.7 Foreign Direct Investment

In foreign direct investment, foreign investors invest capital into a domestic firm for the right to participate in the management of the business or setting up their oversea business in domestic countries for a return on the investment.

This study result suggests that foreign direct investment outflow negatively significant in the three month observations. Surprisingly, the result shows an insignificant result of inflow and outflow of foreign direct investment in the one year observations and inflow of foreign direct investment in the three month observations.

From the beginning of 1980s, foreign direct investment has increased globally at an alarming rate and the global marketplace become more competitive and the developing countries have increasingly become the investment destination of other countries (Mallampally & Sauvant, 1999). As the developing countries provide a relatively low labor cost and abundant resources, these show the potential to attract the investor to setting up their subsidiaries in these countries. The increase of the foreign direct investment outflow of domestic country in foreign country brings significant benefit to the businesses line by introducing the modern production, management principles and better expansion of multinational business (OECD, 2008). These multinational companies would then transfer back the profit into the domestic company. In addition, the well capitalize multinational company would then attract the investment of the foreign investors. Overall, it will tend to increase the money demand of domestic country and strengthen the domestic currency. This study result suggests that the foreign direct

investment outflow has a negative and significant related to the three month observations rate of exchange. It means the increase of the foreign direct investment outflow would result in a significant appreciation of the home currency. As the result from the study of Ifeakachukwu and Ditimi (2014) also suggested that rate of exchange and foreign direct investment outflow have significant relationship in the developing country in the short run.

Surprisingly, this study result suggests that foreign direct investment inflow and outflow are insignificant to the one year observations rate of exchange. Furthermore, the result shows an insignificant relationship between foreign direct investment inflow and rate of exchange in three month observations. In contrast, some of the researchers suggested that foreign direct investment has a significant relationship to explain exchange rate. Ifeakachukwu and Ditimi (2014) carried a study examined the impact of inflow of foreign direct investment on the exchange rate in Nigeria for the period 1986 to 2011. The result shows a significant relationship between them in both long term and short term. According to Ellahi (2011), the major findings of the study show that FDI inflow is significant negative related to rate of exchange in the short run and a significant positive relationship in the long run which are both same sign to the research result.

4.3 Conclusion

The result suggests that the consumer price index, interest rate, foreign portfolio investment asset, foreign portfolio investment liabilities, external debt and balance of payment are statistically significant at 5% significance level in the one year observations. In the three month observations, the result suggests that the interest rate, foreign portfolio investment liabilities, outflow of foreign direct investment and external debt are statistically significant at 5% significance level.

This model also passes all the diagnostic checking where this model is free from multicollinearity, heteroscedasticity, autocorrelation and the variables show normality distributed. This model has been shown to be more suitable to classify as pooled panel data. The following chapter would continue with the policy implications, recommendation and limitation of the study.

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CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATION

5.0 Summary of Statistical Analyses

In this study, an investigation is taken to examine the determinants of exchange rate in Asian-6 namely Malaysia, Thailand, Singapore, Philippines, Indonesia and China by using quarterly and annually data. Parity variables which are interest rate and inflation and non-parity variables which are foreign portfolio investment asset, foreign portfolio investment liability, foreign direct investment inflow, foreign direct investment outflow, external debt, balance of payment and trade balance are taken as this research determinants. This study determined the parity variables to influence the exchange rate by taking non-parity variables as control variables. Non-parity variables are attempted to use in order to support our parity variables to hold in the three month and one year observations. In addition, pooled OLS model had shown suitable to use as a method in this study. The results indicated that interest parity variable is significant in the three month and one year observations which is inconsistent with previous research. The IFE is hold in three month and one year observations. However, inflation parity variable only significant in the one year observations. The PPP is only hold in one year observations but not three month observations. Besides that, several non-parity variables have affect exchange rate movement. Foreign portfolio investment liability and external debt are significant in both three month and one year observations. Furthermore, foreign direct investment outflow is held in three month observations whereas, foreign direct investment inflow, foreign portfolio investment asset and balance of payment hold in one year observations.

5.1 Implications of the Study

This study could bring impact to the future researchers in conducting an investigation on parity variables as determinants of exchange rate. The gaps between the arguments of researchers could be narrowing down by taking this study's result as a reference. Based on previous studies, the researchers focused on the discussion on the theory and reality basis on the significance of parity variables alone on the exchange rate. In this study, Purchasing Power Parity and International Fisher Effect have been used as the determinants of the exchange rate along with the non-parity variables in both three month and one year observations. The gaps can be reduced by including non-parity variables which can affect the significance of parity variables on the exchange rate.

5.2 Limitation

The limitation of this study is the number of countries that used to examine the determinants of exchange rate is insufficient. There are only six countries used in this study which are Malaysia, Thailand, Singapore, Philippines, Indonesia and China.

5.3 Recommendations for Future Research

In order to get a better result, it is suggested to add more countries in future studies. A wider group of countries can help to robust the model. Previous studies, most of the researchers do not consider the non-parity variables in their research. Based on this research finding, although PPP holds in the one year observations while IFE holds in both three month and one year observations. Somehow PPP remained insignificant in the three month observations. Therefore, future study is recommended to include more relevance non-parity variables into the model in order to strengthen the trade.

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