THE DETERMINANT IMPACTING ON BILATERAL EXCHANGE RATE: A CASE STUDY OF THE THAI BAHT AGAINST THE U.S. DOLLAR
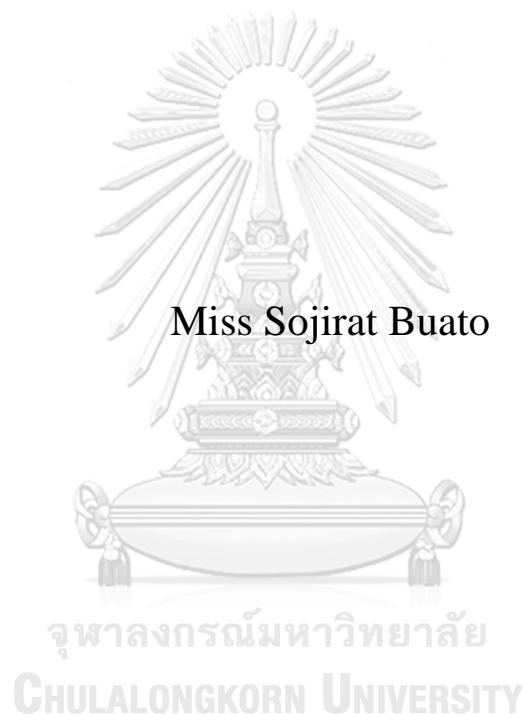
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An Independent Study Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Arts in Business and Managerial Economics
Field of Study of Business and Managerial Economics
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ปัจจัยที่กระทบต่ออัตราแลกเปลี่ยน
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สาขาวิชา	เศรษฐศาสตร์ธุรกิจและการจัดการ	ลายมือชื่อนิสิต ....
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Sojirat Buato : THE DETERMINANT IMPACTING ON BILATERAL EXCHANGE RATE: A CASE STUDY OF THE THAI BAHT AGAINST THE U.S. DOLLAR . Advisor: Assoc. Prof. NUALNOI TREERAT, Ph.D.

Thailand relies on the openness economy, in which accounted for rather than two-thirds of GDP. Also, the bilateral exchange rate quoting the most is the Thai baht against the U.S. dollar. Thence, this study examines the determinants impacting on it in order to foresee the direction of Thai baht against U.S. dollar. The scope of this study is from January 2001 through December 2019 and tested by the OLS approach. The empirical result for this study shows that the domestic interest rate, foreign interest rate and exports impact and are significant at 1% to this bilateral exchange rate. Meanwhile, the relative price levels do not impact on this quotation.

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Chapter 1

Introduction

1.1 The background and significance of the study

The bilateral exchange rate is important to Thailand's economy particularly, baht value compared to U.S. dollar value because this pair is able to be used for exchanging between Thailand trader and foreign trader around the world economy. The U.S. dollar is a major trading currency in international trade. Not only the bilateral trade between Thailand and the United stated but also between Thailand and other countries quote their trade transactions by using the bilateral exchange rate of Thai currency per the U.S. currency. Nevertheless, there are many economics variables associated to the bilateral exchange rate volatility. In view of macroeconomics theory, relative price levels, domestic interest rate and foreign interest rate affect the exchange rate movements (Mishkin, 2016). Further, the exports influence the change in exchange rate as well because the exports stimulate the changes in demand for home currency. Hence, these four factors get involved to the exchange rate because when people would like to hold the home currency more, causing the home currency appreciation. Therefore, I would like to extend this concept in case of the bilateral exchange rate of baht value per one U.S. dollar from January 2001 through December 2019, which are covered since the period after applying the managed float regime until nowadays. The results of this study will benefit Thailand's economy because it can help the Thai business sector that needs to transfer international transactions better evaluate the direction of the bilateral exchange rate in Thailand so as to keep the currency away from any exchanging loss.

The economy in Thailand has been driven by the openness economy. The exports and imports have accounted being a crucial part of the gross domestic product (GDP) movement. Also, Thai economy depends on the export sector because it is dominated rather than two-thirds of Thailand's GDP (Anifowose, 2017). Therefore, the exchange rate is imperative to use for transferring transactions between Thailand and overseas. Most of the time, the bilateral exchange rate of Thai currency against the U.S. currency has been used for payments. As you can see, the proportion of exports and imports payments from Thailand to Asian gathered from 1993 through 2019 is shown below,

The proportion of using U.S. dollar, Japanese yen, Thai baht, Singapore dollar, Malaysian ringgit, Euro and other to receive from exports is accounted for 82.69%, 1.79%, 12.08%, 1.52%, 0.51%, 0.52% and 0.9% respectively. The proportion of using U.S. dollar, Japanese yen, Thai baht, Singapore dollar, Malaysian ringgit, Euro and other to pay for imports is accounted for 87.71%, 1.78%, 4.88%, 3.18%, 1.91%, 0.52% and 0.01% respectively. The bilateral exchange rate of Thai baht per the U.S. dollar is quoted for export and import transactions the most. Because of that, the quotation between Thai baht and U.S. dollar is important and strongly dominated for Thailand's international trading.
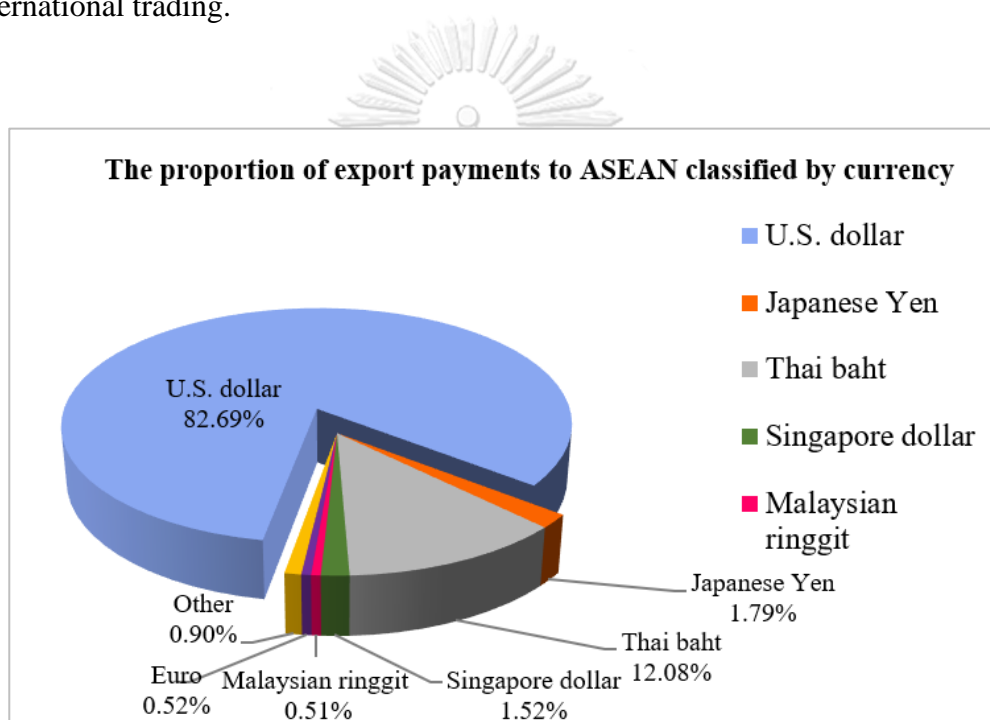
Figure 1: The proportion of export payment to ASEAN
Source: Data collected from the bank of Thailand
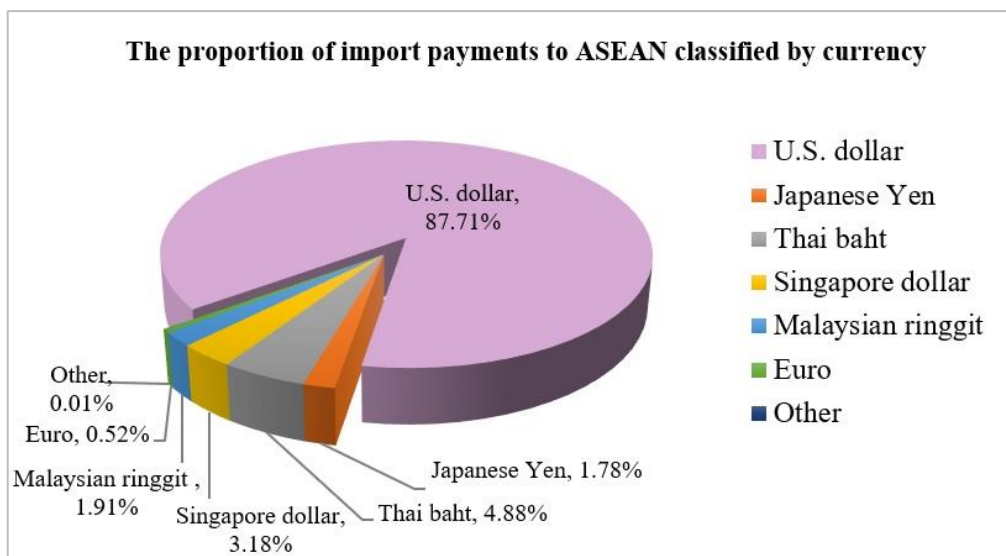
Figure 2: The proportion of import payment to ASEAN
Source: Data collected from the bank of Thailand

1.2 The research questions

This study examines whether conventional macroeconomics determinants, in which are relative price levels, domestic interest rate, foreign interest rate and exports, affect the bilateral exchange rate of Thai currency per the U.S. currency.

1.3 The objectives of the study

1. To elucidate definition of the exchange rate and the history of exchange rate regime in Thailand.

2. To understand the factors in terms of macroeconomics theory.

3. To show the empirical results from previous studies.

4. To recommend the alternative applications to prevent from exchange rate fluctuations.

1.4 The scope of the study

This study is designed to examine the relationship by employing Ordinary Least Square (OLS) approach. The second data is gathered from the Bank of Thailand (BOT), Federal Reserve Economic Data (FRED), and Economic and Trade Indices Database (ETID) from January 2001 through December 2019 including 228 months. I apply a multiple regression model. Those four variables are independent variables and I use the direct quotation of the exchange rate, which is the baht value per one U.S. dollar as a dependent variable.

1.5 The expected outcomes and benefits

1. To understand the relationship between the macroeconomics variables and the bilateral exchange rate.

2. To indicate the macroeconomics variable influencing the bilateral exchange rate in Thailand.

3. To benefit to Thai business sectors foresee the direction of the bilateral exchange rate in Thailand.

4. To give the alternative applications for preventing the exchange rate fluctuations.
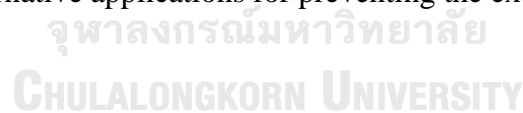
1.6 The term of definition

- The bilateral exchange rate in Thailand is denoted for the bilateral exchange rate of home currency per a foreign currency.

- The home currency is denoted for Thai baht.

- The foreign currency is denoted for U.S. dollar.

Chapter 2

Literature review

2.1 The history of exchange rate regime in Thailand

Thailand had applied the fixed exchange rate system since the post-second world war period until June 1997. The fixed exchange rate is adjustably tied to the basket of currencies. Then, Thailand joined a member of the International Monetary Fund (IMF) causing since 2 July 1997, Thailand had changed to a managed float system aiming to carry out the obligations of IMF. Therefore, the Thai baht is determined to reflect demand and supply in an economy. Additionally, the Bank of Thailand (BOT) stays to interfere when the volatilities of the exchange rate are overwhelming. Also, the bank of Thailand controls the bilateral exchange rate in Thailand within the inflation targeting framework and stands in the stability level. The movement of the bilateral exchange rate in the past until a recent year, from January 1981 through March 2020, is shown below:
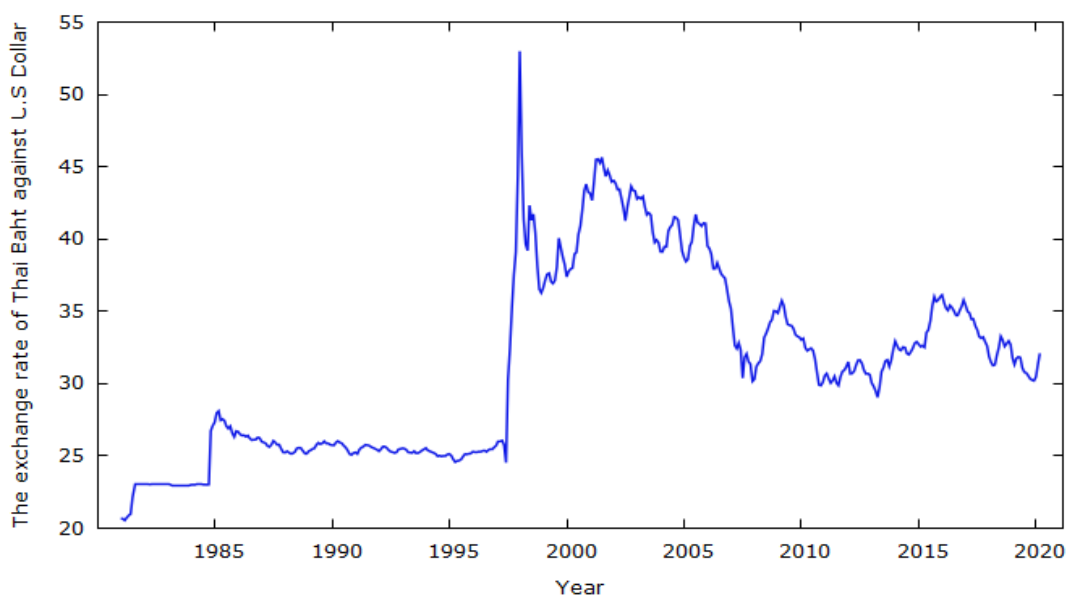
Figure 3: The movement of Thai baht per U.S. dollar from January 1981 through March 2020
Source: Data collected from the bank of Thailand

During the year 1987 through 1996, the economy in Thailand had been expanding from the private investment sector. Also, there were overwhelming investments in the real estates during that period. Hence, Thailand became the production base for foreign investment because Thailand has the lower cost and appropriate for manufacturing. Meanwhile, the balance of payment in Thailand was a negative value or deficit overmuch because there are the imports was greater than the exports. Moreover, the interest rate in Thailand was around 14% to 17%, which is very high when compared to aboard, so the difference between the interest rate in Thailand and foreign was soaring. While the fixed exchange rate system had been applying, Thai people borrowed the money from aboard enormously on grounds of financial liberalization, in which freely move the capital without government restrictions.

In 1997, Thailand had suffered the financial crisis or well known as the 'Tom Yam Kung' crisis on the ground of the economic bubble, which the current market price of assets is rather than the intrinsic value. On July 2, 1997, Thai baht was floated from 25 to 50 bahts per U.S. dollar. Consequently, the foreign investor was confident less to invest in Thailand due to the financial meltdown, then the capital account is sharply deficit. Whereas Thailand could not maintain the fixed exchange rate system longer owing to lose a large amount of international reserves extremely until there are no international reserves anymore, so Thai currency was attacked to devalue consecutively by speculators who exploit the benefits from the countries could not preserve their currencies. This phenomenon is called a 'speculative attack'. On the grounds of this, Thailand requested assistance from the IMF and at the end of the day, Thailand had transformed from the fixed exchange rate system to the managed float system. However, at that time Thailand faced a lack of financial liquidity because of the deterioration in the capital account.

After 1997, Thai currency had floated and depreciated massively. Because of this situation, it stimulated the exports in Thailand to be high outstandingly. On behalf of baht depreciation, foreigners spent their currency less to buy Thai products, so they became in favor to buy. Afterward, the current account turned into surplus and Thailand recovered from the crisis. Besides, financial crisis in the United States in 2008, the federal reserve system had faced to the lack of financial liquidity resulting in the world

economy collapsed as well. Because of this situation, the federal reserve system launched the policies called 'quantitative easing' **(**QE**)**. These policies helped the world economy recovery again. The investors from overseas were more interested to invest in Asia, in which was expanding in that period. Therefore, Thailand is a place that there is a lot of capital inflow from them, resulting in Thai baht was devalued in 2010.

2.2 The exchange rates

The exchange rate is a crucial instrument to exchange transactions from a currency to another currency. Mishkin (2016) defined that the foreign exchange rate is categorized into two categories. The first one is the immediate exchange rate used for transferring bank transactions or called the 'spot rate'. The second one is the future exchange rate used for transferring bank transactions or called the 'forward rate'. Besides, when we spend a smaller amount of home currency to transfer foreign currency, it expresses home currency 'appreciation'. However, when we spend a larger amount of home currency to transfer foreign currency, it expresses home currency 'depreciation'.

Also, when the home currency is overvalued and its central bank tries to intervene it from appreciation situation by holding more international reserves. Then, the exchange rate level of home currency per a foreign currency is higher. It is called 'devaluation'. On the other hand, when the home currency is undervalued and its central bank intervenes it from depreciation situation by holding fewer international reserves. Then, the exchange rate level of home currency per a foreign currency is lower. It is called 'revaluation'.

The exchange rate system is classified by three majors. The first one is managed by a currency pegged to another currency or called the 'fixed exchange rate system'. The second one is managed by a currency allowed to going up and down against all other currencies or called the 'floating exchange rate system'. However, when a country gets involved in the exchange rate by purchasing and selling foreign exchange reserves in order to make its economy system into stability level, it is called a 'managed float system'.

Mishkin (2016) found the relation between foreign exchange rates and competitiveness that in the 1980s many businesses in the United States became less competitive because U.S. dollars became more valuable in terms of foreign currencies, so foreign buyers need to spend more money to exchange it, thereby American products looked more expensive in view of foreigners. Accordingly, the demand for American products fell. However, in 1990s the U.S. dollar value had dropped from its appreciation period in the 1980s. Consequently, American products looked cheaper in view of foreigners and many businesses in the United States became more competitive.

Therefore, Thailand can gain more competitiveness when baht depreciates because Thai products become cheaper compared to other countries and foreign products become more expensive by holding domestic prices unchanged. However, when baht appreciates, it leads to being less competitive because Thai products become more expensive compared to other countries and foreign products become cheaper.

Law of One Price Theory

Mishkin (2016) elucidated that exchange rates can be explained by the law of one price. The similar product is produced in two countries and there is no international trade restriction. The price should be the same no matter where we buy it. However, this theory reflects just individual prices in its country. The bilateral exchange rate can be calculated as follows:

$$E_{H/F} = \frac{Price\ of\ a\ domestic\ product}{Price\ of\ a\ foreign\ product}$$

where H stands for a home currency, F stands for a foreign currency and $E_{H/F}$ is the bilateral exchange rate.

Purchasing Power Parity Theory

Mishkin (2016) also defined that 'purchasing power parity' or PPP is a principle notion explaining the changes in the bilateral exchange rate. It demonstrates that the changes in the price levels between two different currencies reflect its bilateral

exchange rate. This thought is adopted from law of one price by measuring the price level of products in its nation. The bilateral exchange rate can be calculated as follows:

$$E_{H/F} = \frac{Price\ level\ in\ home\ currency}{Price\ level\ in\ foreign\ currency}$$

where H stands for the home currency, F stands for the foreign currency and $E_{H/F}$ represents for the bilateral exchange rate.

However, this theory can be explicated through a concept called the 'real exchange rate' It uses its domestic product prices comparing to foreign product prices by expressing on the form of its home currency so as to exchange it for foreign products. Purchasing power parity given the bilateral real exchange rate is always equivalent to 1.0. If the bilateral real exchange rate is below 1.0, which means the bilateral real exchange rate depreciation, the demand for foreign products decreases because it is more expensive to buy compared to domestic products. However, when the bilateral real exchange rate exceeds 1.0, which means the bilateral real exchange rate appreciation. Thus, the demand for foreign products increases because it is cheaper to buy compared to domestic products. However, purchasing power parity theory does not work well because some products and services may not be bought or sold everywhere. The bilateral real exchange rate can be computed as follows:

$$E_{H/F} = E_{H/F}^* \times \frac{Price\ level\ in\ home\ currency}{Price\ level\ in\ foreign\ currency}$$

$$E_{H/F}^* = \frac{E_{H/F}\ \times\ Price\ level\ in\ foreign\ currency}{Price\ level\ in\ home\ currency}$$

where H stands for the home currency, F stands for the foreign currency, $E_{H/F}$ represents the bilateral nominal exchange rate and $E_{H/F}^*$ represents for the bilateral real exchange rate or the domestic product price in terms of foreign products.

As determined by purchasing power parity, the 'Big Mac Index' was initiated in 1986 by Pam Woodall and written in 'The Economist' magazines. The Big Mac index is measured from the hamburger prices sold by McDonald's across countries. The McDonalds' hamburger is identical goods that is produced and sold in many countries around the world, so it assumes to be a basket of goods. For this reason, it can an

interesting indicator to predict the exchange rate. Suppose that the hamburger price sold in the U.S. dollars costs 5 dollars and sold in Thailand costs 110 bahts. The implied exchange rate would be 22 bahts per one U.S. dollar, but the current spot exchange rate is 32 bahts per dollar. So, it can indicate that the baht value is overvalued around 45%. Cumby, R. E. (1996) stated that the change in price of hamburger can reflect the exchange rate movement. The empirical evidence showed that a soaring Big Mac index in the home country leading to its currency depreciation.

Interest Parity Condition Theory

The 'interest parity condition' is the situation that we cannot exploits the benefit from the higher foreign interest rate owing to the expected home currency appreciation (Mishkin, 2016). Therefore, we cannot make arbitrage between domestic and foreign interest rates resulting in the relative expected return equals to zero. The bilateral real exchange rate owing to the interest parity condition is able to calculated as follows:

$$E_{H/F} = \frac{E_{H/F}^e}{i^F - i^D + 1}$$

where i^D is the domestic interest rate, i^F is the foreign interest rate, E_t represents the current exchange rate and $E_{H/F}^e$ represents the expected bilateral exchange rate.

2.3 The overview of factors

There are four interesting factors that trend to induce the exchange rate. There are relative price levels, domestic interest rate, foreign interest rate and exports by holding the other factors constant.

2.3.1 Relative price levels

With regard to purchasing power parity theory, Mishkin (2016) stated that when domestic prices escalate by holding foreign prices unchanged. Foreigners would like to buy domestic products less resulting in its currency devaluing so as to sell domestic products well. Nevertheless, when domestic prices shrink, foreigners would like to buy domestic products more resulting in its currency turns to strengthen. Therefore, an increasing relative price levels compel a currency to depreciate, but a dropping relative price levels compel a currency to appreciate. On the grounds of international competitiveness, when the domestic prices boost up, the foreigners will think that those products turn into more expensive resulting in the export demand in its country declines. Therefore, the home currency will depreciate. The relative price levels can be calculated as follows:

$$Relative\ price\ levels = \frac{CPI_H}{CPI_F}$$

where, CPI_H represents consumer price index in home country and CPI_F represents consumer price index in foreign country.

Following Mishkin's theory, the effect of relative price levels to the bilateral exchange rate of the U.S. dollar value per one baht can be shown in the graph below:
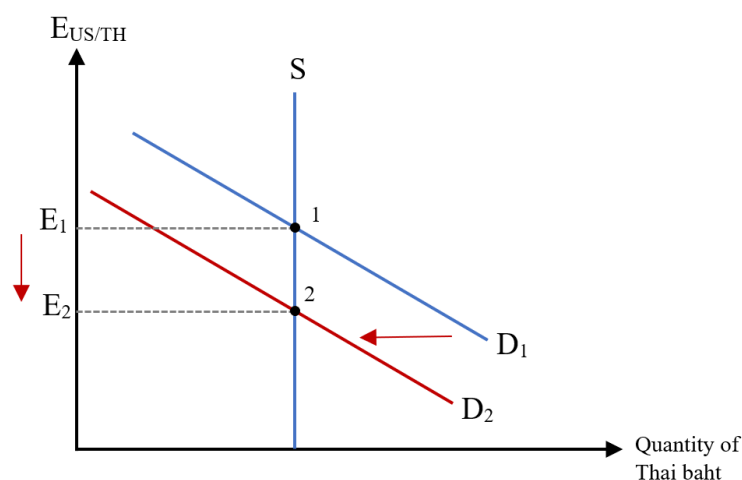
Figure 4: the response of relative price levels on the value of U.S. dollar per one baht

The graph above illustrates when the relative price levels increase, it leads to the lower demand for Thai baht, then it leads to the lower value of U.S. dollar per one baht or the baht depreciation. Accordingly, the more inflation in a country, it leads to the more home currency depreciation.

2.3.2 Domestic interest rate

Mishkin (2016) stated that the home currency appreciation induces the domestic assets are demanded more by holding everything else constant. Given the domestic interest rate is paid for domestic assets. Thus, the domestic interest rate in a country rises resulting in the expected returns on its going up when compared to foreign assets or the relative expected return hikes. Subsequently, many people would like to hold more domestic assets. Then, the demand for domestic assets raises and leads to the demand curve for home currency shifts rightward and its currency appreciates. In contrast, if the domestic interest rate falls, it causes the expected returns on its going down or the relative expected return declines. Accordingly, the demand curve for home currency shifts leftward and its currency depreciates. The relative expected return can be calculated as follows:

$$Relative\ expected\ return = i^D + \frac{E_{t+1}^e - E_t}{E_t} - i^F$$

where E_t represents the current exchange rate and E_{t+1}^e represents the expected exchange rate in the future.

In the case of Thailand, if the Thai interest rate represents the domestic interest rate. The response of the Thai interest rate on the bilateral exchange rate can be shown in the graph following Mishkin's theory below:
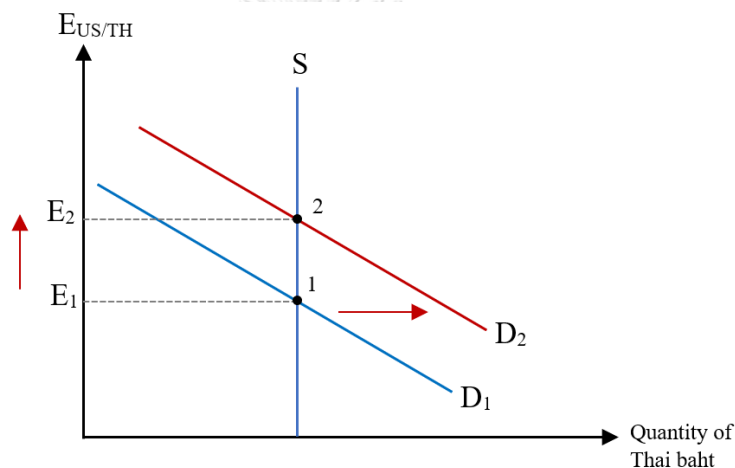
Figure 5: the response of domestic interest rate on the value of U.S. dollar per one baht

The graph above shows that when the Thai interest rate enhances, it leads to the higher demand for Thai baht, then it leads to the higher value of the U.S. dollar per one baht or the baht appreciation.

Furthermore, the changes in domestic interest rate can be explained through the 'fisher effect' (Mishkin, 2016). The idea of fisher effect is the nominal interest rate (i) will be equivalent to the real exchange rate (i_r) adding with the expected inflation rate (π). This notion can be written below:

$$i = i_r + \pi$$

The first one is the changes in the domestic interest rate owing to the change in the real domestic interest rate by keeping the expected inflation rate unchanged. A soaring real domestic interest rate points to a widening relative domestic interest rate. Thereafter, people would like to hold on domestic assets more, then the home currency will appreciate. In contrast, a diminishing real domestic interest rate guides a drop in the relative domestic interest rate. Thereafter, people would like to hold on domestic assets less, then the home currency will weaken.

The second one is the changes in the domestic interest rate owing to the changes in the expected inflation by keeping the real domestic interest rate unchanged. An enlarging expected inflation rate induces a slackening in the expected exchange rate in the future. Then, the relative domestic interest rate falls resulting in the depreciation in home currency. Whereas, a dropping expected inflation rate induces an upturn in the expected exchange rate. Then, the relative domestic interest rate enlarges resulting in the appreciation in home currency.

2.3.3 Foreign interest rate

Mishkin (2016) explained that given the foreign interest rate is paid for foreign assets and holding everything else constant. The foreign interest rate in a country soars, consequently, it guides the expected return on foreign assets going up when compared to domestic assets or the relative expected return lessens. As a result, many people would like to hold more foreign assets. Afterward, the demand for foreign assets boosts up, then leads to the demand curve for home currency shifts leftward and the home currency depreciates. However, if the foreign interest rate drops, it leads to the relative expected return surges. Thence the demand curve for home currency shifts rightward and the home currency appreciates.

In the case of foreign interest rate, if the federal fund rate represents the foreign interest rate. The response of the federal fund rate on the exchange rate can be shown following of Mishkin's theory can be shown below:
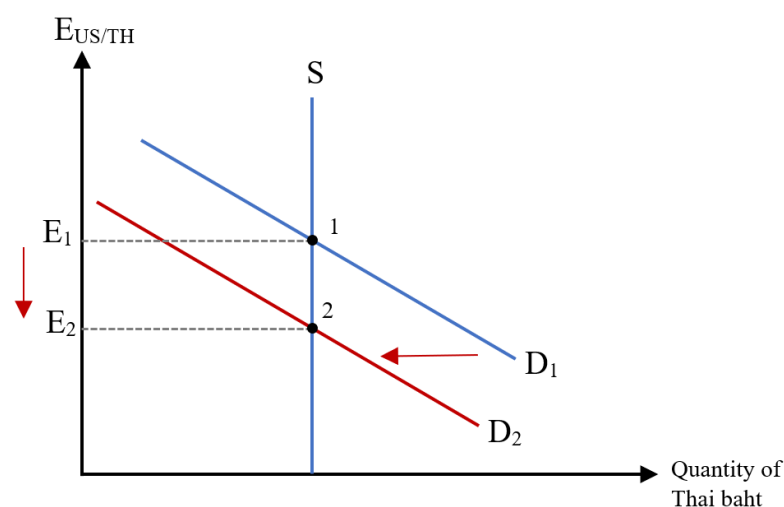
Figure 6: the response of foreign interest rate on the value of U.S. dollar per one baht

The graph above shows that when the federal fund rate is going up, it leads to the lower demand for Thai baht, then it leads to the lower value of the U.S. dollar per one baht or the baht depreciation.

2.3.4 Exports

The exports are a vital determinant that drives the exchange rate. When the exports augment, it induces the home currency to appreciation. The reason is when the exports soar, then the exporters need home currency more so as to exchange from the foreign currency back to its home currency resulting in the home currency appreciation. Besides, Mishkin (2016) stated that an uprising in expected export demand induces its home currency to strengthen in the long run. There are previous researchers investigated the relation between the exports and the exchange rate. Abdoh et al. (2016) examined that the expanding exports of nine Asian counties, which are Thailand, Vietnam, Malaysia, Singapore, Laos, Vietnam, Cambodia, Indonesia and Brunei Darussalam, lead to their home currency to appreciate. Similarly, Chaiphat (2017) found that the export value has the essential effect on the exchange rate in Thailand, in which causes Thai baht appreciation compared to the U.S. dollar.

2.4 The empirical results from previous studies

Finding the factors influencing the exchange rate is still the questionable tissue among researchers. Many previous studies have tested the several factors on the exchange rate as follows:

Bouraouia & Phisuthtiwatcharavongb (2015) examined the exchange rate of Thai value per U.S dollar in the period of 2004 through 2013. They found that a rising ratio of export prices to import prices induces Thai value appreciation or a decline in Thai value per one U.S. dollar. Besides, an enlarging international reserve leads to Thai value depreciation or a raise in Thai value per one U.S dollar. However, they found that the monetary base, manufacturing production index, government debt and gap of interest rate between Thailand and the U.S. are not substantial to this quotation.

Siriratana (2020) investigated factors related to the Thailand exchange rate compared to the currency of Japan, China and the United States in the period of 2007 through 2016. The empirical evidence appeared that the policy interest rate impacted to the exchange rate. The policy rate induced the appreciation Thai currency against in Japanese, Chinese and U.S. currency. Notwithstanding, the balance of payment and foreign direct investment are no significance to these three quotations. Besides, the consumer price index is not substantial to the value of Thai against Japan and the United States. Yet, it is significantly positive to the value of Thai against China.

Chow and Kim (2004) studied by applying based on the VAR-GARCH model to investigate the association between the interest rates and exchange rates in four Asia countries after Asia crisis in the period of 1993 through 2002. The study showed that the changes in interest rates in Thailand, Korea, Indonesia and Philippines did not force the changes in the exchange rate of its currency compared to the U.S. currency. Similarly, Abdoh et al. (2016) found that by employing the random effects model (REM), the interest rate does not impact on the bilateral exchange rates among nine Asian countries in the period of 2005 through 2014.

Wongpunya (2015) investigated how important fundamental models are able to predict the bilateral exchange rate movement in the period of post-Thailand financial crisis during 1999 through 2013. This study examined fundamental models, in which

are the Hooper-Morton model, Dornbusch-Frankel model and Frankel-Bilson model. The empirical evidence showed that those three fundamental models worked well in Thai currency against the British pound, U.S. dollar and Euro. However, those three fundamental models did not work for Thai currency against Korean won, Japanese yen and Chinese yuan. Nevertheless, the study tested the models with the root mean square forecast error (RMSE). The results appreared that all models could not be good predicted models. Besides, RMSE test showed that the random walk model is better for forecasting these six quotations rather than the fundamental models.

Agbola & Kunanopparat (2005) examined the impact of the determinants on Thailand's exchange rate regimes by employing the binomial probit model in the period of 1990 through 2002. The result showed that the foreign currency reserves and GDP per capita are substantial to both fixed and flexible exchange rate systems. They explicated that an uprising in foreign currency reserves, GDP per capita and monetary shock caused an increasing probability in applying the flexible exchange system. Conversely, a surge in GDP per capita, foreign currency reserves and monetary shock conduct a decreasing probability in applying the fixed exchange rate system.

Chaiphat (2017) considered the connection between the fundamental determinants with the baht value per the euro and U.S. dollar by employing the OLS regression and Bayesian model in the period of January 2005 through January 2015. The statistics evidence demonstrated that the foreign exchange reserves and the interest rate have an inverse direction to the Thai value per the euro and U.S. dollar. The differences of inflation and unstable politics have the positive direction to the Thai value per the U.S. dollar or the baht depreciation. However, the differences of inflation are negative to the Thai value against the euro or the baht appreciation.

Hsieh (2009) examined the factors influencing the exchange rate of Indonesian rupiah per the U.S dollar by applying the macroeconomics model. This study uses the power purchasing parity theory to test the price level in Indonesia and the U.S. to the bilateral exchange rate. The result showed that the producer price index (PPI) differential between these two currencies influences on the exchange rate rather than the consumer price index (CPI) differential. However, both of them have a significantly positive relation to exchange rate or rupiah depreciation. Besides, she applied the

uncovered interest parity theory to test the interest rate differential. She found that the difference of interest rate is no significance to the exchange rate. She also applied the monetary theory to test the money supply differential, expected inflation differential and real gross domestic price index differential to the exchange rate. The empirical result demonstrated that this model can be explained significantly, and the money supply differential and expected inflation differential have the positive effect to the exchange rate or rupiah value depreciation. Conversely, the real gross domestic product has the negative effect to the exchange rate or rupiah value appreciation.

Isse & Ibrahim (2017) focused on money supply, lack of government, external debt, GDP per capita, inflation and balance of trade to the exchange rate of Somali shilling from 1970 through 2014. They found that lack of government, external debt and balance of trade is substantial to the exchange rate by employing the OLS approach. In addition, lack of government is found that there is a positive relationship to the exchange rate, in which causes Somali shilling weakens. In contrast, external debt and balance of trade are found that there is a converse relationship to the exchange rate, in which causes Somali shilling strengthens. Notwithstanding, the inflation and GDP per capita are no substance.

Umar & Sun (2015) determined how the stock market and country risk relate to the exchange rate of the renminbi per the U.S. dollar by applying VAR model in the period of January 2000 through December 2013. They found that when stock market in China performs well, the renminbi will be stronger. Whereas, the renminbi weakens will cause the accretion in its country risk.

Uddin et al. (2013) examined the behavior of relative monetary variables between Bangladesh and the U.S that trend to influence this bilateral exchange rate. Also, they examined the political uncertainty as a dummy variable. This study employed a co-integrating approach in the period of January 1984 through April 2012. The empirical evidence showed that relative money and relative debt cause Bangladeshi depreciation. However, political uncertainty causes Bangladeshi appreciation.

Li et al. (2019) analyzed the factors on the bilateral exchange rate of the Renminbi per U.S. dollar by applying the multiple regression techniques in the period of 1990

through 2010. The statistical evidence showed that an expanding GDP and inflation induces the bilateral exchange rate to appreciation. Conversely, an increase in the balance of payment forces a raise in Renminbi value per U.S. dollar or Renminbi depreciation.

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Chapter 3

Research Methodology

3.1 Conceptual framework
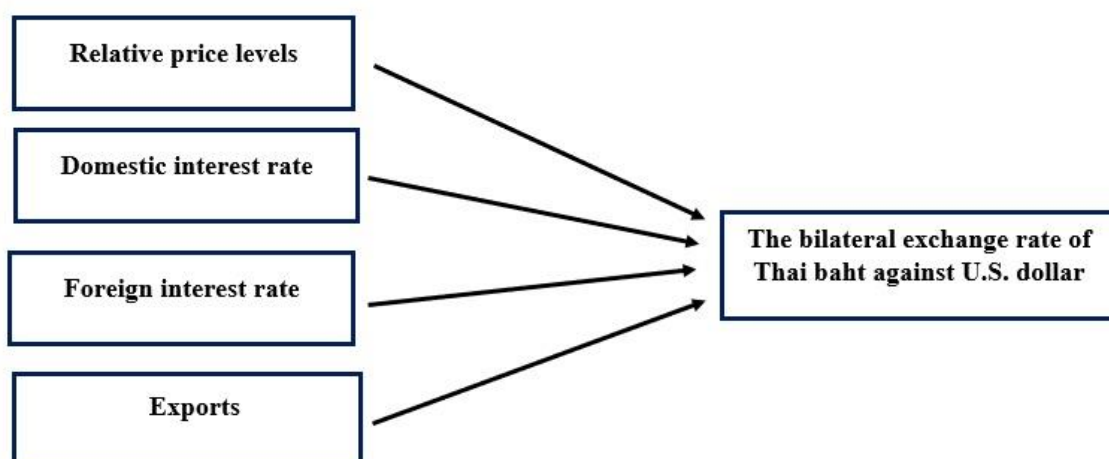
Figure 7: The conceptual framework

   The conceptual framework above relates relative price levels, domestic interest rate, foreign interest rate and exports to the bilateral exchange rate of the baht value per one U.S. dollar. According to macroeconomics theory, a raising relative price induces its home currency depreciation, or the value of Thai baht per one U.S. dollar goes up. A rise in domestic interest rate causes its home currency appreciation or the value of Thai baht per one U.S. dollar goes down. On the contrary, a surge in foreign interest rate causes its home currency depreciation. Finally, an expanding in exports in a country leads to its home currency appreciation.

Table 1: Summary of relationship between independent and dependent variables

Relationship	Expected outcomes
Relative price levels and baht value per one U.S. dollar	Positive (+)
Domestic interest rate and baht value per one U.S. dollar	Negative (-)
Foreign interest rate and baht value per one U.S. dollar	Positive (+)
Exports and baht value per one U.S. dollar	Negative (-)

3.2 The research questions

1. Does the price level in Thailand relative to the United States impact on the bilateral exchange rate?

2. Does the interest rate in Thailand impact on the bilateral exchange rate?

3. Does the interest rate in the United States impact on the bilateral exchange rate?

4. Do the exports impact on the bilateral exchange rate?

3.3 Data collection

     I use secondary data from the Bank of Thailand (BOT), Federal Reserve Economic Data (FRED), and Economic and Trade Indices Database (ETID) for the period of January 2001 through December 2019 including 228 months. I use the monthly data of the variables and their measurement as follows:

Table 2: The data of the variables

Variable type	Variable	Data	Units	Source
Dependent Variable	Bilateral exchange rate of Thai baht per U.S. dollar (BIEX)	Exchange rate of Thai baht per U.S. dollar	Bahts	BOT
Independent Variable	Relative price levels (RPL)	consumer price level in Thailand (CPI$_{TH}$) consumer price level in U.S. (CPI$_{US}$) Relative Price Levels $= \dfrac{CPI_{TH}}{CPI_{US}}$	None	ETID and FRED

Variable type	Variable	Data	Units	Source
Independent Variable	Domestic interest rate (DIR)	Interbank overnight lending rate	Percent	BOT
Independent Variable	Foreign interest rate (FIR)	Federal fund rate	Percent	FRED
Independent Variable	Exports (EP)	Exports	Million Dollars	BOT

3.4 Model analysis

I use function from multiple regression model. Then, I test this function by using Ordinary Least Square technique (OLS) in GRETL. The model can be shown as following:

$$BIEX = \beta_0 + \beta_1\, RPL + \beta_2\, DIR + \beta_3\, FIR + \beta_4\, EP + \varepsilon$$

where BIEX represents the bilateral exchange rate of baht value per one U.S. dollar, RPL represents the relative price levels, DIR represents the domestic interest rate, FIR represents the foreign interest rate, EP is the exports and ε represents the error variable.

Chapter 4

Empirical Results

4.1 Descriptive statistics

Table 3: The summary of descriptive statistics

Descriptive statistics	BIEX	RPL	DIR	FIR	EP
Mean	35.5582	0.9723	2.1462	1.5499	14335.2909
Median	34.2316	0.9679	1.7850	1.0200	16075.8250
Standard Deviation	4.4114	0.0226	0.9969	1.6613	5381.1126
Minimum	29.2085	0.9342	0.9600	0.0700	4705.0000
Maximum	45.7229	1.0148	4.9500	5.9800	22385.8800
Count	228.0000	228.0000	228.0000	228.0000	228.0000

The result of descriptive statistics above shows that the mean of bilateral exchange rate (BIEX) is 35.5582 bahts per U.S. dollar. The median, minimum and maximum for bilateral exchange rate is 34.2316, 29.2085 and 45.7229 bahts per U.S. dollar respectively. Also, its standard deviation is 4.4114.

The mean of relative price levels **(**RPL**)** is 0.9723. The median, minimum and maximum for relative price level is 0.9679, 0.9342 and 1.0148 respectively. Also, its standard deviation is 0.0226.

The mean of domestic interest rate (DIR) is 2.1462 percent. The median, minimum and maximum for domestic interest rate is 1.7850, 0.9600 and 4.9500 percent respectively. Also, its standard deviation is 0.9969.

The mean of foreign interest rate (FIR) is 1.5499 percent. The median, minimum and maximum for relative price level is 1.0200, 0.0700 and 5.9800 percent respectively. Also, its standard deviation is 1.6613.

The mean of exports (EP) is 14,335.2909 million dollars. The median, minimum and maximum for relative price level is 16,075.8250, 4,705.0000 and 22,385.8800 million dollars respectively. Also, its standard deviation is 5381.1126.

4.2 Multicollinearity

Table 4: The test of multicollinearity

	BIEX	RPL	DIR	FIR	EP
BIEX	1.0000				
RPL	-0.6746	1.0000			
DIR	-0.0647	0.1206	1.0000		
FIR	0.4366	-0.5419	0.5606	1.0000	
EP	-0.8978	0.6831	-0.0549	-0.4471	1.0000

On the grounds of, the correlation matrix among the independent variables is not exceeded ± 0.8. Therefore, there is no multicollinearity in this model.

4.3 Heteroskedasticity

Table 5: The test of heteroskedasticity

Breusch-Pagan test for heteroskedasticity
Test statistic: LM = 5.735404
p-value = P (Chi-square (4) > 4.704879) = 0.219799

On the grounds of testing heteroskedasticity, the p-value is 0.219799, in which is exceeded than 0.05. Therefore, there is no heteroscedasticity in this model.

4.4 The empirical results

Dependent variable	BIEX
R-squared	0.8382
Adjusted R-squared	0.8353
P-value (F)	0.0000

Table 6: The empirical results tested by OLS

Variable	Coefficients	Standard Error	t-ratio	P-value
Intercept	36.2345	8.8852	4.0780	0.0001***
RPL	11.0057	9.4851	1.1600	0.2472
DIR	-1.0778	0.1835	-5.8720	0.0000***
FIR	0.5944	0.1288	4.6160	0.0000***
EP	-0.0007	0.0000	-22.6100	0.0000***

Note: *** is significant at 1%

4.5 Interpretation

From the empirical result, the multiple regression equation is shown below:

BIEX = 36.2345 + 11.0057 RPL -1.0778 DIR + 0.5944 FIR - 0.0007 EP

According to the empirical results, the p-value (F) of this model is 0.0000. Hence, this model is valid. Also, the R square is 83.82%, so it indicates this model can explain 83.82 percent. The results show that the domestic interest rate deriving from the overnight interbank lending rate, the foreign interest rate deriving from the federal fund rate and exports are statistically substantial to the bilateral exchange rate of Thai baht against the U.S. dollar. However, the relative price levels are not significant to this quotation.

The relative price levels are not significant because its p-value is 0.2472. It indicates that the relative price levels do not impact on the bilateral exchange rate of Thai baht against the U.S. dollar, in which do not follow the theory that an uprising in the relative price levels induces the Thai baht depreciation. The coefficient is 11.0057,

which implies that if relative price levels increase by one, the value of Thai baht per one U.S. dollar rises by 11.0057, holding other factors constant. This result is similar to Isse & Ibrahim (2017), in which they examined that inflation is not substantial to the exchange rate. However, Hsieh (2009), Chaiphat (2017) and Li et al. (2019) found that the larger inflation differential causes the changes in their home currencies.

The domestic interest rate is significant at 1% because its p-value is 0.0000. It indicates that the domestic interest rate impacts on this quotation. The coefficient is   -1.0778, which implies that if the domestic interest rate increases by one percent, the value of Thai baht per one U.S. dollar declines by 1.0778, holding other factors constant. It has the same direction following the theory, which is an uprising in the domestic interest rate induces the Thai baht appreciation. The relationship is along with Siriratana (2020) and Chaiphat (2017). However, Chow and Kim (2004) and Abdoh et al. (2016) found that the domestic interest rate do not influence the changes in exchange rates.

The foreign interest rate is significant at 1% because its p-value is 0.0000. It indicates that the foreign interest rate impacts on this quotation. The coefficient is 0.5944, which implies that if foreign interest rate increases by one percent, the value of Thai baht per one U.S. dollar soars by 0.5944, holding other factors constant. It has the same direction following the theory, which is an uprising in the foreign interest rate induces the Thai baht depreciation.

Finally, the exports are significant at 1% because its p-value is 0.0000. It indicates that the exports impact on this quotation. The coefficient is -0.0007, which implies that if exports increase by one million dollars, the value of Thai baht per one U.S. dollar falls by 0.0007, holding other factors constant. This result has the same direction following Abdoh et al. (2016) and Chaiphat (2017), which is an uprising in the exports induces the Thai baht appreciation.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This study scrutinized four macroeconomics variables impact on the bilateral exchange rate of Thai baht per the U.S. dollar in the period of January 2001 through December 2019. The empirical evidence showed that the domestic interest rate deriving from the overnight interbank lending rate, the foreign interest rate deriving from the federal fund rate and exports impact on the bilateral exchange rate of Thai baht per the U.S. dollar. Nevertheless, the relative price levels do not impact on this quotation. The relative price levels are not substantial because according to PPP, the relative price levels will exist in the long run rather than the short run period. The changes in relative price levels will combine and reflect the changes in bilateral exchange rate of Thai baht per the U.S. dollar in the longer period than the period in this study. Besides, the domestic interest rate is essential and causes baht strengthens because when Thai interest rate surges, the foreigners are interested to invest in Thailand. Thence, this would increment the foreign investment in Thai bonds and deposits. For this reason, it leads an uprising in capital inflows and the demand for Thai baht expands, so it causes baht strengthens. Also, the foreign interest rate is significant and leads baht weakens because when the United Stated changes the policy by boosting the federal fund rate up, it will attract Thai investors to invest in the U.S. government bonds and U.S. treasuries. In that event, it will accrue the capital outflows and the demand for Thai baht falls resulting in baht weakens. Furthermore, the exports are substantial because when Thai exports grow, the demand for Thai baht will amplify and causes Thai baht strength. All in all, relative price levels do not impact, yet domestic interest rate, foreign interest rate and exports impact on this bilateral exchange rate.

5.2 Recommendations

Notwithstanding, there are other factors causing the movement of bilateral exchange rate. For further study, it may apply other fundamental factors such as money supply, current account, foreign direct investment, etc. Furthermore, in the current situation, the Thai currency is quite fluctuated owing to the trade war and world economic stagnation. Some foreign investors choose Thai currency as a safe haven for short-term financing. It would cause Thai baht more strengthen because foreign investors demand more Thai baht. Therefore, the Bank of Thailand needs to closely monitor the movement of the short-term investment and hot money from aboard so as to maintain the exchange rate into the stability level and move in line with economic foundations. The Bank of Thailand can manage the baht strengthens through transmission mechanism by declining the policy interest rate. Besides, the capital control is an alternative way to command the overwhelming capital inflows. According to the volatilities of the exchange rate, sometimes it is difficult to predict or expect. Even the speculators are able to lose from the speculations. Therefore, the exporters and importers should do the hedge so as to against the risk from the fluctuation of the exchange rate. Foreign exchange risk management is a good way to protect the risk. The entrepreneurs would not be worried much about fluctuations of exchange rate. Also, they are able to forecast the revenues and expenses in advance. It makes the business sectors have the low currency risk and grow sustainably in the future. The entrepreneurs can hedge the risk by using the forward, future, option, or local currency for their trading. The forward contract is a private contract, in which locks a certain rate today and has the obligation to deliver the underlying assets at a certain date in the future. Besides, the future contract is alike to the forward contract, but it is more standardized, in which the size of contract is not able to be customized privately. Moreover, the option is the right to buy or sell at the later date, in which the entrepreneurs pay only the premium and make a decision again whether they should exercise in the future. Additionally, using the local currency of bilateral trade is a good way to avoid the fluctuations of baht against U.S. dollar. The traders between Thailand and ASEAN counties can use their local currencies for their transferring transactions as

well. Furthermore, the advantage of using local currencies is the traders being able to
negotiate with each other to get some discounts directly.

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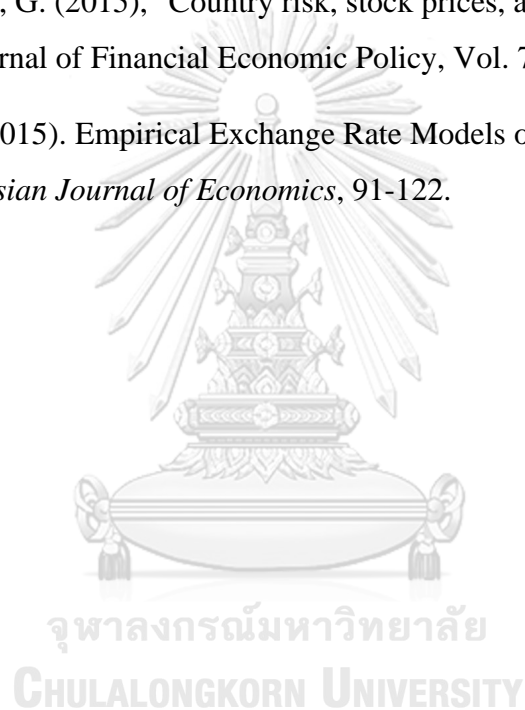
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