The Impact of Bilateral Exchange Rate on Trade Between Thailand and China

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ABSTRACT

The purpose of this article is to investigate the impact of the real exchange rate volatility on trade between Thailand and China. It focuses on the monthly aggregate export and import of Thailand to China for the full period from 1997 to 2011. And the full period will divided into sub period 1997:6 to 2000:5 and 2000:6 to 2011:12. Therefore our findings are summarized as follows: First, the GLS (Generalised Least Square) regression indicates real exchange rate volatility have positive impact on aggregate export between Thailand and China in period 1997:06 to 2000:12. Because the finance crisis make the exchange rate of Thai have uncertainty and volatility. But the real exchange rate volatility has no impact on aggregate import of Thailand from China in the same time. Second, the GLS (Generalised Least Square) regression indicates the real exchange rate volatility have no impact on aggregate export and import between Thailand and China in period 2000 to 2011 and 1997 to 2011. And the real exchange rate has no impact on trade between Thailand and China in the same time. On the other hand, the GDP of importing countries turn out to have positive effects in every period. So it know that the aggregate export and import of Thailand and China depend on the income of population, if the income is bigger, the export and import will bigger.
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CHAPTER 1

INTRODUCTION

1.1 Background and Problem Statement

With the development of economic globalization and trade liberalization, the regime and movement of exchange rate greatly influence over the world. In open economy system, the exchange rate volatility and the balance of trade need to pay close attention to thoroughly investigate. At first, the macroeconomic policies of the government depend on the trade of balance relative to the total trade that whether judge with the same reasonable levels. Realizing how the movements of exchange rate affect the balance of trade in the long term and can help the government determine the target of the trade balance in a certain period. Second, the movements of the trade have a significant impact on the national income. Therefore, understanding how the movements of exchange rate affect the balance of trade can help the governments determine the target of the national income and trade structure. The movements of exchange rate may lead to the change of the total trade, but the change of exchange rate is a relatively stagnant process. Because the impact of exchange rate volatility on trade is very worthy to research, and academics have a lot of research in this.

As it is well known, the exchange rate implements the function of transfer pricing in the international economy, the movement of exchange rate have a profound impact on a county’s balance of payments and domestic economic activity, so the regime of exchange rate is an important part of macroeconomic policy. Since China reformed and opened to the outside world, the exchange rate of RMB implemented two major reforms. At first: China has maintained a de-facto fixed exchange rate of Chinese RMB against the US dollar since 1994. Second, the reform of the exchange rate regime -based on the market supply and demand with referencing a basket of currencies- opted for a managed floating exchange rate system on July 2005. The reform can increase the flexibility of exchange rate and greatly enhance the volatility
of exchange rates. Thailand has adopted the managed-float exchange rate for Thai baht against the US dollar with the help of International Monetary Fund since 1997. This system allows price stability and carries the growth of Thailand's economy.

Since the Breton-Woods system of fixed exchange rate broke down in 1973 and the Jamaica system has been building, a debate began to emerge in economic circles as to the impact of exchange-rate volatility on the performance of international trade, the resulting increase in exchange rate variability has introduced uncertainty into trading relationships worldwide. This debate is still going on because there is no consensus among economists to date on how exchange rate volatility influences trade volume from either a theoretical or an empirical perspective. McKenzie (1999) surveys both the theoretical and empirical contributions found in the literature which have addressed the relationship between exchange rate volatility and trade flows.

The relationship between exchange rate movements and trade performance has been investigated in a number of empirically and theoretical studies, often with conflicting results. This literature review shows that the variety results, frequently for identical countries, may stem from empirical evidence being extracted from different time periods and different methodologies. For example, Sercu and Uppal (1997) argue that when considering the impact of exchange rate volatility on trade flows, identifying the source of the increase in exchange rate volatility is important. It is surprising that there are very few studies that analyze the relationship between exchange rate variability and foreign for China and Asian Countries, especially is Thailand and China.

Exchange rates' impact on trade is a controversial issue. The main issue appears to be the effectives of nominal exchange rate changes on real deprecation or appreciation. Moreover, researchers wonder whether real exchange rate changes improve or worse trade balance. Empirical evidence shows that changes in the real exchange rate have effect trade exchange rate changes on the trade balance is unclear. This paper will concentrate weather the real exchange rate volatility improve, worse or no impact the trade flows between Thailand and China.

To measure exchange rate volatility is an essential issue of international
finance management since exchange rate movement is main source of uncertainty for many counties. But existing empirical evidence is rather puzzled. Several studies find a strong significant relationship between exchange rate volatility and trade, more than a few studies have found the weak results and subsequent insignificant correlations between exchange rate volatility and aggregate trade. This study focuses on Thailand and China. And the real exchange rate may be have a significant positive effect on aggregate trade, or may be no have or may be have negative effect. Tantatape (2002) indicates that foreign real income does not seem to be a significant determinant of Thailand’s trade balance, and real exchange rate plays a very important role on Thailand’s trade. Therefore, the foreign income has impact on trade. Judging from the available documents, the research of the bilateral exchange rate and trade issues are rarely seen between the China and other trading partners. Especially the bilateral exchange rate and trade issue between China and Thailand. Therefore, it is necessary to conduct an empirical research to the relationship of the bilateral exchange rate and trade between China and Thailand as in detailed combine with theoretical investigation.

In this paper, additional evidence on the effect of exchange rate volatility on trade flows is presented. Specifically, this study investigates the impact of exchange rate volatility on the China exports to the Thailand for the period 1997-2011 in the context of export and import model. The paper differs from the majority of papers that investigated the relationship between exchange-rate volatility and trade in a number of ways. Firstly, the data of analyzed in the study have not been used before to examine the impact of exchange-rate volatility on trade between in China and Thailand using 15 years data. Secondly, this study uses an export and import function, and not the standard model used in the literature, to investigate the relationship between exchange-rate volatility and volume of trade. Third, many papers previously published as special attention is given to the export volatility, but disaggregate sectoral trade data is also analyzed.

So this paper explores the impact of the exchange rate on the trade flows between China and Thailand. Furthermore, using GLS (Generalized Least Square) to
study the export and import model by using the monthly data of period 1997-2011. The Bank of Thailand (2012) Thailand has adopted the Monetary targeting regime between July 1997 and May 2000 and adopted inflation targeting regime since June 2000 to present. So this paper will divide full-period into two sub-period. The full-period is 1997/06-2011/12. And the sub-period is 1997/06-2000/05, and 2000/06-2011/12.

1.2 Exchange Rate Behavior of Thailand and China

Exchange rate is the quantity of one currency required to buy or sell one unit of the other currency, it determined the competitiveness of a country’s products on the international markets. As an important macroeconomic variable, exchange rate has an important effect on trade.

In an era characterized by increasingly intergraded national economics the exchange rate is the key relative price in open economies. As such, a great deal of attention has been focused on characterizing its behavior. In a view of the rapid growth in Thailand-China trade over the past 15 years and plans by the two countries for ever faster growth in the future, it is becoming increasing imports to understand the origins of the exchange rate behavior between these two countries.

Figure 1 demonstrates gradual nominal exchange rate movements of the Thailand baht against Chinese RMB since June 1997 to Dec 2011 over a 15-year time period. From June 1997 to Jan 1998 has revalue against Chinese RMB and the period of major depreciation of the Thailand baht against Chinese RMB began in 1998 and it has continuously depreciated at an average rate of 0.15. The trend in the exchange rate, throughout Dec 2007 to June 2009, has slowed down. From the Figure 1, nominal exchange rate was almost constant from 1999 to 2011. And it show that the strong fluctuation for the period 1997-2000, because it happen finance crisis make movement strong.

Figure 2 demonstrates gradual real exchange rate movements of the Thailand Baht against Chinese RMB since June 1997 to Dec 2011 over a 15-year time period. It show that real exchange rate were not constant and showed substantial fluctuations
for the same time period mainly due to fluctuating relative price between Thailand and China.

**Figure 1** Monthly Nominal Thai Baht Exchange Rate Against Chinese RMB From 1997–2011. (Source: Bank of Thailand.)

**Figure 2** Monthly Real Thai Baht Exchange Rate Against Chinese RMB From 1997–2011. (Source: Bank of Thailand.)
1.2.1 The Exchange Rate Behavior in Thailand

According to report by Bank of Thailand (1998), the country has adopted three types of exchange rate regimes during the past four decades from early 1960 to 2012. Thailand adopted a floating exchange rate regime before 1963. However, this regime was ended on 20 October 1963 and was linked to U.S. dollar at a rate B20.80 per U.S. dollar. In order to retain the pegged exchange rate, the gold content of Thai Baht had reduced for several times. To avoid the continuous reduction of gold reserves, the BOT introduced a 4.5% fluctuation range in May 1972 and up-valued the official rate to B20.00 per U.S. dollar in July 1973. In March 1978, the exchange rate regime was changed from one that was pegged to the U.S. Dollar to a system of pegging to a weighted basket currency of Thailand's major trading partners. The Effective Rate was established and the Baht's link to U.S. Dollar was broken. Afterwards, the Effective Rate was placed a controlled and was allowed to float within a limited range (Controlled Floating Rate). Starting the last quarter of 1984 to the second quarter 1997, the baht was officially pegged to a basket of major trading partner’s currencies. The basket of currencies was revised for twice and composed of 10 currencies of Thailand's major trading partners. A substantial and fast depreciation of the baht was observed shortly after the switch from a fixed to a floating exchange rate, during the period of 1984-1997, the Exchange Equalization Fund (EEF) defended the Baht value against the U.S. Dollar by using some monetary and financial measures in line with the pegged exchange rate regime.

Since 2 July 1997, Thailand has adopted the managed-float exchange rate regime, of which the value of the Baht is determined by market forces. The Bank of Thailand would intervene in the market only when necessary, in order to prevent excessive volatilities and achieve economic policy targets. The floating regime enhances flexibility and efficiency in monetary policy implementation and increases confidence of domestic and international investors. According to report by Bank of Thailand (2012), Thailand received financial assistance from the International Monetary Fund (IMF), while the IMF program, a monetary targeting regime was
adopted. Under this regime, the Bank targeted domestic money supply using the financial programming approach in order to ensure macroeconomic consistency as well as to reach the ultimate objectives of sustainable growth and price stability. The Bank would set the daily and quarterly monetary base target. On which its daily liquidity management was based, Daily liquidity management was essentially aimed to ensure against excessive volatility in interest rates and liquidity in the financial system,

Thailand adopted inflation targeting regime since May 2000 to present. After the IMF program, the Bank made an extensive reappraisal of both the domestic and the external environment and concluded that the targeting of money supply would be less effective than the targeting of inflation. The main cause for change was that the relationship between money supply and output growth became less stable over time, particularly since the financial crisis. With the exit from the IMF program, it became necessary for authorities to identify a new policy anchor which would be appropriate for Thailand. The Bank of Thailand announced the adoption of inflation targeting in May 2000, with a main objective of maintaining price stability. Given the institutional reforms required for an inflation targeting framework to operate successfully, it was envisaged that inflation targeting would help rebuild confidence and credibility of the central bank and monetary

1.2.2 The Exchange Rate Behavior in China

The developing China history of exchange rate regime divided into three stages. The first stage is the period of dual exchange rate regime (1981-1993). The second stage is the period of a single and relatively fixed exchange rate regime (1994-2005). The third stage is the period of managed floating exchange rate regime base on the market (from 2005 to now). The situation of export and import is not different on the different period of exchange rate regimes.

After a few reductions in the exchange rate of RMB, this reduced the price of the international market and makes the competitiveness of product increase during the period of the dual exchange rate regime, the depreciation of the RMB make the cost
of foreign direct investment declined under a certain degree and can use the cheap labor in China, to promote the structure change from the resource-intensive to labor-intensive.

After the exchange rate regime change in 1994, the exchange rate of RMB appreciates slowly, it make the price of export goods increase and the price of import goods decrease, thereby affecting the profits of related products. And the labor-intensive products are still the main manufactured goods of export in China.

The Chinese RMB was pegged to US Dollar since July 2005. China introduced a managed floating exchange rate regime and this has promoted its gradual appreciation against almost all major trading currencies with the exception of the euro. The appreciation of RMB increase the production cost of enterprise, which further damps the price advantage of labor-intensive products and have a significant affect the exports of product.

1.3 The Trade Behavior between Thailand and China

![Figure 3](image-url)

**Figure 3** Thailand Monthly Aggregate Exports to China from 1997 to 2011. Thailand Aggregate Monthly Import Form China Form 1997 to 2011. Source: Bank of Thailand.

As is well known, the relationship between Thailand and China has been positive and constructive since diplomatic ties between two countries were established 15 years ago. The China-ASEAN Expo Secretariat (2002) shows that the “zero
tariffs” preferential policies related to the China-ASEAN Free Trade Area (CAFTA) has effect boosted the trade between China and Thailand from the China-ASEAN’s statistical data. The Zero tariffs make the trade increases as quickly as possible between Thailand and China. According to Chinese customs statistics, Sino-Thai bilateral trade in 2010 amount to 18615 billion baht, an increase of 38.6%, of which: export 4785 billion baht, up to 48.6% and imports of 1155 billion baht, and increase of 33.3% (Figure3). so the Thailand is the one of major trading partners of the China., Sino-Thai bilateral trade in 2010 amount to 1595 billion baht, and increase of 37.9%, increase more than 5.9% in the Thailand against the Global trade. Of which, export is 8470 baht an increase of 33.2%, so the China became the second export markets of the Thailand. And import is 8470 billion baht; an increase 42.3%, the China is the second largest source of imports in the Thailand. (Figure3)

It starts trade relation between Thailand and China in 1976 after the official restoration of diplomatic ties in 1975. From the statistical of IMF, the first trade agreement between the two countries was signed on March 31, 1978. The major objectives of the agreement were the setting up of trade volume targets and promotion of trade expansion. Sakurai [1995] indicated that by the end of the 1980s Thailand achieved a high rate of economic growth as a result of an economic boom in direct foreign investment from overseas and its expanded exports of manufactured goods. At the same time, stronger measures to liberalize trade and promote investment were implemented. This resulted in growth and development during in the late 1980s. The Thailand-China Subcommittee on Co-operations in Economic, Trade, Investment and Tourism was establishing on March 12, 1975. The major objective of Subcommittee was to develop and strengthen trade cooperation between Thailand and China. However, this subcommittee was given up in May, 2010, after the changing of the Thai government from the Democrat to the Thai Rak Thai Party in early 2001. Look at the figure 3, Thailand-China’s foreign trade has been considerably increasing since 1997. From 1997 to 2002, the total trade of the two countries to about 31 percent and then increased more sharply after China’s accession to the World Trade Organization (WTO) on December 11, 2001.
Although Thailand-China’s foreign trade had upward trends since the early 1990s, it was fluctuating. The two countries’ trade peaked with a growth rate of 61.5 percent in 2000, owing to the high economic growth of Thailand and the huge devaluation of the renminbi (RMB) in early 1999 (from 5.8 to about 8.3 RMB per US dollar). Since 1996, the foreign trade of Thailand and China had slowed down due to Thailand’s declining GDP growth and economic crisis in 1996 and 1997. In the midst of the economic crisis faced by Thailand in 1998, Thailand-China’s foreign trade growth bottomed to -10.5 percent. Due to the economic recovery and the high devaluation of the Thai baht after the crisis, however, which led to much cheaper exports from Thailand to China, the foreign trade of Thailand and China picked up once again, with a growth rate of 21.4 percent and 43.7 percent in 1999 and 2000, respectively.

In 2001, the foreign trade of Thailand and China slowed down again to only 5.5 percent growth rate due to the GDP slowdown of Thailand and global recession caused by the US’ dot.com crisis but then recovered afterwards. (Figure 3) In 2002, after China’s WTO accession, foreign trade growth of the two countries grew to 30.1 percent and trade between the two countries further grew at impressive rates. Thailand’s export growth to China increased more than 60 percent in 2003, which was 4 times higher than average total export growth of Thailand.

In 2003, the trade between Thailand and China obtained great achievements again, the zero tariffs led the Sino-Thai trade grow, the growth rate is up 48.4% and the total trade is 127 billion dollar. In 2004, the total trade of the Sino-Thai is 5,320 billion baht, of which China import from Thailand is 2,485 billion baht and the value of export is 2,836 billion baht. In 2008, the total trades of Sino-Thai reach to 12,775 billion baht, of which China import from Thailand is 161.9 billion dollar and the value of the export is 7000 billion baht. The total trade value increase 138.36% from 2004 to 2008, 20.06% higher than the average of ASEAN (Association of Southeast Asian Nations). The total trade of Sino-Thai amounted to 13,370 billion baht, of which the import is 8,680 billion baht and the export is 4,657 billion baht form Thailand to China in 2009. (Figure 3)

In 2010, the bilateral trade value between China and Thailand reached 1,748
billion baht, an increase of more than 30 percent from 2009. In December 2011 Thailand’s officially recorded export to China about 62,986 billion baht and its import from China were 81,025 billion baht, Thailand exports to China grow very rapidly during the 1999s, and have continued to grow since 2011. (Figure3). By contrast China export to Thailand is very big in the period 1999 to 2011. As above, the Thailand is the one of major trading partners of the China. The China became the second export markets of the Thailand.

1.4 Research Objectives

The objective of this paper, therefore aims to study the impact of the exchange rate volatility on trade between Thailand and China using monthly data for the period 1997/06-2011/12.

1.5 Research Questions

Six specific questions are addressed:

1. Is the GDP of China a significant determinant of export from Thailand to China?

2. Is the GDP of Thailand a significant determinant of import of Thailand from China?

3. Is the real exchange rate a significant determinant of export from Thailand to China?

4. Is the real exchange rate a significant determinant of import of Thailand from China?

5. Is the real exchange rate volatility a significant determinant of exports from Thailand to China?

6. Is the real exchange rate volatility a significant determinant of imports of Thailand from China?
1.6 Scope of Study

There may be difference in the impact exchange rate volatility on trade across countries. So, this paper will explore the impact of real exchange rates on trade balance between Thailand and China. Despite the impact of exchange rate variability on trade has been investigate in a number of empirical and the theoretical studies, but the effects of exchange rate movements on the trade flow still not well understood. This paper will divide three data to analysis the impact of exchange rate and aggregate trade between Thailand and China. The paper will divide the full period (1997/06-2011/12) into two sub period: 1997/07-2000/05, and 2000/07-2011/12.

1.7 Expected Benefits

The following are the expected benefit from the study:

1. Importers and exporters are beneficial from this study. Because by understanding the research result, if the real exchange rate has a significant impact on trade, exporters and importers will use the certain way to improve the profit. If the real exchange rate has no impact on trade, exporters and importers can not consider the exchange rate issue and adopt the other way to improve the profit.

2. The government is beneficial from this study. Because by understanding the effect of exchange rate on trade, the government can adjust the exchange rate. If the exchange rate became higher, the purchase power of importing countries will decline and make the flow export of one’s own country will decline. At last, it made the income of people decrease. Therefore, the government adjusts the exchange rate and the purpose is to raise the living standard of the people.

3. The general public is beneficiaries from this study. By understanding the research result when the real exchange rate have a significant effects on trade, which will lead to price hikes, the purchasing power will decline.
1.8 Operation Definition

**IMF:** International Monetary Fund- an international body that coordinates loans to countries and establishes fiscal policies used in international trade. The IMF plays three major roles in the global monetary system. The fund surveys and monitor economic and financial developments, lends funds to countries with balance-of-payments difficulties, and provides technical assistance and training for countries requesting it.

**The export:** In international trade, the export is to ship the goods and services out of the port of a county.

**The import:** The import is to bring the goods and service into the port of a country.

**GDP (Gross Domestic Product):** GDP is a macroeconomic measure of the value of output economy adjusts for price changes. The number reached by valuing all the productive activity within the country at a specific year’s price. When economic activity of two or more time periods is valued at the same year’s price, the resulting figure allows comparison of purchasing power over time, since the effects of inflation have been removed by maintaining constant price.

**Nominal exchange rate:** Nominal exchange rate are established on currency financial markets call” forex market”, which are similar to stock exchange markets, Rates are usually established in continuous quotation, with newspaper reporting daily quotation(as average or finishing quotation in the trade day on a specific market).

**CPI:** Consumer Price Index, a measurement of prices for a range of consumer products. It represents the majority of the country population and measure all urban consumer and there spending habits. It is calculated urban areas and provides a fairly good look at how much inflation has occurred in the country. This type of index is widely used and similar in most way to cost of living index.

**Real exchange rate:** Real exchange rate is nominal exchange rate corrected somehow by inflation measures.
Volatility of real exchange rate: The relative rate at which the real exchange rate moves up and down. Volatility if found by calculating the annualized Standard deviation of daily change in price. If the real exchange rate moves up and down rapidly over short time periods, it has high volatility. If the exchange rate almost never changes, it has low volatility.

The rest of the paper is structured as follow: Chapter 2 presents the theoretical framework used in the analysis, Chapter 3 outlines how the variable included in the econometric models are measured and reports the source of data, and Chapter 4 discusses the empirical results. The last section contains a summary and conclusions.
CHAPTER 2

REVIEW OF LITERATURE

2.1 The Effect of Exchange Rate on Trade

The relationship of exchange rate and trade balance is an important basis for the foreign policy of the country. Classic economic theory says that the relationship of exchange rate and trade balance have focused on Marshall-Lerner condition and J-curve. Most of the studies assessing the impact of currency depreciation on the external account of a country have focused on the well known Marshall-Lerner condition, which is a long run effect and the J-curve is the short-run effect.

Bahmani-Oskooee (1986) analysis that the Marshall-Lerner condition was not satisfied in Thailand, implying that devaluation of the bath could not improve Thailand’s trade balance in the long run. The Marshall-Lerner condition is actually said to be an indirect way of assessing the effectiveness of devaluation. More recently studies try to relate a measure of the trade balance directly to the exchange rate and estimate a trade balance model. Given the adjustment lags in the short run, the focus has shifted to tracing the short-run dynamics which comes under the heading of the J-curve. In estimating the J-curve effect, researchers establish a direct link between a measure of the trade balance and one of its major determinants, the real exchange rate. Bahmani-Oskooee (1985) found the evidence of significant J-curve effects, testing mostly revolves around variants of the two-country imperfect substitute model to obtain the necessary estimate of the price elasticity by using structural demand functions. Rose and Yellen (1989) has found that a very little evidence of a reliable long-run relationship between the real trade balance and the real exchange rate and no evidence at all for J-curve effects only of U.S trade with German and finance. Hernan Rinco (1999) examined the relationship between trade balance and exchange rate test for Marshall-Lerner condition in Colombia using Johansen-Juselius method. His empirical results provided significant evident for Marshall-Lerner condition. Boyd (2001) use the VARDL (Vector Autoregressive Distributed Lag) and ARDL
(autoregressive-distributed lag) model to co-integration the relationship of real exchange rate volatility and total trade by the quarterly data of the OECD (included United, England, French, Japan, Canada, Italy, and Holland and so on) countries, to found that the Marshall-Lerner condition is to hold and have the J-curve. Onafowora (2003) findings suggest that Indonesia and Malaysia in their bilateral trade to both the US and Japan, and for Thailand in its bilateral trade to the US, which are short run J-curve effects.

Because the Marshall-Lerner condition and J-curve affects only analysis the empirical data of individual counties and come to the conclusion and which do not have general applicability. So this paper will not research it. And the study will explain whether exchange rate volatility hampers trade flows between Thailand and China.

A numerous studies have attempted to find the nature of the relationship between exchange rate volatility and trade and reported both positive and negative in theoretically and empirically. The IMF (1984) survey of the effects of the effects of exchange rate variability on world trade concludes that: “The large majority of empirical studies on the impact of exchange rate variability on the volume of international trade are unable to establish a systematically significant link between measured exchange rate variability to establish a systematically significant link between measured exchange rate variability and the volume of international trade, whether on an aggregate or on a bilateral basis.” A detailed literature survey on the effects of exchange rate volatility on trade has been outlined in this Chapter (see Table 1, 2 and 3). Several theoretical studies such as Ethier (1973); Clark (1973); Baron (1976); Cushman (1986); Peree and Steinherr (1989) have shown that an increase in exchange rate volatility will have adverse effects on the volume of international trade. Other theoretical studies have demonstrated that increased volatility can have ambiguous or positive effects on trade volume: for instance, Viaene and de Vries (1992), Franke (1991) and Sercu and Vanhulle (1992). Numerous empirical studies have been conducted to investigate whether trade is
influenced by exchange rate volatility. It is widely believed that increased exchange rate volatility inhibits the growth of foreign trade. Negative effects of exchange rate uncertainty on trade flows are reported by many authors. They have all found that exchange-rate risk depresses trade flows. However, studies by Hooper and Kohlhagen (1978), Gotur (1985), Bailey et al. (1986, 1987), McKenzie (1998), Aristotelous (2001), Bailey and Tavlas (1988), Bahmani et al. (1993), and Gagnon (1993), among others, do not find any significant relationship between exchange-rate volatility and trade. On the other hand, McKenzie and Brooks (1997), Klein (1990), Franke (1991), Giovannini (1988), Brada and Mendez (1988), Asseery and Peel (1991), Kasman and Kasman (2005), Sercu and Vanhulle (1992), Doyle (2001) and Bredin et al. (2003) have found positive effects of exchange rate volatility on trade.

2.1.1 Negative Effect

Table 1 list all the negative effect paper. There are some studies that indicate a negative relationship between exchange rate volatility and international trade flow. It is often believed that exchange rate volatility should have negative impact on international trade since at least Ethier (1973). Hooper and Kohlhagen (1978) which empirically tested for the effects of volatility and found a negative relationship.
<table>
<thead>
<tr>
<th>Paper</th>
<th>Sample Period</th>
<th>Nominal or real exchange rate used</th>
<th>Countries and Estimation technique used</th>
<th>Main Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cushman’s (1983)</td>
<td>1970-1982Q</td>
<td>Real</td>
<td>OLS</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Akhtar and Hilton (1984)</td>
<td>1974-81Q</td>
<td>Nominal</td>
<td>German and U.S. OLS</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Caballero and Corbo (1989)</td>
<td>1960-1990Q</td>
<td>Real</td>
<td>Chile, Colombia, and Peru OLS</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Savvides (1992)</td>
<td>1973-1986Q</td>
<td>Real</td>
<td>OLS</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Ghura and Greenes (1993)</td>
<td>1972-1987M</td>
<td>Real</td>
<td>Africa countries OLS</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Doroodian (1999)</td>
<td>1993-1996Q</td>
<td>Nominal</td>
<td>India, South Korea, and Malaysia GARCH</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Paper</td>
<td>Sample Period</td>
<td>Nominal or real exchange rate used</td>
<td>Countries and Estimation technique used</td>
<td>Main Result (continue)</td>
</tr>
<tr>
<td>--------------------------</td>
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</tr>
<tr>
<td>Arize et al. (2000)</td>
<td>1980-1999 Q</td>
<td>Real</td>
<td>13 countries, including Thailand, GARCH</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Paper</td>
<td>Sample Period</td>
<td>Nominal or real exchange rate used</td>
<td>Countries and Estimation technique used</td>
<td>Main Result (continue)</td>
</tr>
<tr>
<td>--------------------------------------</td>
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</tr>
<tr>
<td>Saang Joon Baak (2007)</td>
<td>1996-2006M</td>
<td>Real</td>
<td>Hong Kong and Japan co integration error correction models</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Shoaib Ahmed, Shoaib (2009)</td>
<td>2003-2008 M</td>
<td>Real</td>
<td>Bangladesh and the other countries cointegration and error correction models</td>
<td>Negative effect</td>
</tr>
<tr>
<td>Junnan Zhao (2010)</td>
<td>1991-2007 Q</td>
<td>Real</td>
<td>New Zealand cointegration and error correction models</td>
<td>Negative effect</td>
</tr>
</tbody>
</table>

**Notes:** A stands for annual, Q stands for quarterly and M stands for monthly.

From the Table 1 known that Cushman’s (1983) finding which indicated that there was a significant negative effect on trade quantity from the real exchange rate risk or volatility in many cases. Using time series methods since the data were quarterly over the period 1970-1982. The empirical results support generates using the OLS regression. Akhtar and Hilton (1984) show that the Nominal bilateral exchange
volatility measure to estimate an export demand equation for German and U.S. Since
the data were quarterly over the period 1974-1981. The empirical results support
generates using the OLS regression. It concludes that there is a strong negative effect
of nominal exchange rate uncertainty on the exports between German and US.
Caballero and Corbo (1989) show that the real bilateral exchange-rate volatility
measure to estimate an export demand equation for six countries, among them Chile,
Colombia, and Peru. Since the data were quarterly over the period 1960-1990. The
empirical results support was generated using the OLS regression. It concludes that
there is a strong negative effect of real exchange-rate uncertainty on the exports of all
these countries. Bini-Smaghi (1991) using the standard deviation of weekly rates of
changes in effective exchange rate as a volatility measure and derives a significant
negative relationship. In particular, the data were quarterly over the period 1970-1990.
The empirical results support was generated using the OLS regression. Savvides
(1992) decomposed exchange rate volatility into its anticipated and unanticipated
components and tested the hypothesis that only the unanticipated component
significantly affects trade flows. The study conducted for sixty-two Industrial and
developing economies covering the period 1973-1986 found that unanticipated
exchange rate volatility inhibited the growth of exports of the developing countries. It
concludes that there are unanticipated volatility has a stronger negative effect on trade
flows than does anticipated volatility.

From the Table 1.Ghura and Greenes (1993) in exploring the effect of
exchange rate volatility on the trade flow of sub-Saharan Africa countries. Gauging
exchange rate volatility by the coefficient of variation and utilizing data covering the
period 1972-1987, the study found that exchange rate volatility had a significantly
negative and robust impact on trade flows. The study however, focused exclusively on
the fixed exchange rate era and therefore did not investigate the likely impact of
increased volatility during the flexible exchange rate period on trade flows. Doroodian
(1999) investigated the impact of exchange rate volatility on the export volume of
three developing countries, i.e., India, South Korea, and Malaysia. Since the data were
quarterly over the period 1973–1996, the measure of exchange rate volatility was
generated using the GARCH approach. The empirical results supported the notion that the GARCH-based measure of exchange rate volatility had a significantly negative impact on the exports of all three countries. Wei (1999) estimates a panel of 63 countries during the year 1975, 1980, 1985, and 1990. He examined a total of over 1,000 country pairs. Using switching regressions, the author found that, for country pairs with large potential trade, exchange-rate volatility had a negative and significant effect on bilateral trade among the countries considered. Rauch (1999) develops a justification for different disaggregate trade behavior based on the business networks involved in international trade and incomplete information. It concludes that the effect of exchange rate uncertainty is negative and significant for the great majority of trade. Arize et al. (2000) is another study that looked at the link between measures of exchange rate uncertainty and again, He found that the exchange rate uncertainty has a significantly negative impact on export volume of all 13 counties, including Thailand. Husan Verigil (2001) investigates the impact of real exchange rate volatility on the export flows of Turkey to the United States and its three major trading partners in the European Union for the period 1990:1-2000:12. Cointegration and error-correction models are used to obtain the estimates of the cointegration relations and the short-run dynamics, respectively. It evidence that the real exchange rate volatility has a significant negative effect on real exports. Rahmatsyah (2002) found that the negative impact for exports to Japan inconclusive for exports to USA, by using the data of quarterly during the 1970-1997. Arize Osang Slottje (2005) investigates empirically the impact of real exchange-rate volatility on the export flows of eight Latin American countries over the quarterly period 1973-2004. Estimates of the cointegrating relations are obtained using the error-correction technique. The major results show that exert a significant negative effect upon export demand in both the short-run and the long-run in each of the eight Latin American countries. Saang Joon Baak (2007) indicate that the exchange rate volatility has negative impacts on export either on the short run by using co integration test and estimations of error correction models between Hong Kong and Japan. Exchange rate is the quantity of one currency required to buy or sell one unit of the other currency, it
determined the competitiveness of a country’s products on the international markets. As an important macroeconomic variable, exchange rate has an important effect on trade. Saang Joon Baak (2008) examines the impacts of the real exchange rate between the RMB and the US dollar on the trade between the two countries with the quarterly data from 1986 to 2006. And show that the volatility of exchange rate turned out to negatively influence the Chinese exports to the US, but not to have any influence on the US export to China. Md Shoaib Ahmed, Shoaib (2009) investigate the exchange rate volatility and it impacts on bilateral exports growth: evidence from Bangladesh. The countries are considered to determine based on the bilateral relationship between Bangladesh and the other countries under a range of regional economic blocks such as North America, Western Europe, Eastern Europe, SAARC, ASEAN, and Asia-Pacific regions. To establish the empirical relationship between exchange rate volatility and impact on exports growth, cointegration and error correction techniques are used by considering the data from 2003 to 2008. From the investigation, the result shows that the exchange rate volatility has a negative and major effect both in short run and long run with important trading partners, which are Western European and North American countries. Junnan Zhao (2010) empirically investigates the impact of real exchange rate volatility on the real bilateral export flows of New Zealand by using quarterly data over 1991Q1-2007Q1 period. Cointegration and error-correction models are employed to obtain the estimates of the long run equilibrium and the short-run dynamics, respectively. We analysis the ignored potential structure breaks which might bias the results, and provide evidence that real exchange rate volatility has a significant negative effect on real exports in the long run, but a weak positive effect in the short run for New Zealand.

2.1.2 Positive Effect

In contrast, some studies demonstrate a positive effect of exchange rate volatility on international trade. The table 2 lists all the positive effect paper. Coes (1981) uses a log-level specification to examine Brazilian exports (annual data for
1965–1974) and concludes that a significant reduction in exchange-rate uncertainty in the country's economy during the crawling-peg era had a positive effect on the country's exports after the crawling peg was adopted in 1968. Gotur (1985) finds that the effect of volatility is significantly positive for Japan’s aggregate exports. The data were quarterly over the period 1970-1982. The empirical results support generates using the OLS regression.
<table>
<thead>
<tr>
<th>Paper</th>
<th>Sample Period</th>
<th>Nominal or real exchange rate used</th>
<th>Countries and Estimation technique used</th>
<th>Main Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahmani-Oskooee (1986)</td>
<td>1973-1983</td>
<td>Nominal</td>
<td>Brazil, Greece, India, Israel and Thailand</td>
<td>A long run positive effect</td>
</tr>
<tr>
<td>Medhora (1990)</td>
<td>1976-82A</td>
<td>Nominal</td>
<td>OLS Benin, Burkina Faso, Côte d'Ivoire, Niger, Senegal, and Togo</td>
<td>Not significant and positive effect</td>
</tr>
<tr>
<td>Asseery and Peel (1991)</td>
<td>1972-87Q</td>
<td>Real</td>
<td>OLS - ECM</td>
<td>Significant and positive except for UK</td>
</tr>
</tbody>
</table>
Table 2 Exchange Rate Volatility and Trade: Positive Effect

<table>
<thead>
<tr>
<th>Paper</th>
<th>Sample Period</th>
<th>Nominal or real exchange rate used</th>
<th>Countries and Estimation technique used</th>
<th>Main Result (continue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasman &amp; Kasman (2005)</td>
<td>1982-2001Q</td>
<td>Real</td>
<td>Cointegration, ECM</td>
<td>Significant positive effect on export</td>
</tr>
</tbody>
</table>

Note: A stand for annual, Q stand for quarterly and M stand for monthly. ECM is mean error correction modeling, VAR is mean autoregressive, and VD is mean variance decomposition.

Bahmani-Oskooee (1986) employed a distributed lag structure to assess import and export demand functions for a sample of seven developing countries (Brazil, Greece, India, Israel and Thailand) during the 1973-1983 and found that trade flows
are more responsive to change in the relative prices and the exchange rate in the long run. De Grauwe (1988) stressed that the dominance of income effects over substitution effects can lead to a positive relationship between trade and exchange-rate volatility. This is because, if exporters are sufficiently risk averse, an increase in exchange-rate volatility raises the expected marginal utility of export revenue and therefore induces them to increase exports. De Grauwe suggested that the effects of exchange-rate uncertainty on exports should depend on the degree of risk aversion. The empirical results support generates using the Gravity model. Klein’s (1990) study examined the effects of real exchange rate volatility on specific categories of bilateral exports from the United States over the period 1978 to 1986, from which he concludes that real exchange rate volatility may stimulate export supply by risk-neutral firms through its effects on their expected profits. It comprehensively test the impact of exchange rate uncertainty on U.S. monthly bilateral sector exports to six major industrial countries and generally finds that uncertainty has a positive effect on the value of trade. Medhora (1990) indicate that the exchange rate volatility has positive impacts on export either on the short run by using OLS to regression during the period 1976 to 1982, comprised six countries Benin, Burkina Faso, Côte d'Ivoire, Niger, Senegal, and Togo. Asseery and Peel (1991) indicate that the exchange rate volatility have a significant positive effect on export by using the OLS and ECM to estimate the result over the quarterly period from 1972 to 1987 and find that bilateral exchange rate changes and exchange rate volatility do play an active role on trade. McKenzie and Brooks (1997) analyses the effect of exchange rate volatility on Germany-US bilateral trade flows for the period 1973:4–1992:9. ARCH models are used to generate a measure of exchange rate volatility and are then tested against Germany's exports to, and imports from, the US. This paper differs from many papers previously published as the effects of volatility are found to be positive and statistically significant for the period under review. The debate over the use of real or nominal exchange rate data in the derivation of volatility estimation is also addressed. Kasman & Kasman (2005) analyses the effect of exchange rate volatility on bilateral trade flows over the quarterly period from 1992 to
2001 and find that the bilateral exchange rate changes and exchange rate volatility do play an active role on trade. Cointegration and error correction models are used to generate a measure of exchange rate volatility, it indicate that the exchange rate volatility has a significant positive effect on export. Poon (2005) examines the relationship between exchange rate volatility and exports of the five selected East Asian economies. A measure of the quantitative proxy of the exchange rate risk is constructed, focusing on the role of moving-average in smoothing the persistence of the risk measure. Vector autoregressive (VAR) model, error correction modeling (ECM), and variance decomposition (VD) are applied to characterize the joint dynamics of variables in both the short and long run. The Johansen results indicate a stable long-run relation between exports and exchange rate. Results show that a great fluctuation of exchange rate volatility has significantly impacted the volume of exports for the economies concerned. Abdulhusain (2010) is to examine empirically the effects of exchange rate movements on trade performance with reference to the Sri Lanka-China trade relationship over the quarterly period from 1993 to 2007 and find that bilateral exchange rate changes and exchange rate volatility do play an active role on trade, while income growth changes have less influence in determining the total exports and imports between two countries. These show a strong positive relationship between real exchange rate volatility and distance between trading partners. Since distance cannot be affected by volatility, this strong relationship suggests that greater distance between countries significantly increase bilateral exchange rate volatility through the effect of distance on the intensity of commercial relationship such as trade.

2.1.3 Little or No Effect

Still other papers conclude that volatility has no discernible impact on the volume of international trade. Table 3 lists all the little or no effect paper. Gotur (1985) indicate that the exchange rate volatility has little to no impacts on export by using OLS regression. Willett (1986) nothing that the empirical evidence up to that time had not revealed the expected reduction of trade, hypothesizes that this had been
because international risk increase in the floating period, but international and domestic risk had behaved differently. Rose (1989) utilized the “imperfect substitutes” model to analyze the relationship between the effective real exchange rate and real aggregate trade balance of five major OECD countries: the United Kingdom, Canada, Germany, Japan, and the United States. He found no relationship between these two variables. Kyriacos (2001) found that exchange rate volatility did not have an effect on the volume of British export to the US. Kyriacos Aristotelous (2001) finds that exchange rate volatility did not have an effect on the volume of British exports to the US. This finding supports those who point out that exchange rate volatility may have no impact on trade and may have an effect in some other fashion such as on prices or direct foreign investment. Aristotelous (2001) that finds the exchange-rate volatility does not have any effect on the performance of the British export to the United States during the period of 1889-1999. Tang (2003) analyzing the annual time series data from 1970 to 1999 and estimates China’s aggregate import demand function, shows the volume of import have a long-run equilibrium relationship with domestic economic activity and relative price. Tenreyro (2007) analyzing the exchange rate volatility does not have a significant impact on trade of 87 countries and using the annual data on bilateral exports during the 1970-1997. Bahmani-Oskooee and Kovyaryalova (2008) and Bahmani-Oskooe and Mitra (2008) analyzing the impact of exchange rate uncertainty on trade flows with reference to commodity trade between two countries found that exchange rate uncertainty has more short-run effects than long-run effects. Dimitrios and Paul (2006) show that the impact of exchange rate volatility on real aggregate export of the countries: Norway, Poland, Hungary, Switzerland for 1973:q1 2006:q4. It uses the standard deviation of moving average of the log of real exchange rate as a measure of exchange rate volatility. The empirical results support was generated using the Cointegration, regression. Over all results suggest that exchange rate volatility has no major effects on aggregate export for the E.U. countries. Wool-Baharumshah (2010) investigates the impact of real exchange rate (REX) volatility on the trade performance of six East Asia emerging market economies several break dates were detected in the data
generating process (GDP) of REX and volatility series over the sample period 1990:1 to 2008:12. It use the panel cointegration test and find that the exchange rate fluctuation have no effect or even a positive effect on international trade. Bahmani-Oskooee (2011) concentrate on the trade flows between Malaysia and the U.S Over the period 1985 to 2010. After showing that exchange rate volatility has neither short-run nor long-run effect on the trade flows between the two countries, we disaggregate the trade data by industry and consider the experience of 101 U.S. exporting industries to Malaysia and 17 U.S. importing industries from Malaysia. While exchange rate volatility seems to have significant short-run effects on the trade flows of most industries, short-run effects translate into the long run only in a limited number of small industries.
### Table 3 Exchange Rate Volatility and Trade: No Effect

<table>
<thead>
<tr>
<th>Paper</th>
<th>Sample Period</th>
<th>Nominal or Real exchange rate used</th>
<th>Countries and Estimation technique used</th>
<th>Main Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gotur (1985)</td>
<td>1974-82Q</td>
<td>Nominal</td>
<td>OLS</td>
<td>Little to no effect</td>
</tr>
<tr>
<td>Bailey, Tavlas and Ulan (1986)</td>
<td>1973-84Q</td>
<td>Nominal</td>
<td>OLS</td>
<td>Not significant, mixed effects</td>
</tr>
<tr>
<td>Bailey, Tavlas and Ulan (1987)</td>
<td>1962-85Q</td>
<td>Nominal &amp; Real</td>
<td>OLS</td>
<td>Little to no effect</td>
</tr>
<tr>
<td>Bailey and Tavlas (1988)</td>
<td>1975-86Q</td>
<td>Nominal</td>
<td>OLS</td>
<td>Not significant effect</td>
</tr>
<tr>
<td>Rose (1991)</td>
<td>1975-1990Q</td>
<td>Real</td>
<td>OLS the United Kingdom, Canada, Germany, Japan, and the United States</td>
<td>No relation and no effect</td>
</tr>
<tr>
<td>Akhtar and Hilton (1991)</td>
<td>1974-81Q</td>
<td>Nominal</td>
<td>OLS</td>
<td>Not significant, mixed effect</td>
</tr>
</tbody>
</table>
In sum, the impact of exchange rate volatility on foreign trade is an empirical issue because theory alone cannot determine the sign of the relation between foreign trade and exchange-rate volatility. And the papers listed above contributed to deepening our understanding of some issues related to exchange rates and the trade.

2.2 Nominal or Real Measure of Exchange Rate Volatility

One recurring question in the debate on the effects of exchange rate volatility is whether it is real or nominal exchange rate volatility which enters into the decision making function of trader. Much of the early theoretical and empirical work in the field chose to focus on nominal exchange rate volatility. But the recently papers focus on real exchange rate volatility. The impact of real exchange rate changes on trade is currently a controversial issue. The main issue appears to be the effectiveness of nominal exchange rate changes on real depreciation or appreciation. Moreover, researchers wonder whether real exchange rate changes improve or worsen trade balance. Empirical evidence shows that changes in the real exchange rate have

<table>
<thead>
<tr>
<th>Paper</th>
<th>Sample Period</th>
<th>Nominal or Real exchange rate used</th>
<th>Countries and Estimation technique used</th>
<th>Main Result (continue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gagnon(1993)</td>
<td>1975-1990Q</td>
<td>Real</td>
<td>Simulation analysis</td>
<td>Not significant effect</td>
</tr>
</tbody>
</table>

Note: A stands for annual, Q stands for quarterly and M stands for monthly. ECM is mean error correction modeling; OLS is mean Ordinary Least Square.
affected trade balanced in some countries, but not in all countries. This implies that the direction of the impact of real exchange rate changes on the trade balance is unclear.

Most early studies, including Ahbrahms (1980) and Tursby (1987) document a large negative effect of nominal variability on trade. Gotur (1985) argues along such lines, stating that over the medium-term time horizon adopted by traders, “the real exchange rate is the more relevant measure because the effects of uncertainty on a firm’s revenues and cost that arise from fluctuations in the nominal exchange rate are likely to be offset in large part by movements in costs and prices”. Rodrick (1986) showed a positive coefficient on import volume in four of the 11 countries on real exchange rate volatility. Koray and Lasrape (1989) mention that using real exchange rate is theoretically appealing though fail to substantiate this claim. And studies from the 1990s, including Frankel and Wei (1993) report that the volatility of exchange rate have a small effect on trade. Belanger (1992) considers the impact of nominal exchange rate uncertainty on real sectoral US imports from Canada and concluded that exchange rate variability does not significantly depress the volume of trade. But Silvana Tenreyro (2001) indicates that the nominal exchange rate variability has no significant impacts on trade flows. Klein’s (1990) study examined the effects of real exchange rate volatility on specific categories of bilateral exports from the United States over the period 1978 to 1986, from which he concludes that real exchange rate volatility may stimulate export supply by risk-neutral firms through its effects on their expected profits. Bahmani-Oskooee and Ratha (2008) found that US trade flows are sensitive to real exchange rate in most of trading partner.

2.3 The Ways to Measures of Exchange Rate Uncertainty
There are a number of possible ways to measure exchange rate volatility, including, moving average standard deviations, ARCH-based measures and higher frequency standard deviations. Early studies examined countries’ aggregate trade, often using a variant of ordinary least squares (OLS) to test models that include a number of explanatory variables. These usually fail to find significant effects. Gotur (1985) use a
function of importer’s income and finds that the effect of volatility is significantly positive for Japan’s aggregate exports, but insignificant for imports. Bailey (1987) run 33 OLS regressions for the export of 11 OECD countries and fined that Japan’s volatility coefficients are all insignificant. Thursby (1987) use the gravity model, Linder hypothesis and exchange rate risk. Two of the 17 countries yielded a positive coefficient on the exchange rate risk variable although neither was significant at the 95% level of significance Koray and Lastrappe (1989) use VAR models to examine whether exchange rate volatility affects the volume of trade. They find that exchange rate volatility explains only a small of imports and exports. Brada and Mendez (1988) using a gravity model of bilateral trade and finding that even though exchange rate volatility reduce trade, its effect is smaller than that of restrictive commercial polices. Frankel and Wei (1993) using an instrumental-variables approach, also conclude that the effect of exchange rate volatility on trade is small. Pozo (1992) used a GARCH model to quantify volatility in the US-British exchange rate and found significant negative effects on trade volume. Kroner and Lastrapes (1993) using a multivariate GARCH-in-mean model, find that an increase in volatility may be associated with an increase in international trade. Mckenzie and Brooks (1997) exam US-German bilateral trade flows and using an ARCH derived measure of volatility found a positive and significant impact of exchange rate volatility on export and imports. Mkenzie (1998) using the ARCH and GARCH models to generate a measure of exchange rate volatility which is then tested in a model of Australian imports and exports. Doroodian (1999) using the GARCH approach to measure the impact of exchange rate volatility on the export volume of the India, South Korea and Malaysia. Doroodian (1999) investigated the impact of exchange rate volatility on the export volume of three developing countries, i.e., India, South Korea, and Malaysia. Since the data were quarterly over the period 1973–1996, the measure of exchange rate volatility was generated using the GARCH approach. Arize (1997) taken explicit account of this nonstationarity by employing new techniques of multivariate cointegration and error-correction modeling. Lal and lowinger (2002) used the Johansen cointegration technique to find that the long-run impact of devaluation on
the trade balance is insignificant. Aristotelous (2002), Arize (2000), Chowdhury (1993) and Hassan and Tufte (1998) among others, this study also examines the long-run relationship between exchange rate volatility and exports by performing co-integration test and the short-run impacts of exchange rate volatility on export by estimating error-correction(EC)models. Along with exchange rate volatility, GDP of the importing country and real bilateral exchange rate also employed as explanatory variables of real export volumes. In estimating these effects, we follow the approach introduced by Arize, Osang, and Slottje (2000) who examine the impact of exchange-rate volatility on the export flows for thirteen LCDs using both co-integration and error-correction techniques. Based on that approach, we find that the variability of the real exchange rate had a negative effect on export demand for China and Thailand, both in the short and the long run. Onfrowora (2003) using the cointegrating vector error correction model to examines the short run and long run effects of real exchange rate changes on the real trade balance of three ASEAN countries to the US and Japan..A review article by Bahmani-Oskooee and Ratha(2004) reveals that the application of cointegration and error-correction modeling methods provides a useful method of estimating the short-run and the long-run effects of currency depreciation on the trade balance. Baum (2004) main contribution relates to how uncertainty is modeled and they note that GARCH measures are model dependent and a moving window conflates uncertainty over time periods. But Tenreyro (2004) adopts a similar approach to Rose (2000) by using gravity equations for aggregate country data and considers the impact of uncertainty on trade. Kyriacos (2001) uses a generalized gravity model to investigate the relationship between exchange-rate volatility and volume of trade. And he thinks that the Gravity models have a remarkably consistent history of success as an empirical model that explains the volume of trade between countries. But Arize, Osang and Slottje (2008) estimates of the short-run dynamics are obtained for each country utilizing the error-correction technique.

In estimating these effects, we follow the approach introduce by Arize, Osang and Slottje (2000) who examine the impact of exchange-rate volatility on the export
flows of thirteen LDC using error-correction techniques. And Onafowora (2003) uses cointegration analysis and the error correction model to examine the relationships between the real trade balance and real exchange rate for three ASEAN countries-Thailand, Malaysia, and Indonesia-in their bilateral trade to the US and Japan over the quarterly period 1980:1 to 2001:4. A key feature of these studies, compare to earlier work, is the application of a time-series econometric methodology that test for unit roots and cointegration. SaangJoon Baak (2008) show that the estimated coefficient values of the error correction terms included in the error correction models were all significant and negative, confirming the presence of cointegrating vectors detected in the coberturaion test. However, estimation results of the error correction models did not clearly present the short-run impacts of the explanatory variables on the exports.

In a word, GLS are used to generate a measure of exchange rate volatility which is then tested in a model of China-Thailand imports and exports. We use the standard deviation of monthly exchange rate changes to obtain an annual uncertainty measure.

From the above, it will research the effect of exchange rate on trade between Thailand and China, there are many papers about China, Chou (2000) analyzing the quarterly data for the period from quarter of 1981 to the fourth quarter of 1996, shows exchange rate variability has a long-run negative impact on the Chinese exports. Tang (2003) estimates China’s aggregate import demand function using the annual time series data from 1970 to 1999 and reports the volume of import have a long-run equilibrium relationship with domestic economic activity and relative price. Among these few papers, Zhang (1999) analyze the monthly data for the period from January 1986 to January 1997 and concludes that the reform had exchange rate moderately influence the trade balance in the long-run in China.

Even though the papers listed above contributed to deepening our understanding of some issues related to exchange rates and the Chinese trade, it is surprising that the impacts of the value of the RMB on the bilateral trade between
China and its trading partners have rarely been studied, considering recent appreciation pressure aims to reduce the trade deficit of partner countries. As above mentioned about the China, there are many papers about Thailand. Rose (1991) finds that there a little evidence of significant impacts of the real exchange rate significantly impacts the bilateral trade balance between Thailand and its major trading partner. Upadhyaya and Dhakal (1997) show that the Thailand are long run impact of devaluation on the trade balance is insignificant. Baharumshah (2001) estimated a bilateral trade balance model between Thailand and the US in one relation and between Thailand and Japan in another relation. Both studies concluded that devaluation of the Thai baht could improve Thailand’s trade balance with the partner’s country.

### 2.4 Conceptual Framework

The conceptual framework has been drawn from reviewing the literature as per the objective of the study. In sum, the studies conclude that the GDP may be have an impact on trade and may be no impact on trade between countries. Tantatape (2002) shows the GDP have significant impact on aggregate trade. The real exchange may be having positive, negative or no impact on trade between counties. Poon (2005) show the exchange rate no has significant relationship on trade. The volatility of exchange rate may be have a positive, negative or no impact on trade between countries. Studies by Gotur (1985), McKenzie (1998) do not find any significant relationship between exchange rate volatility and trade. On the other hand, Franke (1990), Doyle (2001) has found positive effects of exchange rate volatility on trade. Cabalero and Vittorio (1989) have presented models which show how volatility my impact either positively and negatively on trade. Rose and Yellow (1989) research the volatility exchange rate and trade in USA and found it have no significant relationship.

Therefore, the figure 4 shows conceptual framework developed for the study.
GDP
- Tantatap (2002)
- Abdulhusain (2010)

Real exchange rate
- Arize et al. (2000)
- Poon (2005)

Exchange rate volatility
- Dimitrios and Paul (2006)
- Saang Joon Baak (2008)

Export
- Shoaib Ahmed, Shoaib (2009)

Import
- Shoaib Ahmed, Shoaib (2009)

Figure 4 Conceptual Framework
3.1 The Export and Import Functions

3.1.1. The Model

Many of the studies that have assessed the effects of exchange rate uncertainty have modeled the quantity of exports or imports as a function of the importing country's income, a measure of relative price, and a proxy for volatility. And trade balance is usually measured as the difference between the total export and imports. As above, many studies using a variant of OLS (ordinary least squares) to test models that include a number of explanatory variables, but these can not find significant effects. Because the ordinary least squares (OLS) estimate the model that will provide the possibly unequal error variance and for correlations between different errors. Therefore, many studies use the unit root test and cointegration to adjust the model, and then use the ordinary least square (OLS) to estimates the coefficient of the function. But a common application of GLS estimation is to time-series regression, in which it is generally implausible to assue that errors are independent. Therefore, this paper use GLS (Generally Least Square) with the export functions and estimates the coefficient of the function to understand the relationship between exports volumes and the explanatory variables, including the bilateral real exchange rate between the Chinese RMB and the Thai Baht. In the absence of commodity price data, We follow the studies of Chowdhurry (1993) and Hassan and Tufte (1998) or Bahmani-Oskooee (2002), Bahmani-Oskooee SaangJoon (2008)and Hegerty (2009) and use the (CPI-based) real exchange rate as the measure of the relative price level.

Following the typical specification of other articles, the relationship between exports and other economic variables is examined in this paper to have following functional form:
\[ \ln X_t = \alpha_i + \beta \ln Y_t^{\text{China}} + \gamma \ln REX_t + \delta \ln VOL_t + \epsilon_t \quad (1) \]

And

\[ \ln M_t = \alpha_i' + \beta' \ln Y_t^{\text{TH}} + \gamma' \ln REX_t + \delta' \ln VOL_t + \epsilon_t' \quad (2) \]

Where: \( \ln \) represents natural logarithm, \( X_t \) is the Thailand aggregate export to China and \( M_t \) is the aggregate import by Thailand from China. Model (1) we expect an estimate of \( \beta \) to be positive indicating an increase in Thailand export earnings due to economic growth in trading China. Similarly, Model (2) we expect an estimate of \( \beta' \) to be positive due to economic growth in the Thailand. \( Y_t^{\text{China}} \) express as gross domestic product of China and \( Y_t^{\text{TH}} \) express as gross domestic product of Thailand. \( REX_t \) is bilateral real exchange rate. \( VOL_t \) is the volatility of the bilateral real exchange rate and \( \epsilon \) is a disturbance term. Volatility is proxies by the within-year standard deviation of percentage changes in the monthly observation of \( REX_t \). Numerous volatility measures have been used in the literature: Real bilateral exchange rate between the Thai baht and China RMB, volatility measure of the real bilateral exchange rate (REX). Following De Vita and Abbot (2004) and Bahmani-Oskooee and Mitra (2008), for each year, it is defined as the standard deviation of the monthly percentage in the real exchange rate within that year. Therefore, using time series methods since the data were monthly over the period 1997-2011. The empirical results support generates using the GLS regression.

3.1.2 GDP

The GDP of the China or Thailand is commonly used as a proxy measure for economic activity of the China or Thailand in much literature dealing with quarterly or annual data. Accordingly, the variable \( Y_t^{\text{China}} \) in model (1) is defined to be the GDP of the China. \( Y_t^{\text{TH}} \) in model (2) is defined to be the GDP of Thailand. In the case
of China and Thailand, monthly GDP are not report. Instead, the quarterly data of GDP are report from 1997 to 2011. Then, the monthly data are computed from these quarterly data.

3.1.3 Real Bilateral Exchange Rate

The real exchange rates are included in the export equations of these papers and are computed in the conventional way as follows:

\[ p_{jt} = \ln(E_{jt} \times \frac{CPI_t}{CPI_j}) \]  

Where \( P_{jt} \) symbolizes the real monthly exchange rate in natural logarithm scale. \( E_{jt} \) is the nominal monthly exchange rate. \( CPI_t \) and \( CPI_j \) denote monthly consumer price index of an exporting country \( t \) and importing country \( j \), respectively.

Finally, it should be noted that this paper employs not the nominal exchange rate but the real exchange rate as an explanatory variable. Nominal exchange rate if the THB against the Chinese RMB did not move at all or moved just slightly for a substantial part of the time period covered in the research. Saanog Joon BAAK (2008) for example nominal exchange rates were almost constant from 1997:06 to 2011:12, implying that the nominal exchange rate cannot play a role as an explanatory variable of the Chinese exports. However, the real exchange rate, which are employed as one of the explanatory variables in this paper, were not constant and showed substantial fluctuations for the same time period mainly due to fluctuating price between Thailand and China. Figure 1 and Figure 2 illustrates their movements. The issue of constant nominal exchange rates have discussed above chapter 1.

3.1.4 Real Exchange Rate Volatility

The present study applies the standard deviation of exchange rates as the measure of the exchange rate volatility. Specifically, the real exchange rate volatility is defined as the natural logarithm of the standard deviation of monthly real exchange
rates for a certain time period. The volatility exchange rates are computed in the
conventional way as follow:

\[
\sigma_t = \ln \left( \frac{1}{n} \sum_{k=k_0}^{m} (\overline{RER}_{jk} - \overline{RER}_j)^2 \right),
\]

(4)

Where \( t \) represents a month and \( k \) a day, \( \overline{RER}_{jk} \) is a daily real exchange
rate, \( \overline{RER}_j \) is the mean of \( \overline{RER}_{jt} \)'s from \( k = tm \) to \( k = tm \), \( tm \) and \( tm \) are the last
and the first day include in the computation of \( \sigma_t \), respectively. \( k = 0 \) is defined to
be the last day in quarter \( t \), \( k = 1 \) is one day earlier than that, and so on. Real
exchange rates were derived by dividing the nominal exchange rate by the price
index.

3.2 Data

We use the monthly data collect from June 1981 and ends in the last month of
2011 in our empirical analysis. The data are collected from the following sources:

(a) Direction of Trade Statistics of IMF, various issues.
(b) International Financial Statistics of IMF (CD-ROM)
(c) The Bank of Thailand.

\( X_t \) = the share of Thailand aggregate exports to the China from Source (c).
\( M_t \) =the volume of Thailand aggregate imports from the China from Source
(c).

\( Y_t^{China} \) = GDP of China is correct from source (b)
\( Y_t^{TH} \) =GDP of Thailand is correct from source (b)

\( pjt = \ln \left( Ejt \times \frac{CPI_t}{CPI_j} \right) \) = Bilateral real exchange rate between Thai baht and
Chinese RMB, when the \( CPI_t \) is the exporter Thailand CPI, and the \( CPI_j \) is
importer China CPI. When the \( CPI_t \) is the CPI of China, \( CPI_j \) is the CPI of
Thailand. $E_{it}$ is the nominal bilateral exchange rate defined as the number of J’s currency per unit of Thai baht per Chinese Yuan. $CPI_t$ of Thailand is correct from (c). $CPI_j$ of China if correct from (a). The nominal exchange rate is correct from (a).

VOL = Volatility measure of the real bilateral exchange rate (REX). Following De Vita and Abbott (2004) and Bahmani-Oskooee and Mitra (2008), for each year, it is defined as the standard deviation of the daily percentage changes in real exchange rate (REX) within that year.

### 3.3 Expected Result

According to the theory of economic, the growth of foreign income will increase the demand of domestic commodities and it will bring income effects. It is expected that the higher the economic activity in the importing country, the higher the demand for exports. Therefore, the value for $\beta$ is expected to be positive. Since a higher real exchange rate implies a lower relative price of the exporting products, the value for $\gamma$ is also expected to be positive. In contrast, since low price of the competitor’s products will have negative impacts on the exports of Thailand, the value for $\gamma$ are expected to be negative. In the analysis, this paper added the effect of exchange rate fluctuation; it reelected the uncertainty of price. This effect remains to be empirical test on the trade of Thailand and China.

In this equation, $Y_t$ is used as a proxy for the level of economic activity in the importing country. It is expected that the higher the economic activity in the importing country, the higher the demand for exports. Therefore, the value for $\epsilon$ is expected to be positive. Since a higher real exchange rate implies a lower relative price.
CHAPTER 4

RESULT ANALYSIS

4.1 Descriptive Statistics

4.1.1 From June 1997 to May 2000 in Model

| Table 4 Descriptive Statistics of Variables in Model (1) |
|-----------------|----------------|----------------|----------------|
| ln (EXPORT)     | ln (GDP)       | ln (EXCHANGE)  | ln (VOL)       |
| Mean            | 8.699584       | 8.875396       | -2.262447      | -5.862714       |
| Median          | 8.651131       | 8.829087       | -2.818043      | -5.957347       |
| Maximum         | 9.186675       | 9.168898       | 12.16735       | -4.039271       |
| Minimum         | 8.113915       | 8.631752       | -5.22436       | -7.539765       |
| Std. Dev.       | 0.228972       | 0.147255       | 2.790484       | 0.863781        |
| Observation     | 36             | 36             | 36             | 36              |

Note: The each variable is natural logarithm and from model 1. EXPORT is stand for the Thailand export to China and the data is monthly data. GDP is stand for China’s GDP. EXCHENG is real exchange rate for Thailand Baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:05. (Source: the Bank of Thailand.)

Using descriptive statistics show the data for the table can be more intuitive understanding of the data distribution. From table 4 can know the each variables and Standard deviation. This show that from June 1997 to May 2000, the logarithm Export of Thailand to China average monthly is 8.699574, the highest value is 9.186675, the lowest value is 8.113915. the standard deviation is 0.228972, explain export of Thailand to China the actual situation in the level or above. Export of Thailand to China is growing trend. The logarithm GDP of China average monthly is 8.875396, the highest value is 9.168898, the lowest value is 8.631752, the standard deviation is 0.147255, so can see GDP of China is growing trend, Thai baht and Chinese Yuan real
exchange value average monthly is -2.262447, the highest value is 12.16735 and the lowest value is -5.22436, a fluctuation is very large. The volatility of real exchange rate average monthly is -5.862714, the highest value is -5.862714 and the lowest is -7.539765, and the fluctuation is large too. The Observation is 36 and mean is that this period using 36 month.

From the standard deviation can know 3 years, the real exchange rate and volatility have wide fluctuations. Because the beginning of the financial crisis in 1997 and Thailand’s economic performance has been dismal. So it will make the exchange rate fluctuate wildly.

**Table 5** Descriptive Statistics of Variables in Model (2)

<table>
<thead>
<tr>
<th></th>
<th>ln (EXPORT)</th>
<th>ln (GDP)</th>
<th>ln (EXCHANGE)</th>
<th>ln (VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>8.876908</td>
<td>12.87659</td>
<td>-1.734652</td>
<td>-5.862714</td>
</tr>
<tr>
<td>Median</td>
<td>8.802546</td>
<td>12.88138</td>
<td>-1.70714</td>
<td>-5.957347</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.415925</td>
<td>12.92762</td>
<td>-1.453563</td>
<td>-4.039271</td>
</tr>
<tr>
<td>Minimum</td>
<td>8.536060</td>
<td>12.81400</td>
<td>-2.101633</td>
<td>-7.539765</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.224472</td>
<td>0.037819</td>
<td>0.105186</td>
<td>0.863781</td>
</tr>
<tr>
<td>Observation</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
</tbody>
</table>

**Note:** The each variable is natural logarithm and from model 2. IMPORT is the import of Thailand from China. GDP is the GDP of Thailand. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:05. (Source: the Bank of Thailand.)

Using descriptive statistics show the data for the table can be more intuitive understanding of the data distribution. From table 5 can know the each variables and Standard deviation. This show that from June 1997 to May 2000, the logarithm import of Thailand to China average monthly is 8.876908, the highest value is 9.415925, the lowest value is 8.536060.the standard deviation is 0.224472, explain export of Thailand to China the actual situation in the level or above. Export of Thailand to
China is growing trend. The logarithm GDP of Thailand average monthly is 12.87659, the highest value is 12.92762, the lowest value is 12.814, the standard deviation is 0.037819, so can see GDP of Thailand is growing trend, Thai baht and Chinese Yuan real exchange value average monthly is -1.734652, the highest value is -1.453563 and the lowest value is -2.101633, the standard deviation is 0.105186. A fluctuation is very large. The volatility of real exchange rate average monthly is -5.862714, the highest value is -5.862714 and the lowest is -7.539765, and the fluctuation is large too. From the standard deviation can know 3 years, the real exchange rate and volatility have wide fluctuations. Because the beginning of the financial crisis in 1997, and Thailand’s economic performance has been dismal. So it will make the exchange rate fluctuate wildly. The Observation is 36 and means that have 36 monthly between June 1997 and Dec 2000.

As above know that the exchange rate and volatility have wide fluctuation, average monthly is -1.734652 and -5.862714, the highest value respectively is -1.453563 and -4.039271, and the lowest are -2.101633 and -7.539765.

**4.1.2 From June 2000 to Dec 2011, by Export and Import Data**

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Descriptive Statistics of Export Variables in Model (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ln(Export)</td>
</tr>
<tr>
<td>Mean</td>
<td>10.26788</td>
</tr>
<tr>
<td>Median</td>
<td>10.43482</td>
</tr>
<tr>
<td>Maximum</td>
<td>11.28681</td>
</tr>
<tr>
<td>Minimum</td>
<td>8.965807</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.625429</td>
</tr>
<tr>
<td>Observation</td>
<td>139</td>
</tr>
</tbody>
</table>

**Note:** The each variable is natural logarithm and from model 1. EXPORT is the Thailand export to China and use monthly data. GDP is the GDP of China. The EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. (Source: the Bank of Thailand.)
Using descriptive statistics show the data for the table 6 can be more intuitive understanding of the data distribution. From table 6 can know the each variables and Standard deviation. This show that from 2000 to May 2011, the logarithm Export of Thailand to China average monthly is 10.26788, the highest value is 11.28681, the lowest value is 8.965807 the standard deviation is 0.625429, explain export of Thailand to China the actual situation in the level or above. Export of Thailand to China is growing trend. The logarithm GDP of china average monthly is 9.749201, the highest value is 10.73166, the lowest value is 8.926003, the standard deviation is 0.492476, so can see GDP of China is growing trend, Thai baht and Chinese Yuan real exchange value average monthly is -1.653728, the highest value is -1.461961 and the lowest value is -1.881974, a fluctuation is very large. The volatility of real exchange rate average monthly is -6.820477, the highest value is -4.721400 and the lowest is -8.982174, and the fluctuation is large too. From the standard deviation can know 3 years, the real exchange rate and volatility have wide fluctuations.

<table>
<thead>
<tr>
<th></th>
<th>ln(Import)</th>
<th>ln(GDP)</th>
<th>ln(EXCHANGE)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>10.43819</td>
<td>13.32880</td>
<td>-1.524434</td>
<td>-6.820477</td>
</tr>
<tr>
<td>Median</td>
<td>10.61504</td>
<td>13.37024</td>
<td>-1.514289</td>
<td>-6.886007</td>
</tr>
<tr>
<td>Maximum</td>
<td>11.41301</td>
<td>13.73008</td>
<td>-1.362918</td>
<td>-4.721400</td>
</tr>
<tr>
<td>Minimum</td>
<td>9.175323</td>
<td>12.88914</td>
<td>-1.705551</td>
<td>-8.982174</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.586919</td>
<td>0.251944</td>
<td>0.082401</td>
<td>0.708184</td>
</tr>
</tbody>
</table>

Note: The each variable is natural logarithm and from model 2. IMPORT is the import of Thailand from China. GDP is the GDP of Thailand. The EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. (Source: the Bank of Thailand.)
Using descriptive statistics show the data for the table can be more intuitive understanding of the data distribution. From table 7 can know the each variable and Standard deviation. This show that from June 2000 to 2011, the logarithm import of Thailand to China average monthly is 10.43819, the highest value is 11.41301, the lowest value is 9.175323. the standard deviation is 0.586919, explain import of Thailand to China the actual situation in the level or above. Import of Thailand to China is growing trend. The logarithm GDP of Thailand average monthly is 13.32880, the highest value is 13.73008, the lowest value is 12.88914, the standard deviation is 0.251944, so can see GDP of Thailand is growing trend, Thai baht and Chinese Yuan real exchange value average monthly is -1.524434., the highest value is -1.362918 and the lowest value is -1.705551, the standard deviation is 0.082401. A fluctuation is very large. The volatility of real exchange rate average monthly is -6.820477, the highest value is -4.721400 and the lowest is -8.982174, and the fluctuation is large too.

4.1.3 From June 1997 to Dec 2012, by Export and Import Data

| Table 8 Descriptive Statistics of Export Variables in Model (1) |
|-------------------|-----------------|-----------------|-----------------|-----------------|
|                  | Ln(Export)      | ln(GDP)         | ln(EXCHANGE)     | ln(VOL)         |
| Mean             | 9.945260        | 9.569447        | -1.778950        | -6.623452       |
| Median           | 10.06379        | 9.534264        | -1.672456        | -6.683912       |
| Maximum          | 11.28681        | 10.73166        | 12.16735         | -4.039271       |
| Minimum          | 8.113915        | 8.631752        | -5.224360        | -8.982174       |
| Std.Dev.         | 0.851451        | 0.567618        | 1.280253         | 0.835816        |
| Observation      | 175             | 175             | 175              | 175             |

Note: The each variable is natural logarithm and from model 1. EXPORT is the Thailand export to China and use monthly data. GDP is the GDP of China. The EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2011:12. (Source: the Bank of Thailand.

Using descriptive statistics show the data for the table can be more intuitive
understanding of the data distribution. From table 8 can know the each variables and Standard deviation. This show that from 1997 to 2011, the logarithm Export of Thailand to China average monthly is 9.945260, the highest value is 11.28681, the lowest value is 8.113915, the standard deviation is 0.851451, explain export of Thailand to China the actual situation in the level or above. Export of Thailand to China is growing trend. The logarithm GDP of china average monthly is 9.569447, the highest value is 10.73166, the lowest value is 8.631752, the standard deviation is 0.567618, so can see GDP of China is growing trend. Thai baht and Chinese Yuan real exchange value average monthly is -1.778950, the highest value is 12.16735 and the lowest value is 5.224360, the standard deviation is 1.280253, a fluctuation is very large. The volatility of real exchange rate average monthly is -6.623452, the highest value is -4.039271 and the lowest is -8.982174, and the fluctuation is large too. From the standard deviation can know 3 years, the real exchange rate and volatility have wide fluctuations.

| Table 9 Descriptive Statistics of Import Variables in Model (2) |
|----------------|----------------|----------------|----------------|
| ln(Export)     | ln(GDP)        | ln(EXCHANGE)   | ln(VOL)        |
| Mean           | 10.11701       | 13.23578       | -1.567679      | -6.623452 |
| Median         | 10.24170       | 13.20853       | -1.533069      | -6.683912 |
| Maximum        | 11.41301       | 13.73008       | -1.362918      | -4.039271 |
| Minimum        | 8.536060       | 12.81400       | -2.101633      | -8.982174 |
| Std. Dev.      | 0.826994       | 0.290236       | 0.121954       | 0.835816  |
| Observation    | 175            | 175            | 175            | 175       |

Note: The each variable is natural logarithm and from model 2. IMPORT is the import of Thailand from China. GDP is the GDP of Thailand. The EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2011:12. (Source: the Bank of Thailand.)

Using descriptive statistics show the data for the table can be more intuitive understanding of the data distribution. From table 9 can know the each variables and Standard deviation. This show that from 1997 to 2011, the logarithm import of
Thailand to China average monthly is 10.11701, the highest value is 11.41301, the lowest value is 8.536060, the standard deviation is 0.826994, explain import of Thailand to China the actual situation in the level or above. Import of Thailand to China is growing trend. The logarithm GDP of Thailand average monthly is 13.23578, the highest value is 13.73008, the lowest value is 12.81400, the standard deviation is 0.290236, so can see GDP of Thailand is growing trend, Thai baht and Chinese Yuan real exchange value average monthly is -1.567679, the highest value is -1.362918 and the lowest value is -2.101633, the standard deviation is 0.121954. A fluctuation is very large. The volatility of real exchange rate average monthly is -6.623452, the highest value is -4.039271 and the lowest is -8.982174, and the fluctuation is large too.

4.2 Pearson Correlation Analysis

Correlation is a statistical technique which determines the extent to which change in value of an attribute is associated with change in other attribute. It shows whether the pairs of variable are related and how strongly they are related. It attempts to measure the linear relation between the variables. Herein, the relationship which is expressed by what is know as the correlation coefficient (r) is represented by a value within the range of -0.5 to +0.5, Understanding the magnitude and the significance of the correlation is obligatory to evaluate the correlation between variables. And if the value more than 0.5, it will represents stronger correlation. If the value less than 0.5, it represents a little correlation.

A correlation coefficient of more than 0.5 indicates that two variables move in the same direction at all times or represents perfect positive correlation. As one variable gets larger, the other variable gets larger too. A correlation of 0 indicates that the movements of the variables are totally random or it represents lack of correlation. A correlation coefficient of -0.5 indicates that two variables move in the opposite direction at all times or it represents perfect negative correlation. Here, as variable gets larger, the other variable gets smaller; it is also known as inverse correlation.
4.2.1 Test of the Relationship between 1997 and 2000

Table 10 The Correlation of The Independent Variables of Model (1) between 1997 and 2000.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ln(GDP)</th>
<th>ln(Exchange rate)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(GDP)</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.361974</td>
<td>1.0000000</td>
<td></td>
</tr>
<tr>
<td>ln(VOL)</td>
<td>0.196332</td>
<td>0.362830</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Note: The each variable is natural logarithm and from model 1. GDP is the GDP of China. The EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:05. (Source: the Bank of Thailand.)

From the table 10 can see correlation of the GDP and Exchange rate is 0.361974, 0.3611974 less than 1, indicate maybe there are a little correlation, and the correlation of GDP and exchange rate volatility is 0.196332, and 0.196332 is less than 0.5, the correlation of GDP and VOL is small too, indicate there are a little correlation. Therefore, the independent variables can be regression together in model (1).

Table 11 The Correlation of the Independent Variables of Model (2) between 1997 and 2000.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ln(GDP)</th>
<th>ln(Exchange rate)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(GDP)</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.345871</td>
<td>1.0000000</td>
<td></td>
</tr>
<tr>
<td>ln(VOL)</td>
<td>0.187749</td>
<td>-0.461318</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Note: The each variable is natural logarithm and from model 1. GDP is the GDP of China. The EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:05. (Source: the Bank of Thailand.)
From the table 11 can see correlation of the GDP and Exchange rate is 0.345871, 0.345871 less than 0.5, indicate may be there are a little correlation, and the correlation of GDP and VOL is 0.187749, the correlation exchange rate and VOL is 0.1877g, both is less than 0.5. Therefore, the independent variables can be regression together in model (2).

4.2.2 Test of the Relation between 2000 and 2011

<table>
<thead>
<tr>
<th>Included observations: 139</th>
<th>2000/06-2011/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>ln (GDP)</td>
</tr>
<tr>
<td>ln (GDP)</td>
<td>1.00000</td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.923914</td>
</tr>
<tr>
<td>ln(VOL)</td>
<td>0.048454</td>
</tr>
</tbody>
</table>

Note: The each variable is natural logarithm and from model 1. GDP is the GDP of China. EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period2000:06 to 2011:12. (Source: the Bank of Thailand.)

From the table 12 can see correlation of the GDP and Exchange rate is 0.923914, 0.923914 more than 1, indicate maybe there are strong correlation, and the correlation of GDP and VOL is 0.04844, 0.04844 less than 0.1, it know that there are almost no correlation, the correlation of exchange rate and VOL is 0.147885, 0.147885 less than 0.5 it know that there are a little relation, From above see, the GDP and exchange rage have strong relation, so they can’t be regressed together. Therefore, the model (1) will be adjusted as follow:

\[ LnX_i = \alpha_i + \beta LnY_i^{China} + \delta LnVOL_i + \epsilon_i \]  \hspace{1cm} (5)

And

\[ LnX_i = \alpha_i + \gamma LnREX_i + \delta LnVOL_i + \epsilon_i \]  \hspace{1cm} (6)
Table 13 The Correlation of The Independent Variables of Model (2) between 2000 and 2011

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ln(GDP)</th>
<th>ln(Exchange rate)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(GDP)</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.612961</td>
<td>1.000000</td>
<td></td>
</tr>
<tr>
<td>ln(VOL)</td>
<td>0.083150</td>
<td>0.218389</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Note: The each variable is natural logarithm and from model 2. GDP is the GDP of Thailand. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. Source: the Bank of Thailand.

From the table 13 can see correlation of the GDP and Exchange rate is 0.612961, 0.612961 more than 0.5, indicate maybe there are strong correlation, and the correlation of GDP and VOL is 0.083150, 0.083150 less than 0.1, it know that there are almost no correlation, the correlation of exchange rate and VOL is 0.218389, 0.218389 less than 0.5 it know that there are a little relation, From above as see, the GDP and exchange rage have strong relation, so they can’t be regressed together. Therefore, the model (2) will be adjusted as follow:

\[ LnM_t = \alpha_i + \beta_i LnY_i^{TH} + \delta_i LnVOL_i + \epsilon_i \]  \hspace{1cm} (7)

And

\[ LnM_t = \alpha_i' + \gamma_i' LnREX_i + \delta_i' LnVOL_i + \epsilon_i' \]  \hspace{1cm} (8)
4.2.3 Test of the Relation Between 1997 and 2011

Table 14 The Correlation of The Independent Variables of Model (1) between 1997 and 2011

Included observations: 175                                 1997/06-2011/12

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ln(GDP)</th>
<th>ln(Exchange rate)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(GDP)</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.220339</td>
<td>1.000000</td>
<td></td>
</tr>
<tr>
<td>ln(VOL)</td>
<td>-0.272229</td>
<td>-0.24437</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Note: the each variable is natural logarithm and from model 1. GDP is the GDP of China. EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2011:12 (Source: the Bank of Thailand.)

From the table 14 can see correlation of the GDP and Exchange rate is 0.220339, 0.220339 less than 0.5, indicate maybe there are a little correlation, and the correlation of GDP and VOL is -0.272229, -0.272229 less than 0.5, the correlation of exchange rate and VOL is -0.24437, -0.24437 less than 0.5 it know that there are a little relation, so it can be regression together. But because this part use full period to regression, this parts it will add dummy into the GLS (Generally Least Square) regressed.
Table 15 The Correlation of The Independent Variables of Model (2)

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ln( GDP )</th>
<th>ln(Exchange rate)</th>
<th>ln( VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln( GDP )</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Exchange rate)</td>
<td>0.151153</td>
<td>1.0000000</td>
<td></td>
</tr>
<tr>
<td>ln( VOL)</td>
<td>-0.239817</td>
<td>-0.266124</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

Note: the each variable is natural logarithm and from model 1. GDP is the GDP of Thailand. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2011:12. (Source: the Bank of Thailand.)

From the table 15 can see correlation of the GDP and Exchange rate is 0.151153, 0.151153 less than 0.5, indicate maybe there are a little correlation, and the correlation of GDP and VOL is -0.239817, |-0.239817| less than 0.5, the correlation of exchange rate and VOL is -0.266124, |-0.266124| less than 0.5. So we know that there are little relations, so it can be regression together because this part use full period to regression, this part will add dummy into the GLS (Generalized Least Square) regressed.

4.3 Generalized Least Squares Regression Results

4.3.1 Regression results of Model (1)

Table 16 GLS Regression Of Model (1) between 1997 and 2000

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>ln(GDP)</th>
<th>ln(Exchange)</th>
<th>ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>10.25656***</td>
<td>-0.100903</td>
<td>0.016341</td>
<td>0.0091643*</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0001</td>
<td>0.6939</td>
<td>0.1136</td>
<td>0.0732</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.533430</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 36. C is constant. GDP is the GDP of China. EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility.
of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:06. The asterisks (*** ) indicate the rejection of the null hypothesis of zero coefficients at the 1% significance level. The asterisks (**) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through table 16 the regression results can see, the P-value of the variable GDP is 0.6939, 0.6938 more than 0.1, is mean the variable China GDP is not significant. The coefficients of the GDP of the China are estimated to be a little significantly negative. The coefficient of GDP is -0.100903 In fact, there coefficients are far greater those of exchange rate. But the beginning of the financial crisis in 1997 and Thailand’s economic performance has been dismal. So the GDP is almost no effect the export function. The P-value Of the variable Exchange rate is 0.1136, 0.1136 more than 0.1, is mean the variable exchange rate is not significant, The P-value of the variable VOL is 0.0732 lower than 0.1, is mean the variable VOL is significant. It is revealed that exchange rate volatility positive influence the Thailand exports. More specifically, one percent increase of the exchange rate volatility turns out to raise the Thailand export by 0.9%.

As above, the real exchange rate volatility has positive impact on the Thailand export to China between June 1997 and May 2000. The finding was consistent with previous findings (Medhora (1990), McKenzie and Brooks (1997), Hwang and Lee (2005), Abdulhusain (2010)). The result of the exchange rate and GDP are no significant. Because Thailand has adopted floating exchanges rate regime and the financial crisis of the 1997 to 2000.
Table 17 GLS Regression of Model (5) between 2000 and 2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(GDP)</th>
<th>Ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>8.673156***</td>
<td>0.206568**</td>
<td>0.012286</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0000</td>
<td>0.0215</td>
<td>0.3284</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.565010</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 139. This table only have GDP and volatility variable. C is constant. GDP is the GDP of China. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. The asterisks (***), (**), (**) indicate the rejection of the null hypothesis of zero coefficients at the 1%, 5%, 10% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through table 17 the regression results can see, the p-value of the variable GDP is 0.0215, 0.0215 lower than 0.05, is mean the variable GDP is strong significant. The p-value of the variable VOL is 0.3284 more than 0.01, is mean the variable VOL is no significant at the significance level. Because from the table 17 can see the GDP and exchange rate have strong relation, so it can’t together regression. It known that only GDP can affect the export and the exchange rate volatility can not affect the export between 2000 and 2011.

As above, the coefficients of the GDP of the China exports are estimated to be significantly positive. One percent increase of the China GDP turns out to raise the Chinese export by 2.6%. But the real exchange rate is no impact on the Thailand export to China in period June 2000 to Dec 2011. The finding was consistent with previous findings (Rose (1991), Gognon (1993), Kyriacos (2001)).
### Table 18 GLS Regression of Model (6) between 2000 and 2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(Exchange)</th>
<th>Ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>10.08719***</td>
<td>-0.554981</td>
<td>0.010126</td>
</tr>
<tr>
<td>P-value</td>
<td>0.000</td>
<td>0.3847000</td>
<td>0.425200</td>
</tr>
<tr>
<td>R-squared*</td>
<td></td>
<td>0.563799</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** The observation is 139. This table only has real exchange rate and Volatility variable. C is constant. EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. The asterisks (***), (**) indicate the rejection of the null hypothesis of zero coefficients at the 1% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through Table 18 the regression results can see, the p-value of the variable exchange rate is 0.3847, 0.3847 more than 0.1. The p-value of the variable VOL is 0.425, more than 0.1, is mean the variable VOL is no significant.

As above, this part only uses the real exchange rate and the real exchange rate volatility regression together, because the GDP and exchange rate have very strong relationship. The real exchange rate and volatility does not have significant influences on the Thailand export. The finding was consistent with previous findings (, (Rose (1991), Gognon (1993), Kyriacos (2001),)

### Table 19 GLS Regression Of Model (1) between 1997 and 2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(GDP)</th>
<th>Ln(Exchange)</th>
<th>Ln(VOL)</th>
<th>Dummy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>9.151559***</td>
<td>0.155731***</td>
<td>0.009898</td>
<td>0.020838</td>
<td>0.053963</td>
</tr>
<tr>
<td>P-value</td>
<td>0.000</td>
<td>0.009898</td>
<td>0.148</td>
<td>0.1075</td>
<td>0.6817</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.977016</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** The observation is 175. C is constant. GDP is the GDP of China. EXCHENG is real exchange rate for Thailand baht against the Chinese Yuan. VOL is the volatility.
of the real exchange rate. Dummy is dependent variable. The data is monthly data over the period 1997:06 to 2011:12. The asterisks (****) indicate the rejection of the null hypothesis of zero coefficient at the 1% significance level. The asterisks (**) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through table 19 the regression results can see, the p-value of the variable GDP is 0.009898, 0.009898 less than 0.01, is mean the variable GDP have strong significant. The p-value of the variable Exchange rate is 0.148, 0.148 more than 0.1, is mean the variable exchange rate is not significant, The p-value of the variable VOL is 0.1075, 0.1075 more than 0.1, is mean the variable VOL is no significant. Because this part is full period, it will add the dummy into this part, The finding was consistent with previous findings (Rose (1991), Gognon (1993), Kyriacos (2001),)

The estimation results reported that the coefficients of the China GDP are estimated to be significantly positive. One Percent increase of the China GDP turns out to raise the Thailand exports by 15%. So the GDP have positive impact export, but the real exchange rate and volatility have not impact on export in period 1997 to 2011.

4.3.2 Import index

Table 20 GLS Regression of Model (2) between 1997 and 2000

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(GDP)</th>
<th>Ln(Exchange)</th>
<th>Ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>7.340687***</td>
<td>0.044914</td>
<td>-0.754491*</td>
<td>0.018562</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0939</td>
<td>0.9751</td>
<td>0.0603</td>
<td>0.6265</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.669726</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 36. C is constant. GDP is the GDP of Thailand. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 1997:06 to 2000:05. The asterisks (****) indicate the rejection of the null hypothesis of zero coefficient at the 1% significance level. The asterisks (**) indicate the rejection of the
null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through table 20 the regression results can see, the P-value Of the variable GDP is 0.9751, 0.9751 more than 0.1, is mean the variable China GDP is not significant. The coefficients of the GDP of the China are estimated to be a little significantly positive. The coefficient of GDP is 0.044914 In fact, there coefficients are far greater those of exchange rate. But the beginning of the financial crisis in 1997 and Thailand’s economic performance has been dismal. So the GDP is almost no effect the export. The P-value Of the variable Exchange rate is 0.0603, 0.0603 less than 0.1, is mean the variable exchange rate is significant, It is revealed that real exchange rate positive influence the Thailand exports. More specifically, one percent increase of the exchange rate turns out to decrease the Thailand export by 0.75%. The P-value of the variable VOL is 0.6265 more than 0.1, is mean the variable VOL is no significant.

As above, the exchange rate has positive impact on the Thailand import from China between June 1997 and May 2000. The exchange rate volatility and GDP are no significant. Because Thailand has adopted floating exchanges rate regime and the financial crisis of the 1997 to 2000. The finding was consistent with previous findings (McKenzie and Brooks (1997), Abdulhusain (2010))

Table 21 GLS Regression of Model (7) between 2000 and 2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(GDP)</th>
<th>Ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>-19.39792***</td>
<td>2.239821***</td>
<td>0.002159</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.8934</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.552366</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 139. This table only has GDP and volatility variable. C is constant. GDP is the GDP of Thailand. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. The asterisks (***
indicate the rejection of the null hypothesis of zero coefficient at the 1% significance level. The asterisks (**) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Resource: the Bank of Thailand

Through table 21, the regression results can see, the P-value of the variable GDP is 0.0000, 0.0000 less than 0.01, is mean the variable GDP is strong significant. The P-value the variable VOL is 0.8934 more than 0.1, is mean the variable VOL is no significant. Because the above table 4.2.2.4 sees, the GDP and exchange rate have strong relation, so it can’t regression together. It known that only GDP can affect the export and the exchange rate volatility can not affect the import between 2000 and 2011.

The estimation results reported in table 22 that the coefficients of the GDP of the China are estimated to be significantly positive. One percent increase of the China GDP turns out to raise the Chinese import by 22.3%. But the real exchange rate is no impact on the Thailand import from China in period June 2000 to Dec 2011. The finding was consistent with previous findings (Rose (1991), Gognon (1993), Kyriacos (2001).

<table>
<thead>
<tr>
<th>Variable</th>
<th>C</th>
<th>Ln(Exchange)</th>
<th>Ln(VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>10.03710***</td>
<td>-0.489464</td>
<td>-0.002258</td>
</tr>
<tr>
<td>Prob.</td>
<td>0.0000</td>
<td>0.4425</td>
<td>0.8805</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.543258</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 139. This table only has real exchange rate and real exchange rate volatility. C is constant. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. The data is monthly data over the period 2000:06 to 2011:12. The asterisks (*** ) indicate the rejection of the null hypothesis of zero coefficient at the 1% significance level.
asterisks (**) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level.

Source: the Bank of Thailand.

Through table 23 the regression results can see, the p-value of the variable exchange rate is 0.4425, 0.4425 more than 0.1, is mean the variable of exchange rate is no significant. The p-value of the variable VOL is 0.8805 more than 0.1, is mean the variable VOL is no significant.

As above, this part only uses the real exchange rate and the real exchange rate volatility regression together, because the GDP and exchange rate have very strong relationship. The real exchange rate and volatility does not have significant influences on the import in period 2000 to 2011. The finding was consistent with previous findings (Rose (1991), Gognon (1993), Kyriacos (2001),)

<table>
<thead>
<tr>
<th>Table 23</th>
<th>GLS Regression of Model (2) between 1997 and 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>c</td>
</tr>
<tr>
<td>Coefficient</td>
<td>-20.27329***</td>
</tr>
<tr>
<td>p-value</td>
<td>0.000000</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The observation is 175. C is constant. GDP is the GDP of Thailand. EXCHENG is real exchange rate for Chinese Yuan against the Thai baht. VOL is the volatility of the real exchange rate. Dummy is dependent variable. The data is monthly data over the period 1997:06 to 2011:12. The asterisks (*** ) indicate the rejection of the null hypothesis of zero coefficients at the 1% significance level. The asterisks (**) indicate the rejection of the null hypothesis of zero coefficient at the 5% significance level. The asterisks (*) indicate the rejection of the null hypothesis of zero coefficient at the 10% significance level. Source: the Bank of Thailand.

Through table 23 the regression results can see, the P-value Of the variable
GDP is 0.00000, 0.00000 less than 0.1, is mean the variable GDP is strong significant. The p-value of the variable Exchange rate is 0.4685, 0.4685 more than 0.1, is mean the variable exchange rate is not significant, The Prob. of the variable VOL is 0.7470, 0.7470 more than 0.1, is mean the variable VOL is no significant. Because this part is full period, it will add the dummy into this part,

The estimation results reported that the coefficients of the China GDP are estimated to be significantly positive. One Percent increase of the China GDP turns out to raise the Thailand imports by 23%. So the GDP have positive impact on import between Thailand and China, but the real exchange rate and volatility have not impact on import in period 1997 to 2011. The finding was consistent with previous findings (Rose (1991), Gognon (1993), Kyriacos (2001),)
CHAPTER 5

CONCLUSION

5.1 Discussion

This study has analyzed the impact of exchange rate volatility on aggregate trade between Thailand and China through a GLS (Generally Least Square) regression model which include the GDP, the real bilateral exchange rate, and exchange rate volatility. The data analyzed corresponded to monthly time series for the full period 1997:6-2011:12.

This paper analyzed whether and to what extent the exchange rate between the Thai baht and Chinese Yuan has no impact on the trade between Thailand and China in full period 1997 to 2011. In particular, the impacts of the real bilateral exchange rate on the Thailand exports to the China and on the Thailand imports from the China were measured by estimating GLS(Generally Least Square) regression. The impacts of other variables, such as the exchange rate of a country, the GDP, the volatility of the exchange rate between Thai baht and Chinese RMB were also measured by including them as explanatory variables along with the exchange rate between the RMB and the dollar in the export functions and the import function.

These results indicate that the exchange rate volatility has positive impact on the Thailand export to China between June 1997 and May 2000. The exchange rate and GDP are no significant. Because Thailand has adopted floating exchanges rate regime and the financial crisis of the 1997 to 2000. In general, the GDP of China turned out to have no impact on aggregate trade between Thailand and China from 1997 to 2000. The volatility of exchange rates turned out to positive influence the Thailand export to China.

The exchange rate has positive impact on the Thailand import from China between June 1997 and May 2000. As the same Abdulhusain (2010) the exchange rate volatility and GDP are no significant. Because Thailand has adopted floating exchanges rate regime and the financial crisis of the 1997 to 2000. In the case of the
exports from the Thailand to China, one percent increase of the exchange rate volatility turns out to raise the Thailand export by 0.9%. In the case of the imports of Thailand from China, one percent increase of the exchange rate turns out to decrease the Thailand export by 0.75%.

These results indicate that the exchange rate volatility has no impact on the Thailand export to China between June 2000 and Dec 2011. As Tenreyro (2007) In general, the GDP of China turned out to have positive impact on aggregate trade between Thailand and China from 2000 to 2011. The coefficient values of the GDP were estimated to be positive and bigger than the coefficient values of the exchange rate, implying income elasticity is higher than price elasticity in the export functions examined. One percent increase of the China GDP turns out to raise the Chinese export by 2.6%. But the real exchange rate is no impact on the Thailand export to China in period June 2000 to Dec 2011. This period part only uses the real exchange rate and the real exchange rate volatility regression together, because the GDP and exchange rate have very strong relationship. The real exchange rate and volatility does not have significant influences on the Thailand export.

These results indicate that the exchange rate volatility has no impact on the import of Thailand from China between June 2000 and Dec 2011. In general, the GDP of China turned out to have positive impact on aggregate trade between Thailand and China from 2000 to 2011. The coefficient values of the GDP were estimated to be positive and bigger than the coefficient values of the exchange rate, implying income elasticity is higher than price elasticity in the import functions examined. The coefficients of the GDP of the China are estimated to be significantly positive. One percent increase of the China GDP turns out to raise the Chinese import by 22.3%. But the real exchange rate is no impact on the Thailand import from China in period June 2000 to Dec 2011. This part only uses the real exchange rate and the real exchange rate volatility regression together, because the GDP and exchange rate have very strong relationship. The real exchange rate and volatility does not have significant influences on the import in period 2000 to 2011.
These results indicate that the exchange rate volatility has no impact on the Thailand export to China between June 1997 and Dec 2011. In general, the GDP of China turned out to have positive impact on aggregate trade between Thailand and China from 1997 to 2011. The coefficient values of the GDP were estimated to be positive and bigger than the coefficient values of the exchange rate, implying income elasticity is higher than price elasticity in the export functions examined. One Percent increase of the China GDP turns out to raise the Thailand exports by 15%. So the GDP have positive impact export, but the real exchange rate and volatility have not impact on export in period 1997 to 2011.

These results indicate that the exchange rate volatility has no impact on the import of Thailand from China between June 1997 and Dec 2011. In general, the GDP of China turned out to have positive impact on aggregate trade between Thailand and China from 1997 to 2011. The coefficient values of the GDP were estimated to be positive and bigger than the coefficient values of the exchange rate, implying income elasticity is higher than price elasticity in the import functions examined. One Percent increase of the China GDP turns out to raise the Thailand imports by 23%. So the GDP have positive impact on import between Thailand and China, but the real exchange rate and volatility have not impact on import in period 1997 to 2011.

5.2 Limitations

In this study, the factors that impact the export and import between Thailand and China were examined. Depending on the result of this study, the following proposals were made for future research:

a. The data of GDP is not accurate. As mentioned above, because the data is monthly data from June 1997 to Dec 2011, but the data of GDP of Thailand and China can not exactly obtain, so it will influence the accurate of variable GDP and make the exchange rate almost no impact on export and import between Thailand and China.
b. The sample size is too small, only fourteen years, even if the data is on a monthly basis, the sample is limited, it makes it difficult to use lagged variables for analysis. It also restricts the short run.

5.3 Recommendations and Further Research

Depending on the results of this study, the following proposals were made for further research.

a. The further research could study factors that affect trade. This will help the researcher understand the relationship of exchange rate and trade between countries.

b. The further research could use monthly data to analyze the export model, not only quarterly or annual data.
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