THE EFFECT OF EXCHANGE RATE ON SHRIMP EXPORT FROM VIETNAM TO THE U.S

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Tran Thuy Chi

TABLE OF CONTENTS **Page**

A LIST OF TABLES **Page**

A LIST OF FIGURES **Page**

ABSTRACT

Shrimp is the most important fisheries export product of Vietnam and the U.S is the second largest importer of Vietnamese shrimp. According to the fisheries export development plan of 2015-2020, shrimp export is expected to keep its major role and the U.S is determined to remain as the Vietnamese traditional shrimp import market. To increase shrimp export, one of the most important policies that Vietnamese governors are considering is the exchange rate policy. Therefore, the purpose of the thesis is to examine the effects of real exchange rate VND/USD on Vietnamese shrimp export. A partial adjustment model of the U.S excess demand for Vietnamese shrimp is constructed to investigate this relationship in this study. Monthly data were collected from 2002:03 to 2011:12 for model development.

The study found that the real appreciation of VND against USD has no effects on the U.S import quantity demanded for Vietnamese shrimp both in the short-run and the long-run. However, it is found that the U.S import price for Thai, Chinese and Indonesian shrimps have both short-run and long-run effects on the U.S demand for Vietnamese shrimps while the U.S import price for Indian shrimp has short-run effects only. Among them, the effects of Thai and Indonesian price growths are the largest ones. Their effects are -5.36 for Thailand and 5.18 for Indonesia.

Based on the estimated results, the study suggests that the Vietnamese government should not use exchange rate as a long-run tool to promote the Vietnamese shrimp export to the US. Since prices are found to be the most key factors affecting Vietnamese shrimp export to the U.S market, Vietnamese governors and exporters are encouraged to take priority over promoting the exportations of high quality, clean and diversified products; improving the competitiveness of Vietnamese shrimp in the U.S market in order to develop the sustainable shrimp export.

Key words: Exchange rate effect, export quantity, shrimp

CHAPTER 1: INTRODUCTION

1.1 Shrimp export from Vietnam to the U.S during the period 2001-2011

Shrimp is one of Vietnam's main export fisheries products. In the period 2009-2011, it made up the highest proportion of the total fisheries export value. The figures for 2009, 2010 and 2011 are 39.9%, 41.9%, 39.2%, respectively [Table 1]. According to the report 2011 of Vietnam Association of Seafood Exporters and Processors (VASEP), Vietnam supplied shrimps to 91 markets over the world. Japan, the U.S and the EU are still the traditional shrimp export markets of Vietnam and are responsible for 65% of the total shrimp export value [Figure 1]. Vietnam's monthly average prices of shrimp are within 9.2-9.9 USD per kilo, which is 12-18% higher and sometimes 28% compared to that in last year. The export revenue is about 2,396 million dollars. The number for black tiger shrimp is 1,430 million dollars, occupying 60% and the number for white leg shrimp is 704 million dollars, occupying 29.3% and the remaining 12% is from the other types of shrimp.

Table 1 Vietnam's Main Export Fisheries Products (2009-2011)

	2009		**2010**		**2011**	
	Value (Million USD)	***%***	**Value (Million USD)**	***%***	**Value (Million USD)**	***%***
Shrimp	1698	*39.9*	2107	*41.9*	2396	*39.2*
Pangasius	1368	*32.2*	1439	*28.6*	1806	*29.5*
Tuna	183	*4.3*	293	*5.8*	379	*6.2*
Others	1002	*23.6*	1195	*23.7*	1537	*25.1*
Total	**4251**	***100***	**5034**	***100***	**6118**	***100***

Source: www.vasep.com.vn

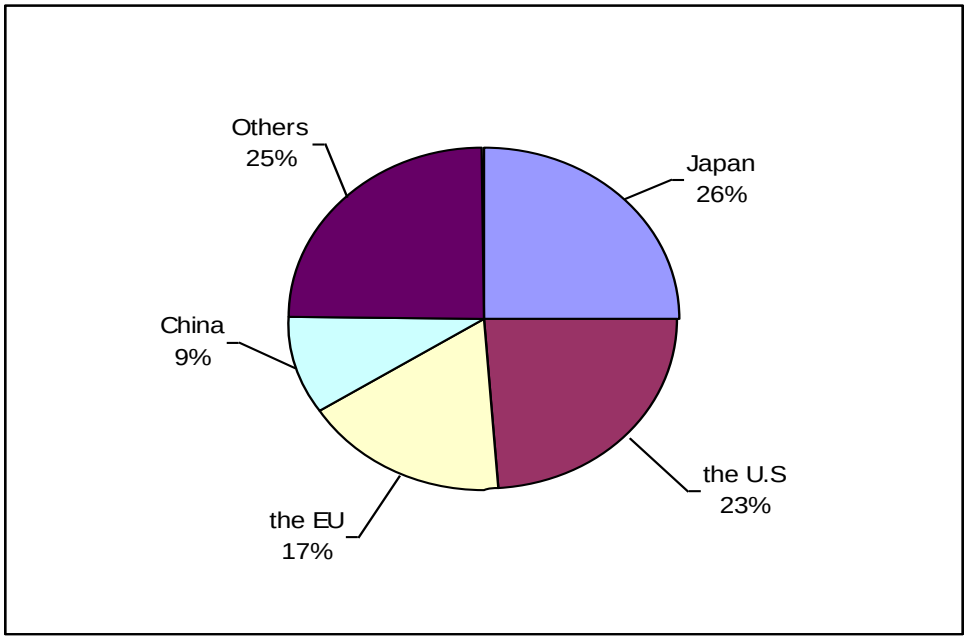


Figure 1 Main Export Markets of Vietnamese Shrimp in 2011

Source: using data from www.vasep.com.vn

Since Vietnam and the U.S signed the Bilateral Trade Agreement (BTA) on 13 June 2000, these two countries have become major shrimp trading partners. The U.S is the second largest shrimp importer of Vietnam, next to Japan, and Vietnam has been top exporter of shrimps to the U.S market. The export value and volume increased sharply during 2001-2003 after signing the BTA. Yet, in late 2003, there was a dispute over the price of Vietnamese shrimp in the U.S market. The Southern Shrimp Alliance of the U.S (SSA) filed a petition to the US department of Commerce and the US International Trade Commission (ITC) alleged that exporters from 6 countries Thailand, Vietnam, China, India, Brazil and Ecuador were participating in product dumping on the World Market. However, VASEP Shrimp Committee (VSC) argued against this and explained that Vietnamese shrimp prices were low due to low labor costs, suitable natural conditions, environment, technique and overall production improvement. But the U.S department of Commerce finally imposed anti-dumping duties on Vietnamese shrimp exports. This event actually affected the bilateral shrimp trading between Vietnam and the U.S. Specifically, it caused a decrease in Vietnamese shrimp exports in 2004 decreased by an approximately 50%, compared that in 2003. The number was about 371 hundred metric tons and 386 million dollars in 2004, compared to 573 hundred metric tons and 595 million dollars in 2003.

After sharply falling down in 2004, Vietnamese shrimp quantity imported to the U.S market fluctuated across year and its growth rate was lower than the previous period 2000-2003. There was a slight increase from 2006 to 2008. However, in late 2008, the global economics crisis happened and it negatively impacted this world largest economy and led to a decrease in purchasing in the U.S in 2009. Hence, Vietnamese shrimp export to the U.S market was also suffered from the impact in this year. According to the Food Outlook 2011 of FAO, domestic landing of shrimp in Texas, Alabama, Mississipi and Lousiana in the U.S went down because of the oil spill in the Gulf of Mexico in 2010. Meanwhile, shrimp consumption in the U.S market remained relatively stable. Therefore, foreign suppliers of shrimp in general and particularly Vietnamese exports enjoyed improved market access. Vietnam increased shrimp exports to the U.S market in 2010. However, in 2011, Vietnamese exports declined to about 454 hundred metric tons of shrimp to the U.S market, about 1000 thousand metric tons lower than that in 2010. This is partial due to lower U.S consumption as the result of the U.S public debt. Moreover, the U.S demand for Vietnamese shrimps has gone down after many shipments from Vietnam were continuously found to contain banned toxic chemicals such as chloramphenicol, trifluralin, enronfloxacin… In opposition of the quantity trend, the figure for the value went up to 521.3 million dollars. The number is 8 million dollars more than the previous year. Shrimps from some major suppliers suffered from diseases, and concurrently a long flood happened in Thailand. This led to supply shortage resulting in shrimp price increase on the world market.

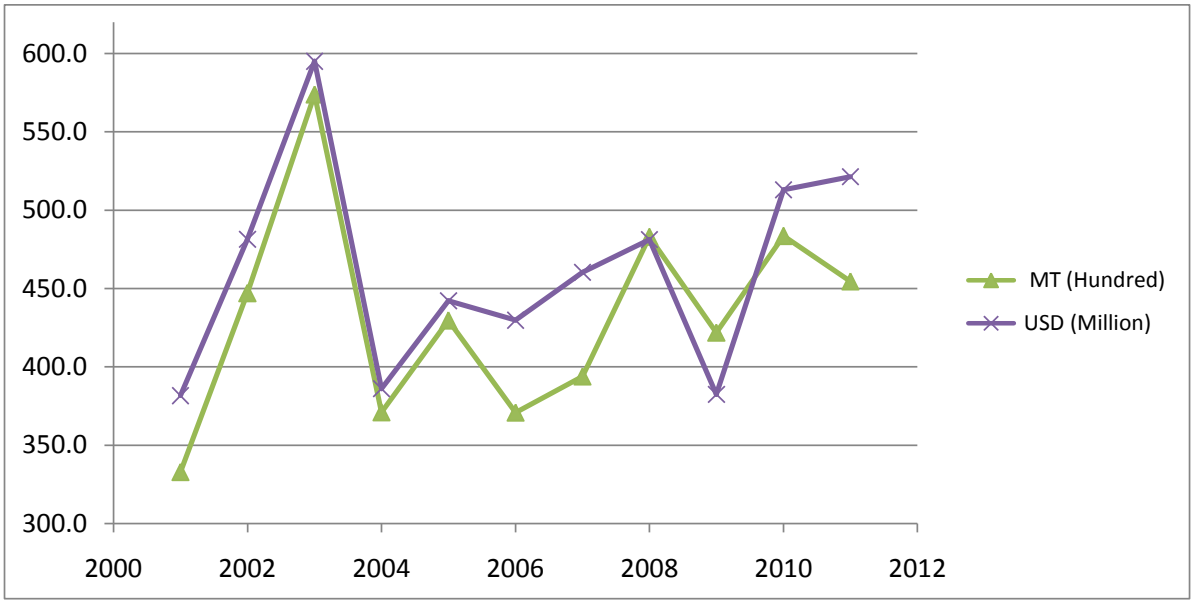


Figure 2 The U.S Shrimp Import from Vietnam during the period 2001-2011

Source: using data from www.st.nmfs.noaa.gov

Figure 3 below shows the average import prices of shrimps from Vietnam, Thailand, China, India and Indonesia in the U.S shrimp import market. These countries are top 6 shrimp suppliers in the U.S. The prices of Vietnamese shrimps are the highest while the prices of Chinese shrimps are the lowest. The average prices of India, Indonesia and Thailand are following Vietnam, respectively. So far, Vietnamese farmers mostly focus on farming black tiger shrimps while farmers of other countries in Asian region such as Thailand, China develop farming white leg shrimps. This fact will explain why Vietnamese shrimp price is always higher than others for this period. White leg shrimps have many more advantage than black tiger shrimps. Particularly, its ability of disease resistance is high, it is easily processed due to softer shell, it can be harvested at the age of 3 months. Hence, its productivity is rather high. Meanwhile, over 4-month old black tiger shrimp can be harvested. Consequently, the farming costs of white leg shrimps are lower than black tiger shrimp, which can help shrimps from Thailand, China lower than Vietnam.

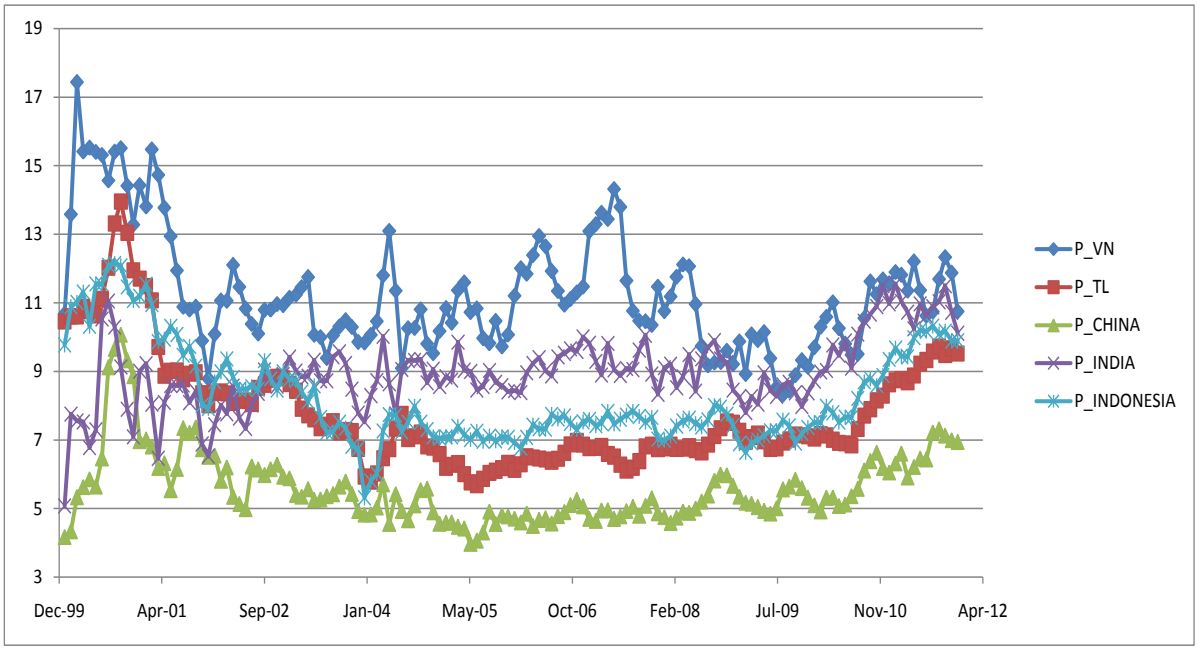


Figure 3 Average U.S Import Prices of Shrimps from some Asian Major Suppliers (2000:01-2011:12)

Source: the author's calculation using data from U.S Department of Commerce

According to Vietnam's fisheries export strategy for the period 2015-2020, shrimp is still the most key strategic fisheries export product and the target market is the U.S. The targeted shrimp export volumes and quantity of 2,700 hundred metric tons and 2,540 million dollars for 2015, respectively. The figures for 2020 will be 3,300 hundred metric tons and

3,300 million dollars. The export market share of the U.S is aimed at 19% of Vietnam's total export revenue with the main products, say shrimp (15%), pangasius (15%) and tuna (35%). In order to fulfill the goals in this strategy, Vietnamese government considers building up policies which support and encourage fisheries exports. One of the most important policies is the exchange rate policy.

1.2 The current exchange rate policy in Vietnam

Vietnam has had many adjustments in the exchange rate regime since 1989. All the adjustments are along fixed regime. IMF classifies Vietnam's exchange rate regime into the conventional fixed peg arrangement. Vietnamese exchange rate is anchored against USD. The State Bank of Vietnam (SBV) announces daily an official rate between USD and VND. Then, commercial banks use this based rate to determine their exchange rates within allowed bands. The bands are different between years. For example, the exchange rate band was widened to +/- 0.75% (from 23rd Dec 2007 to 9th March 2008), then to +/- 1% (from 10th March 2008 to 25th Jun 2008), to +/-2% (from 26th Jun 2008 to 05th Nov 2008), to +/-3% (from 06th Nov 2008 to 23rd March 2009), and to +/-5% (from 24th March 2009 to 25th Nov 2009). Most recently, on 11th Feb 2011, the State Bank of Vietnam decided to reduce the band from +/-3% to +/-1%.

1.2.1 The trend of the nominal exchange rate VND/USD

There is an increasing trend in nominal exchange rate of VND and USD between 2001 and 2011. It started at around 14,500 VND/USD and jumped up to approximately 21,000 VND/USD (Figure 4). In general, VND was devaluated by 44% against USD. There are some reasons why VND lost its value. Firstly, high inflation has prevailed in Vietnam during recent years. Secondly, the global economic crisis impacted on Vietnam's economy. In this state, people want to keep safer assets such as gold, real estate and USD. Therefore, the public trust in VND goes down. Thirdly, gold price was lower in Vietnam than in other countries of the world. So, there was a growing need for gold imports to speculate in Vietnamese market. Fourthly, Vietnam's trade balance has been at a deficit. Therefore, all these facts have strengthened the demand for USD. Commercial banks usually quoted their exchange rate at the SBV's set upper band. There was also a gap between official rate and black market rate. According to Vietnam's law, trading foreign currencies is allowed to perform at only commercial banks. However, trading foreign currencies at gold shops still exists in reality, which is called black market. To prevent too much deals happening in black market and reduce the demand for USD, the State Bank of Vietnam decided to devalue VND

many times. For instance, on 10 Feb 2010, the official exchange rate is 18,544VND/USD. On 18 Aug 2010, the official rate is 18,932 VND/USD, the devaluation rate of VND is 2%. On 11 Feb 2011, the rate is 20,693 VND/USD and the devaluation rate of VND is 8.5%.

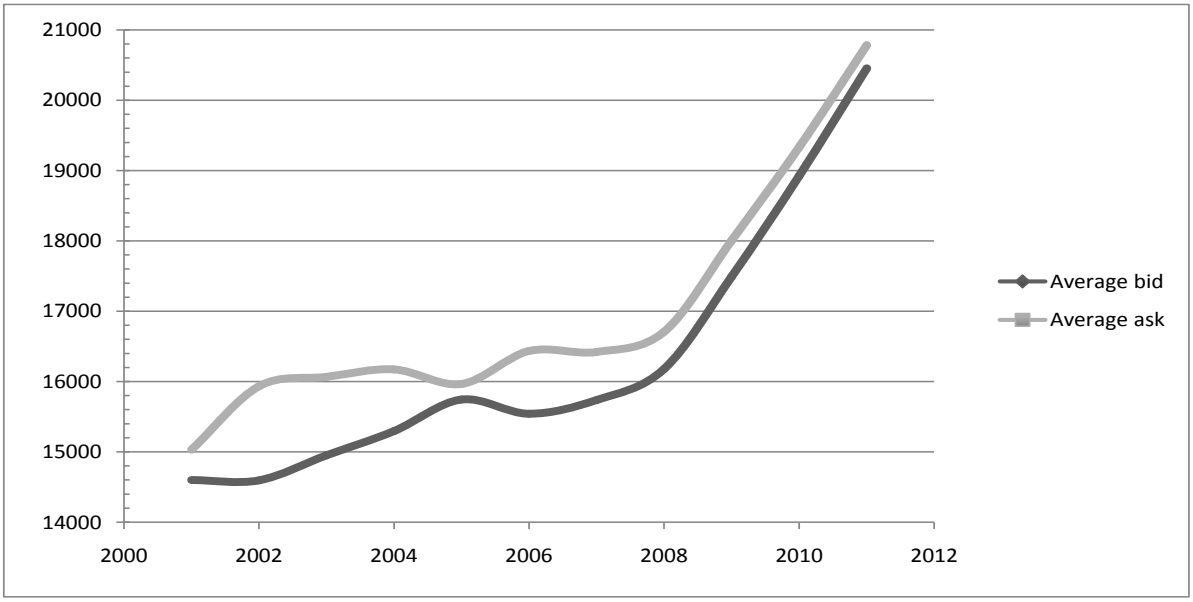


Figure 4 Nominal Bilateral Exchange Rate VND/USD for 2001-2011

Source: using data from www.oanda.com

1.2.2 The trend of the real exchange rate VND/USD

Figure 5a and figure 5b below shows the dynamic of the nominal and real exchange rate VND/USD for last decade. The nominal exchange rate tended to increase for last 10 years. Meanwhile, the real exchange rate tended to decrease since 2004. Huy *et al.* (2011) explained for this fact that CPIs of Vietnam were higher than CPIs of the U.S. According to their calculation, the real value of Vietnamese dong of 2010 was revaluated by 25.9% against USD with the base year 2000. The author's calculation supports the above argument of Huy *et al*. (2011). The real exchange rate VND/US is the product of the nominal exchange rate multiplied by the CPIs of U.S and divided by CPIs of Vietnam. Since 2004, Vietnam's CPIs are always higher than the U.S's CPIs and the gap between two CPIs tended to be larger and larger (Figure 6). Therefore, it is very higher CPIs of Vietnam compared with those of the U.S that the real bilateral exchange rate VND/USD goes down. On other words, in fact, the real value of VND is revaluated against USD. For example, in 2010, the average nominal exchange rate is 19,124 VND/USD, CPI of Vietnam is 198.3%, CPI of US is 126.6%, then the real exchange rate is 12,216 VND/USD. In 2004, the average nominal exchange rate is 15,736 VND/USD, CPI of Vietnam is 115.7%, CPI of US is 109.69%, then the real exchange

rate is 14,920 VND/USD. In 2002, the average nominal exchange rate is 16,995 VND/USD, CPI of Vietnam is 111.2%, CPI of US is 116.4% then the real exchange rate is 17,788 VND/USD. Consequently, the revaluation rate of VND against USD is 45%.

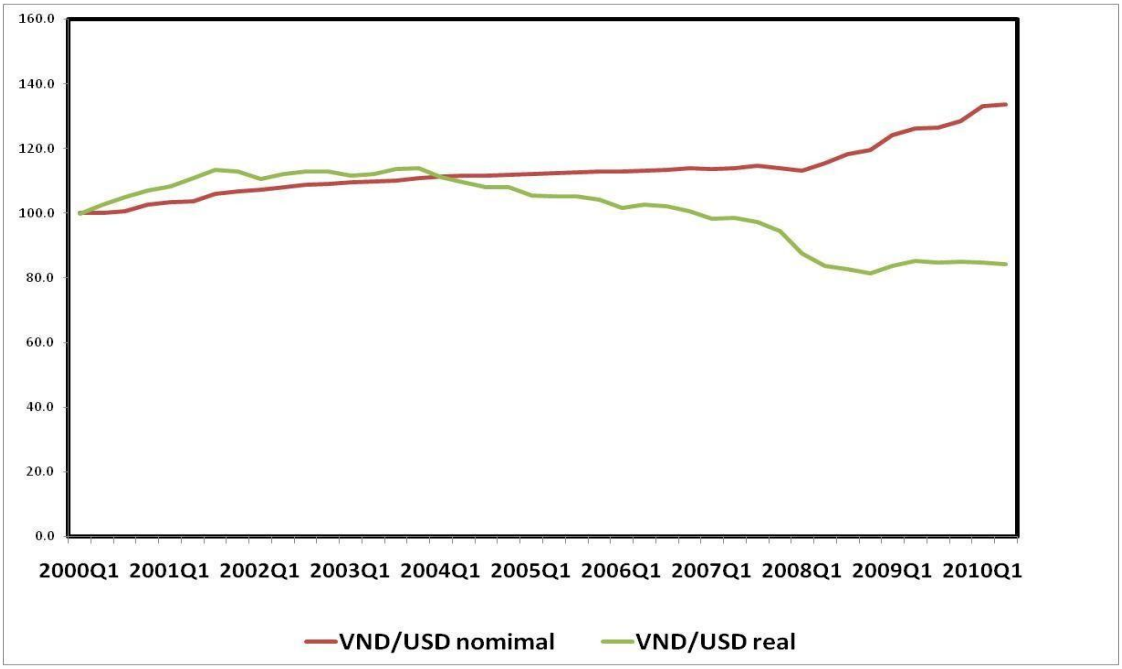


Figure 5a Nominal and Real Exchange Rate VND/USD (2000:Q1-2010:Q4)

Source: Huy et al. (2011)

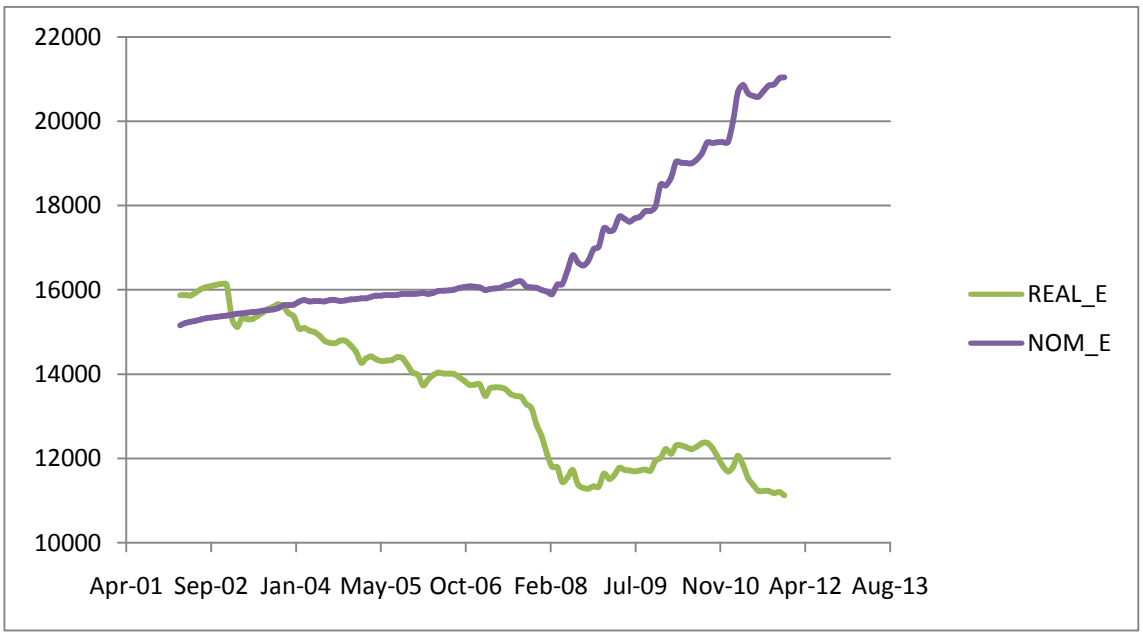


Figure 5b Nominal and Real Exchange Rate (2002:03-2011:12)

Source: author's calculation using data from GSO and IMF

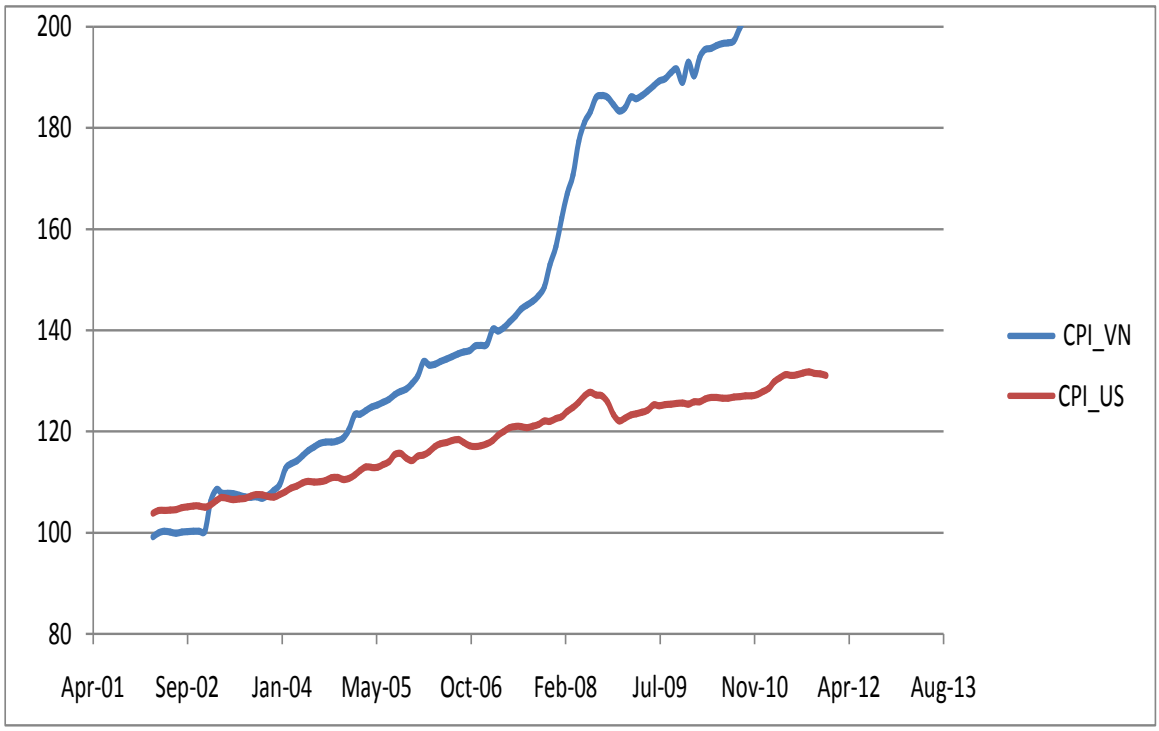


Figure 6 CPIs of Vietnam and the U.S (2002:03-2011:12)

Source: author's calculation using data from GSO and IMF

1.3. Research questions and objectives

Almarwani *et al.* (2007) concluded that not any exchange rate policy would benefit all exporters. Their results showed that there were positive depreciation effects for 6 of the 8 exporters which were affected by exchange rates and there was no effect for Argentine corn and US soybean. It was also found that even in one country this strategy differently impacted on exporters of each commodity, say corn, poultry, soybean, cotton. Specifically, the U.S corn and poultry exports increased with depreciation but soybean exports was not affected. Shane *et al.* (2008) found the effects of appreciation of dollar on exports were negative for all commodities for the 1980-1984 period and for nine of twelve commodities over 1990-2004.

The above results imply that appreciating one currency does not absolutely constrain export of one country but depending on which commodity will be exported. Meanwhile, there are many conversional debates that the current real devaluation of VND against USD makes Vietnam's export products reduce their competitiveness. In practice, Vietnamese processors have to import material for shrimp production and fishmeal from foreign countries. It makes the percentage of import value in Vietnamese shrimp exports relatively high. Huy *et al.* (2011) concluded that change in exchange rate has positive effects on Vietnamese export. Hence, two questions are arisen. They are ***"whether the present exchange rate policy of Vietnamese government helps to encourage exports?"*** and ***"how it actually affects shrimp***

exports?" To answer these questions, the thesis aims to investigate and measure the effects of real bilateral exchange rate VND/USD on export volume in the case of Vietnamese shrimp imported to the U.S during the period 2000-2011.

The next chapter will write about a basic conceptual framework. The chapter 3 will review some studies on the effects of exchange rate on export volume. Chapter 4 describes the methodology and data. Chapter 5 reports the results. Chapter 6 presents some discussion and conclusion. The last chapter summarizes the content of this thesis.

CHAPTER 2: BASIC CONCEPTUAL FRAMEWORK

2.1 Exchange rate, devaluation/depreciation and revaluation/appreciation

Exchange rate is the rate at which one currency will be exchanged for another. In other words, exchange rate is the price of one country's currency in relation to another (OECD). For example, if the exchange rate VND/USD is 10,000, it means that 1 USD is exchanged for 10,000 VND. There are many types of exchange rate. However, for the purpose of the thesis, some kinds of exchange rates will be considered. They are: nominal exchange rate and real exchange rate, bilateral exchange rate and effective exchange rate. Nominal bilateral exchange rate is referred to two countries' currencies, which is established on currency financial markets. Meanwhile, nominal effective exchange rate is the exchange rate of the domestic currency vis-à-vis other currencies weighted by their shares in either the country's international trade or payments (OECD). According to Huy et al. (2011), nominal effective exchange rate is calculated following:

$$NEER_t = \prod_{j=1}^{n} (e_{jt})^{w_{jt}}$$

where t: time;

n: the number of the major trade partners of the home country;

e_{jt}: the nominal bilateral exchange rate between the country j with the home country;

w_{jt}: the weight of the country j's currency at time t, it is equivalent to the trade weight of the country j in the total trade value of the home country with its major trade partners.

Real exchange rate is an important concept in economics. It is a good indicator of competitiveness of one country as it shows the prices of the country's goods and services relative to those of other countries (Alam. 2010). If the real value of one currency against another decreases or it is depreciated, the country's products become relatively cheaper than the products of other country and hence the demand for the country's export may increase. The real exchange rate (r) is commonly calculated as the nominal exchange rate (e) adjusted by the ratio of the foreign price level (P^f) to the domestic price level (P). Mathematically, it can be shown as:

$$r = e \ \frac{P^f}{P}$$

Therefore, real bilateral/effective exchange rate is nominal bilateral/effective exchange rate adjusted by appropriate foreign price level and deflated by the home country price level.

According to IMF, under a fixed exchange rate system, only a decision by a country government or monetary authority can alter the official value of the currency. Devaluation means a reduction in own currency's value. Meanwhile, revaluation is an upward change of own currency's value. For instance, suppose Vietnamese government has set 10,000 VND equal to 1 USD. To devaluate Vietnamese dong, it might announce that from now on 20,000 VND will be equal to 1 USD. This makes VND half as expensive to the USD as before; or in other words, this makes USD twice as expensive to Vietnamese dong as before. Meanwhile, to revalue, Vietnamese government changes the rate from 10,000VND per USD to 5,000 VND per USD. This makes VND twice as expensive to USD, and the dollar half as costly in Vietnam. Under a floating exchange rate regime, market forces generate changes in the value of the currency, which is known as depreciation or appreciation. Actually, the meanings of depreciation and appreciation are the same as the meanings of devaluation and revaluation, respectively. The difference among them is that depreciation and appreciation implies that changes in exchange rate are made by market forces while devaluation and revaluation implies that changes in exchange rate are made by a country government.

2.2 The effect regime of exchange rate on export

The way which helps explain why changes in exchange rate could affect one country's export can be lighted up in the theory of Law of one price. Although assumptions of this theory seem to be too strict, it is the simple way of understanding the relationship. It is assumed that there are no transportation costs, no trade barriers, identical products sold in different countries and at the same price when expressed in same currency. The basic relationship between two prices under the law of one price can be presented formally as follow:

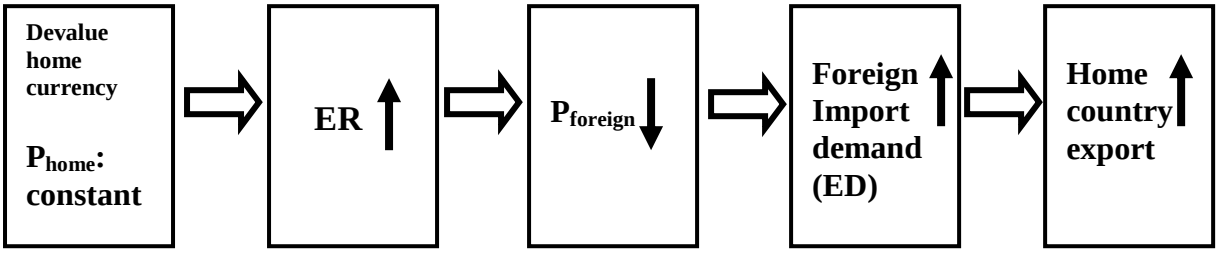
$$P_{home} = ER^* P_{foreign} \quad (1)$$

where P_{home} is the price of commodity *i* in the home country, $P_{foreign}$ is the price of this commodity *i* in the foreign country, ER is the exchange rate expressed in the number of the home country's currency units per the foreign country's currency unit. Rearrange the equation (1), we have:

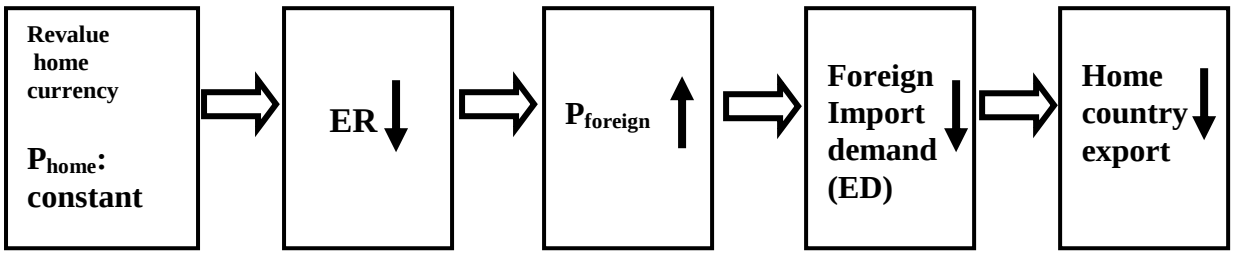
$$P_{foreign} = P_{home}/ER \quad (2)$$

Assuming that home country is the exporter of commodity *i*, the foreign country is the importer of commodity *i*. When the home country devalues their currency against foreign currency, the bilateral exchange rate will increase. From equation (2), the increase in ER leads to the decline in $P_{foreign.}$ Meanwhile, according to neoclassical trade theory, the foreign excess demand (ED) for the commodity *i* from home country is a decreasing function of the own price, say $ED_i = f(P_{foreign})$. Therefore, it is clear that when own price decreases, the demanded quantity will increase and it helps improve the home country's export. This regime can be illustrated through the simple following diagrams:

The case of devaluation/depreciation



The case of revaluation/appreciation



Briefly, the changes in exchange rate affect the export quantity through changing in price. The arguments in Chambers and Just (1979) and Hermann and Lin (1988) are consistent with the theory. In particular, Chambers and Just (1979) said that devaluation by an exporter is equivalent to a proportionate decrease in all prices or a proportionate increase in the importer's income. Similarly, Hermann and Lin (1988) explained why the appreciation of the dollar against krone can improve Norwegian export for the dollar translated into higher purchasing power in terms of krone at the same price. The direction of devaluation effects on export is in the opposite of revaluation on export. Devaluation of one currency may improve the country's export while revaluation of one currency may depress this country's export.

CHAPTER 3: LITERATURE REVIEW

The topic of the effects of exchange rate on export has been investigated theoretically as well as empirically. *Theoretically,* **Chambers and Just (1979)** constructed a more general theoretical model and showed that evaluating the effects of exchange rate on trade basing on a simple model with unduly and unjustly restrictions is bias. In particular, they suggested that excess demand should be taken of a function of prices of all traded goods and the importing country's income. The expression is written following:

$$D_i = f(\gamma, M)$$

where D_i is the quantity demand of the commodity *i*, γ is a vector containing the prices of all n commodities in the importing country and M is income. Supply is a function of the prices of all production possibilities, say $S_i = g(p)$, where S_i is the quantity supplied of the commodity *i*, p is a vector containing the prices of all n commodities in the exporting country. They assumed that there is no trade barriers and in the equilibrium for all commodities then $\gamma = pe$ in which e is exchange rate measured in terms of the units of the importer's currency per unit of the exporter's currency.

According to Chambers and Just (1979) model, all other prices, the exchange rate and income will shift the demand curve and all other prices and the exchange rate will shift the supply curve. Through the general model framework, their results proved that the elasticities of both price and quantity exported with respect to exchange rate are not the same as those of the model assuming that quantity demand and supply are dependent on the own prices only. It is implied that such improper specification can lead to incorrect estimation of two elasticities.

Chambers and Just also suggested two alternative empirical approaches to overcome the bias problem. The first approach is carried out using the concept of separability. It is assumed that consumers are able to divide commodities into several groups and split their total expenditure into groups then by individual commodities. The advantage of this approach is reducing the number of parameters to be estimated but the disadvantage is the lack of appropriate indices. The second one is treating the exchange rate as a price index for all other traded goods.

Empirically, there are many studies on this topic which have been examined on one specific commodity or many different specific commodities and used many different approaches. **Hermann and Lin (1988)** constructed a simultaneous-equation model of the

demand and supply of Norwegian Atlantic salmon in the U.S and the EC and conducted sensitivity analysis to investigate the effects of exchange rates, the total supply of Norwegian Atlantic salmon and the prices of the substitutes on the price and volume of Norwegian exports to the U.S and EC. Their model is a system of seven equations in which demand functions were specified as functions of the own price, the prices of substitutes, the incomes for importing countries and monthly dummy variables.

Hermann and Lin (1988) specified their model in two function forms, say linear and log-log model but the linear model fitted better. The results showed that most of signs of estimated coefficients were consistent with theoretical expectations and were significant at a 1% probability level. Through sensitivity analysis, they found that if the U.S dollar appreciated against the Norwegian krone by 10%, other conditions remaining constant, then the price of Atlantic salmon in the U.S decreased by 4.5% and the consumption increased by 3.6% while EC price went up by 2% and the consumption went down by 3.6%. They explained that when the dollar appreciated against krone, the demand curve was kept constant, the demand cure in the U.S market would shift rightward because the same price in dollar translated into a stronger purchasing power in krone. The total supply from Norway to the U.S and EC was assumed to be fixed then the increase in quantity supplied in the U.S forces supply to EC decrease and price to increase in the EC market.

Almarwani *et al.* (2007) examined the effects of exchange rates on export volumes in four different global markets, namely corn, cotton, poultry and soybean from 1961 to 2000. They derived the expression for excess supply as an increasing function of exchange rates and income in importing countries and a decreasing function of home price and market shares of competitors and specified it in the form of log-log. The results show that depreciation increases exports for 8 of 12 exporters with most elasticities less than 1. They concluded that four commodity export markets did not behave in the same way. For example, the depreciation elasticity of US corn exports is 0.83 but Argentine and EU exports are not affected. In the cotton market, the U.S exports are not sensitive to the exchange rate but Australian (0.34) and Argentine (0.63) exports are sensitive with respect to this factor. In poultry market, the depreciation elasticities for the US, Brazil and the EU are 0.3, 0.6 and 0.59, respectively. In soybean market, Argentina has the highest elasticities (3.14) but the US exports are not affected.

Shane *et al.* (2008) used vector autoregression (VAR) models to investigate the relationship between exchange rates, foreign income and U.S agricultural exports at both

level of aggregation and sub-categories from 1972 to 2006. The results showed strong evidence of significant links between these factors. The sign of the exchange rate was negative in all equations and significant in eight of thirteen commodity categories. Exchange rate elasticities range from -1.3 to -0.2. Hence, if USD is appreciated against the local currencies, it will constrain the U.S agricultural export. If USD is depreciated against the local currencies, it will increase the U.S agricultural export. The sign of the income term is positive and significant for all commodities. Income elasticities range from 0.72 to 5.25. They applied the directed acyclic graphs (DAG) and found that GDP and exchange rate depicted an inversion for causal relationship with exports. For total agricultural exports, the annual change in the exchange rate had a negative effect in 19 of 35 years reported. The income was found to have negative effects in 31 of these years reported. For commodity specific effects, the exchange rate appreciation has negative effects for all commodities during 1980-1984 and for nine of twelve commodities for 1990-2004.

Huy *et al* (2011) used a Vector Error Correction Model (VECM) to examine the effects of nominal effective exchange rate (NEER) on the Vietnamese export value of 195 categories to four major importing markets i.e the U.S, EU, Japan and Korea. Their results showed that the effects of exchange rate vary for different categories as well as different importing markets. They investigated the effects of depreciation rate in two scenarios. One is not considering the effects of Chinese export and another is considering the effects of Chinese exports. In the former scenario, the exchange rate does not have an effect on export value in the case of Japan and Korea largely because 50% of Vietnamese export value is positively impacted by depreciation. Meanwhile, depreciation of VND has positive effects on 3/4 export value of Vietnam in the case of the U.S and EU. However, in the later scenario, the exchange rate affects on export value in all 4 cases larger than the first scenario. They concluded that devaluating VND helps improve Vietnamese exports.

The purpose of this thesis is to carry out an empirical research on the effect of exchange rate on export. Although Chambers and Just (1979) proved that the magnitude of percentage change in quantity and prices with respect to changing exchange rate may be less or larger than that in the overly restrictive model, they did not show its sign. Meanwhile, all above empirical studies show that if depreciation has effects on export then it positively affects one country's export.

Therefore, this thesis aims to refine the inquiry whether devaluating one currency will improve one country's export in the case of Vietnamese shrimp imported the U.S for

2000:01-2011:12. Moreover, the thesis also wants to examine the effects of Chinese, Thai, Indian and Indonesian prices on Vietnamese export. They are major shrimp suppliers in the U.S market then their prices are proposed to affect Vietnamese shrimp export. The U.S import demand of Vietnamese shrimps will be constructed in this study.

The estimated demand model is proposed to include exchange rate, own prices, prices of China, Thailand, India, Indonesia and income. This proposed model is different with Huy *et al*. (2011) who estimated Vietnamese excess supply. While the result of Huy *et al.* (2011) helps to understand the attitude of the suppliers, the estimated result of this thesis is in an attempt to understand the attitude of the foreign importer. This estimation is thought to carry useful information for Vietnamese governors in using this tool as well as constructing export policy because they will extend their knowledge through understanding the partner country's reaction. Finally, the thesis will use the bilateral exchange rate instead of the effective exchange rate in Almarwani et al. (2007), Shane et al. (2008) and Huy et al.(2011).

CHAPTER 4: METHODOLOGY AND DATA

4.1. Methodology

According to neoclassical trade theory, a simple trade model of two countries – one importer and one exporter is usually considered and analyzed. The excess demand is a decreasing function of its own price and income. To have a more practical and meaningful analysis, an expanded model of one importer-many exporters will be constructed. The U.S is the major importer of shrimp in the world market. Annually, this country has to import shrimp from many foreign suppliers. In particular, shrimp is supplied for this market from 43 countries in 2011 (Data 2011 from www.st.nmfs.noaa.gov). In modeling, the study will consider some Asian major suppliers of the U.S, saying Thailand, Indonesia, India and China and Vietnam which occupy by over 65% of the total import volume (Data 2011 from the webstite *www.st.nmfs.noaa.gov*). They are top shrimp suppliers in this market (Data 2011 from website *www.st.nmfs.noaa.gov*). Among them, Thailand is the largest supplier in the U.S import shrimp market. The expression for U.S total excess demand for shrimps from five above countries is the summation of each shrimp supplier:

$$D_{US} = X_{VN} + X_{CHINA} + X_{THAILAND} + X_{INDO} + X_{INDIA} \qquad (3)$$

Where D_{US}: The U.S total quantity demanded for shrimps from Vietnam, China, Thailand, Indonesia and India;

X_{VN}, X_{CHINA}, $X_{THAILAND}$, X_{INDO}, X_{INDIA}: The U.S individual quantity demanded for Vietnam, China, Thailand, Indonesia, and India respectively.

The U.S demand for China, Thailand, Indonesia, India shrimps are assumed to be functions of the own prices and income for the importing country (Chambers and Just (1979); Hermann and Lin (1988)). Consequently, the expressions are for the following:

$$X_{CHINA} = f_1 (P_{CHINA}^{\$}, M); \qquad (4)$$

$$X_{THAILAND} = f_2 (P_{THAILAND}^{\$}, M); \qquad (5)$$

$$X_{INDO} = f_3 (P_{INDO}^{\$}, M); \qquad (6)$$

$$X_{INDIA} = f_4 (P_{INDIA}^{\$}, M); \qquad (7)$$

where $P_{CHINA}^{\$}$; $P_{THAILAND}^{\$}$; $P_{INDO}^{\$}$;$P_{INDIA}^{\$}$: the U.S prices of shrimp demanded for China, Thailand, Indonesia, India in terms of dollars, respectively. M is the real income for the U.S.

Combine equation (3), (4), (5), (6) and (7), we have:

$$D_{US} = X_{VN} + X_{CHINA} + X_{THAILAND} + X_{INDO} + X_{INDIA}$$

$$\Rightarrow X_{VN} = D_{US} - X_{CHINA} - X_{THAILAND} - X_{INDO} - X_{INDIA}$$

$$= D_{US} - f_1(P_{CHINA}^{\$}, M) - f_2(P_{THAILAND}^{\$}, M) - f_3(P_{INDO}^{\$}, M) - f_4(P_{INDIA}^{\$}, M)$$

$$= f_5(P_{VN}^{\$}; P_{CHINA}^{\$}; P_{THAILAND}^{\$}; P_{INDO}^{\$}; P_{INDIA}^{\$}; M) \qquad (8)$$

The U.S derived excess demand for Vietnamese shrimp is consistent with the theoretical general model of Chambers and Just (1979). It means that excess demand is a function of the own price, the prices of other traded goods and the income for the importing country. Nevertheless, as written above, the main purpose of the thesis is to examine the effect of bilateral exchange rate on quantity. Therefore, the exchange rate variable (E) will be included into the model (8). The derived expression of U.S demand for Vietnamese shrimp is rewritten as following:

$$\mathbf{X_{VN} = g\,(E;\, P_{VN}^{\$};\, P_{CHINA}^{\$};\, P_{THAILAND}^{\$};\, P_{INDO}^{\$};\, P_{INDIA}^{\$};\, M)} \qquad \mathbf{(9)}$$

The theory (Chambers and Just (1979)) did not show the sign of the effects from changes in exchange rate on quantity clearly. However, they argued that devaluation by an exporter is equivalent to a proportionate decrease in all prices or a proportionate increase in the importer's income. Hermann and Lin (1988) found that the dollar appreciates against the Norwegian krone by 10%, the price of Norwegian Atlantic salmon in the U.S decreases by 4.5% but the consumption increases by 8.8%. Huy *et al.* (2011) also found that devaluation of Vietnamese dong helps improve Vietnamese exports. The effect of changes in real bilateral exchange rate VND/USD on quantity demanded by the U.S is expected to be positive in this study.

The effects of U.S import price of Vietnamese shrimp are expected to be negative. Shrimps from other countries may be substituted for Vietnamese shrimps. If the import prices of Vietnamese shrimp are kept constant, shrimps from other export countries are lower than before, then consumers will possibly find these cheaper sources. This fact will lead to reduce the U.S import quantity of Vietnamese shrimps. Hence, the effects of the prices of shrimps from other exporting countries are expected to be positive.

The derived excess demand is expected as an increasing function of the income for the foreign country. Hermann and Lin (1988), Almarwani *et al.* (2007) and Shane *et al.* (2008) all found that the foreign income has a significantly positive effect on its imports. Hermann and Lin showed that income elasticities of demand are 7.12 for the U.S and 2.73 for

the EU. Almarwani et al. (2007) discovered that the positive income elasticities are found in 7 of 12 exporters such as US corn, Australian cotton, Brazil and Argentine soybeans. Every 1% decrease in the importer's income lowers exports of soybean from Brazil by 1.66% and Argentine soybeans by 5.93%. Shane *et al.* (2008) also showed that a 1% annual increase in trade partners' income would increase the U.S total agricultural exports by 0.75%.

In summary, the U.S demand for Vietnamese shrimp is a function of exchange rate, import price of Vietnamese shrimp, prices of some major competitors and income. The effects of exchange rate, import prices of shrimps from other countries and income are expected to be positive and the effect of own price is expected to be negative on the quantity demanded by the U.S for Vietnamese shrimp.

In this study, time series data will be used for regression and analysis. Therefore, one property of time series data which has to be examined before specifying econometric model is stationarity. Then, according to the results of the stationary tests, the econometric model will be specified.

Stationary tests

According to Hill *et al*. (2007), traditional methods in econometric time series theory reply on a set of assumptions concerning the stochastic properties of time series analyzed; a key concept being that of stationary. The time series y_t is stationary if for all values, and every time period, it is true that:

$E(y_t) = \mu$ (constant mean)

$var(y_t) = \sigma^2$ (constant variance)

$cov(y_t, y_{t+s}) = cov(y_t, y_{t-s}) = \gamma_s$ (covariance depends on s, not t)

Although a series that either wanders up or down or both over time cannot be stationary, the changes in that series might be. If a nonstationary series becomes stationary after differencing it once, it is called to be intergrated of order one I(1). A stationary series in level (without differencing) is called to be intergrated of order zero I(0). In general, the order of intergration of a series is the minimum number of times it must be differenced to make it stationary.

Stationary is an important condition in time series analysis, because if the nonstationary series are used in regression, then there is a danger of getting apparently significant regression results from unrelated data. Such regression are said to be spurious. To avoid the spurious problem, testing the presence of unit root needs to be performed. One of

the methods is Dickey-Fuller tests. There are three Dickey-Fuller tests, of which one test will be chosen and it is dependent on the dynamic of data. So, before carrying Dickey-Fuller tests, graphs of data should be drawn and looked at for visual inspection firstly.

Case 1: Dickey-Fuller test does not include a constant term in the test equation:

$$\Delta y_t = \gamma y_{t-1} + v_t$$

Case 2: Dickey-Fuller test includes a constant term in the test equation:

$$\Delta y_t = \alpha + \gamma y_{t-1} + v_t$$

Case 3: Dickey-Fuller test includes a constant and a trend term in the test equation:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \lambda t + v_t$$

The null hypothesis is that the series is nonstationary or $\gamma = 0$. The alternative hypothesis is that series is stationary or $\gamma \neq 0$. We reject the null hypothesis if $\tau \leq \tau_c$ (tau-statistic$\leq$ tau-critical). We do no reject the null hypothesis if $\tau > \tau_c$ (tau-statistic> tau-critical). However, in practice, to ensure the errors are uncorrelated, the augmented Dickey-Fuller test will be employed instead of the nonaugmented version. Similarly, the augmented Dickey-Fuller tests have three cases like the above nonaugmented version. The hypotheses of stationarity and nonstationarity are in the same way and the test critical values are the same as those for Dickey-Fuller.

Case 1: Time series does not have a trend and potentially turn around zero, the test equation is following:

$$\Delta y_t = \gamma y_{t-1} + \sum_{s=1}^{m} a_s \Delta y_{t-s} + v_t \qquad (10)$$

Case 2: Time series does not have a trend and potentially turn around nonzero, the test equation is following:

$$\Delta y_t = \alpha + \gamma y_{t-1} + \sum_{s=1}^{m} a_s \Delta y_{t-s} + v_t \qquad (11)$$

Case 3: Time series has a trend in it and is potentially turn around trend line, the test equation is following:

$$\Delta y_t = \alpha + \lambda t + \gamma y_{t-1} + \sum_{s=1}^{m} a_s \Delta y_{t-s} + v_t \qquad (12)$$

In this thesis, the augmented Dickey-Fuller tests (ADF tests) will be employed for its above advantage. To choose the appropriate test equation, graphs of data should be drawn first for visual inspection. According to figures in the appendix, the series of exchange rate and real GDP seem to have trends then the equation (11) will be applied for these cases. Meanwhile, the series of other data seem not to have trend then equation (10) will be applied.

Econometric model

The results of stationary tests show that not all series are stationary at level but they are stationary at the first difference. Hence, all first differentiated data will be used in regression. Besides considering the stationary property of data, one more thing which should be taken into account is that change in economic facts is usually low with respect to change in other factors. They need time to adjust. Therefore, lagged effects should be included into the first difference model, which is called the partial adjustment model hereafter.

The first difference model is following:

$$\Delta VOL\_VN_t = \alpha_0 + \alpha_1 \Delta E_t + \alpha_2 \Delta P\_VN_t + \alpha_3 \Delta P\_CHINA_t + \alpha_4 \Delta P\_TL_t + \alpha_5 \Delta P\_INDIA_t + \alpha_6 \Delta P\_INDO_t + \alpha_7 \Delta M_t + v_t$$

The partial adjustment model is as follow:

$$\Delta VOL\_VN_t = \delta_0 + \sum_0^\infty \delta_{1q} \Delta E_{t-q} + \sum_0^\infty \delta_{2q} \Delta P\_VN_{t-q} + \sum_0^\infty \delta_{3q} \Delta P\_CHINA_{t-q} + \sum_0^\infty \delta_{4q} \Delta P\_TL_{t-q} + \sum_0^\infty \delta_{5q} \Delta P\_INDIA_{t-q} + \sum_0^\infty \delta_{6q} \Delta P\_INDO_{t-q} + \sum_0^\infty \delta_{7q} \Delta M_{t-q} + \sum_1^\infty \theta_q VOL\_VN_{t-q} + v_t$$

Table 2 Variable Definition

Variable	Definition
VOL_VN	The U.S import quantity of Vietnamese Shrimp
E	Real Bilateral Exchange Rate VND/USD
M	The U.S Real Gross Domestic Products (GDP)
P_VN	The U.S Import Price of Shrimp from Vietnam
P_CHINA	The U.S Import Price of Shrimp from China
P_INDIA	The U.S Import Price of Shrimp from India
P_INDO	The U.S Import Price of Shrimp from Indonesia
P_TL	The U.S Import Price of Shrimp from Thailand

As discussed above, economic agents may need time to adjust after there is a change in a certain economic factor. It means that they may not feedback their reaction immediately but in later. However, change in one economic factor may affect economic agents in short-run and its effect will decline over time. Therefore, it is essential to calculate the long-run effect and use Wald test to test their significance to determine their effects. The formula of calculation for long-run effects is written following:

$$\beta_i = \frac{\sum_{1}^{\infty} \delta_{iq}}{1 - \sum_{1}^{\infty} \theta_p}$$

4.2. Data

Due to limitation of accessing data, secondary time series data between 2002:03 and 2011:12 series are collected instead of the longer period 2000:01-2011:12 as initial. Data of monthly shrimp export quantities and values from Vietnam, China, Thailand, Indonesia, India are collected from the U.S Department of Commerce at the website http://www.st.nmfs.noaa.gov/pls/webpls/trade. The quantities and values are measured in terms of kilos and dollars, respectively. To get the average export prices of Vietnam (NOM_P_VN), China (NOM_P_CHINA), Thailand (NOM_P_TL), Indonesia (NOM_P_INDO), India (NOM_P_INDIA), the monthly export values are divided by the corresponding monthly export quantities. These prices are measured in dollars per kilo.

Monthly CPIs of Vietnam during 2002:03 – 2004:12 are obtained from IMF Country report No.03/382, Dec 2003, IMF Country report No.06/423, Nov 2006 and IMF Country report No.07/386, Dec 2007 at the website of IMF. The figures for 2005:01-2011:12 are got from the General Statistic Office of Vietnam (GSO) at the section of monthly statistical information at http://www.gso.gov.vn. Monthly CPIs of the U.S are collected from the U.S Bureau of Labor statistics. CPIs of Vietnam and the U.S are converted into the same base year of 2000 because CPIs of Vietnam have different base years and CPIs of the U.S have base year 1982-1984.

Monthly nominal bilateral exchange rate VND/USD data are collected from the website http://www.oanda.com. The bilateral exchange rates are measured by the number units of dong per dollar. To measure the exact effect of the exchange rate and exclude the effect possibly due to the inflation rates both in the U.S and Vietnam, the real exchange rates

VND/USD (REAL_E) are derived from nominal exchange rate VND/USD (NOM_E), Vietnam consumer indices (CPI_VN) and the U.S consumer price indices (CPI_US).

$$\text{REAL\_E} = \frac{NOM\_E * CPI\_US}{CPI\_VN}$$

Monthly nominal Gross Domestic Production (NOM_M) data of the U.S are got from the website (http://ycharts.com/indicators/consumer_price_index/historical_data). The unit of the real GDP is billion dollars. Because other better monthly data such as personal income or personal expenditure on food or seafood are not able to be found, GDP is used to measure the income effect. For the same reason as that in the exchange rate, nominal GDPs are adjusted by CPIs of the U.S to get real GDP (REAL_M). Similarly, nominal prices are adjusted by corresponding U.S CPIs to get real prices.

$$\text{REAL\_M} = \frac{NOM\_M}{CPI\_US};$$

$$\text{REAL\_P\_TL} = \frac{NOM\_P\_TL}{CPI\_US};$$

$$\text{REAL\_P\_INDO} = \frac{NOM\_P\_INDO}{CPI\_US};$$

$$\text{REAL\_P\_INDIA} = \frac{NOM\_P\_INDIA}{CPI\_US};$$

$$\text{REAL\_P\_CHINA} = \frac{NOM\_P\_CHINA}{CPI\_US};$$

$$\text{REAL\_P\_VN} = \frac{NOM\_P\_VN}{CPI\_US};$$

Data are calculated and processed by Excel 2007 and Eview version 7. All data are transformed into natural logarithm.

CHAPTER 5: RESULTS

5.1. Stationary analysis

Figures in appendix show that the time series seem not to be stationary for all data at level but they seem to be stationary at first difference. The results of Table 3 show that not all data are stationary I(0). Particularly, data of import quantity of Vietnam (VOL_VN) and import price of India (P_INDIA) are stationary I(0) at 1 % level significance. Data of import price of China and India (P_CHINA) is stationary I(0) at 5% level significance. Data of import price of Vietnam and Indonesia (P_VN, P_INDO) are stationary I (0) at 10% level significance. Meanwhile, data of exchange rate (E), price of Thailand (P_TL) and real GDP (M) are not stationary at any level significance.

Table 3 Stationary analysis for data at level (ADF tests)

Variables	VOL_VN	E	P_VN	P_CHINA	P_TL	P_INDIA	P_INDO	M
τ _statistic	-6.88***	-2.1	-2.79*	-3.12**	-2.07	-4.1***	-2.81*	-1.6

Critical values for equation (10)

*** τ *_critical at 1% level : -3.49*

** τ *_critical at 5% level : -2.89*

* τ *_critical at 10% level : -2.58*

Critical values for equation (11)

*** τ *_critical at 1% level : -4.04*

** τ *_critical at 5% level : -3.44*

* τ *_critical at 10% level : -3.14*

The results of table 4 show that all the series are stationary I(1) at 1 % level significance. Therefore, the first differenced data are used in regression of the first differenced model and the partial adjustment model to avoid the spurious problem.

Table 4 Stationary analysis for data at first difference (ADF tests)

Variables	DIF_VOL_VN	DIF_E	DIF_P_VN	DIF_P_CHINA	DIF_P_TL	DIF_P_INDIA	DIF_P_INDO	DIF_M
τ _statistic	-8.87***	-8.45***	-9.83***	-12.22***	-6.00***	-9.16***	-10.81***	-11.9***

Critical values for equation (10)

*** τ *_critical at 1% level : -3.49*

** τ *_critical at 5% level : -2.89*

* τ *_critical at 10% level : -2.58*

Critical values for equation (11)

*** τ *_critical at 1% level : -4.04*

** τ *_critical at 5% level : -3.44*

* τ *_critical at 10% level : -3.14*

5.2 Regression results

Table 5 reports the estimated results of the first differenced model. Most of the estimated results are not significant at 10% level except the U.S import price growths for Vietnamese and Chinese shrimps (DIF_P_VN and DIF_P_CHINA). Usually, in practice,

changing in one economic factor in the past may affect other economic factors in future. Therefore, it is suggested to check lagged effects. The first differenced model will include more lag independent variables and lag dependent variables. In this thesis, changes of the factors within one quarter or changes within three months will be considered.

Table 5 Results of the First Differenced model

DIF_VOL_VN	Coefficients	se	t-statistic	Prob.
C	0.007	0.029	0.249	0.8037
DIF_E	2.66	2.448	1.087	0.2792
DIF_P_VN	-1.14	0.442	-2.585	0.0110
DIF_P_CHINA	1.06	0.487	2.180	0.0314
DIF_P_TL	-1.30	0.936	-1.388	0.1678
DIF_P_INDIA	-0.72	0.496	-1.447	0.1507
DIF_P_INDO	0.75	0.671	1.115	0.2671
DIF_M	6.24	4.317	1.444	0.1514
R^2 0.14	DW 1.77			

The estimated results of the partial adjustment model are presented in table 6. Compared with the first differenced model, these results seem to have improved. Firstly, R^2 is higher. Secondly, more estimated results are significant at least 10% level except for the exchange rate (DIF_E, DIF_E(-1), DIF_E(-2), DIF_E(-3)) and the income effects (DIF_M, DIF_M(-1), DIF_M(-2), DIF_M(-3)). Therefore, we will focus on the discussion of results given by the partial adjustment model only hereafter.

Table 6 Results of the Partial Adjustment model

DIF_VOL_VN	Coefficients	se	t-statistic	Prob.
C	0.01	0.030	0.165	0.8690
DIF_E	1.59	2.444	0.649	0.5178
DIF_E(-1)	-2.05	2.59	-0.791	0.4307
DIF_E(-2)	3.29	2.512	1.308	0.1945
DIF_E(-3)	2.98	2.418	1.232	0.2212
DIF_P_VN	-1.04	0.525	-1.973	0.0517
DIF_P_VN(-1)	-1.11	0.508	-2.188	0.0315
DIF_P_VN(-2)	-1.40	0.477	-2.937	0.0043
DIF_P_VN(-3)	-0.62	0.487	-1.264	0.2097
DIF_P_CHINA	1.76	0.616	2.851	0.0055
DIF_P_CHINA(-1)	1.53	0.626	2.444	0.0166
DIF_P_CHINA(-2)	1.75	0.593	2.948	0.0042
DIF_P_CHINA(-3)	0.22	0.556	0.394	0.6944
DIF_P_TL	-2.99	1.191	-2.504	0.0142

Table 6 (cont.) Results of the Partial Adjustment model

DIF_VOL_VN	Coefficients	se	t-statistic	Prob.
DIF_P_TL(-1)	-2.88	1.117	-2.574	0.0118
DIF_P_TL(-2)	-2.46	1.123	-2.192	0.0311
DIF_P_TL(-3)	1.30	0.984	1.321	0.1901
DIF_P_INDIA	-1.01	0.598	-1.681	0.0963
DIF_P_INDIA(-1)	-0.58	0.648	-0.895	0.3729
DIF_P_INDIA(-2)	-1.28	0.663	-1.923	0.0578
DIF_P_INDIA(-3)	0.02	0.581	0.034	0.9723
DIF_P_INDO	1.78	0.790	2.25	0.0270
DIF_P_INDO(-1)	2.08	0.828	2.512	0.0139
DIF_P_INDO(-2)	2.18	0.787	2.764	0.0070
DIF_P_INDO(-3)	0.76	0.756	1.04	0.3180
DIF_M	4.36	4.18	1.042	0.3004
DIF_M(-1)	1.89	4.231	0.447	0.6555
DIF_M(-2)	-0.34	4.351	-0.077	0.9387
DIF_M(-3)	0.20	4.422	0.045	0.9636
DIF_VOL(-1)	-0.01	0.115	-0.094	0.9246
DIF_VOL(-2)	-0.30	0.119	-2.518	0.0137
R^2 0.47	DW 1.96			

Since we are using time series data, autocorrelation problem should be normally tested. According to the results of the Breusch-Godfrey Serial Correlation LM Test, Prob Chi-square (3) is 0.2313 > 0.05, the null hypothesis of no autocorrelation cannot be rejected. In other words, autocorrelation is not a problem. The result of final estimated model regression is following:

$$\Delta VOL\_VN_t = 0.01 + 1.59\Delta E_t - 2.05\Delta E_{t-1} + 3.29\Delta E_{t-2} + 2.98\Delta E_{t-3} - 1.04\Delta P\_VN_t - 1.11\Delta P\_VN_{t-1} - 1.4\Delta P\_VN_{t-2} - 0.62\Delta P\_VN_{t-3} + 1.76\Delta P\_CHINA_t + 1.53\Delta P\_CHINA_{t-1} + 1.75\Delta P\_CHINA_{t-2} + 0.22\Delta P\_CHINA_{t-3} - 2.99\Delta P\_TL_t - 2.88\Delta P\_TL_{t-1} - 2.46\Delta P\_TL_{t-2} + 1.3\Delta P\_TL_{t-3} - 1.01\Delta P\_INDIA_t - 0.58\Delta P\_INDIA_{t-1} - 1.28\Delta P\_INDIA_{t-2} + 0.02\Delta P\_INDIA_{t-3} + 1.78\Delta P\_INDO_t + 2.08\Delta P\_INDO_{t-1} + 2.18\Delta P\_INDO_{t-2} + 0.76\Delta P\_INDO_{t-3} + 4.36\Delta M_t + 1.89\Delta M_{t-1} - 0.34\Delta M_{t-2} + 0.2\Delta M_{t-3} - 0.01\Delta VOL\_VN_{t-1} - 0.3\Delta VOL\_VN_{t-2}$$

Table 7 reports the estimated long-run effects of each independent variable on the dependent variable. The estimated results show that exchange rate, the price of India and the real income (DIF_E, DIF_P_INDIA, DIF_M) are not significant at 5% or even 10% level.

Table 7 Estimated long run effects of each independent variable on dependent variable

Variables	Short run effects		Prob. t-stat	Long run Effects		Prob. Chi-square
DIF_E	δ_{10}	1.59	0.5178			
	δ_{11}	-2.05	0.4307	β_1	4.44	0.1298
	δ_{12}	3.29	0.1945			
	δ_{13}	2.98	0.2212			
DIF_P_VN	δ_{20}	-1.04	0.0517			
	δ_{21}	-1.11	0.0315	β_2	-3.18	0.0001
	δ_{22}	-1.40	0.0043			
	δ_{23}	-0.62	0.2097			
DIF_P_CHINA	δ_{30}	1.76	0.0055			
	δ_{31}	1.53	0.0166	β_3	4.01	0.0006
	δ_{32}	1.75	0.0042			
	δ_{33}	0.22	0.6944			
DIF_P_TL	δ_{40}	-2.99	0.0142			
	δ_{41}	-2.88	0.0118	β_4	-5.36	0.0012
	δ_{42}	-2.46	0.0311			
	δ_{43}	1.30	0.1901			
DIF_P_INDIA	δ_{50}	-1.01	0.0963			
	δ_{51}	-0.58	0.3729	β_5	-2.17	0.1188
	δ_{52}	-1.28	0.0578			
	δ_{53}	0.02	0.9723			
DIF_P_INDO	δ_{60}	1.78	0.0270			
	δ_{61}	2.08	0.0139	β_6	5.18	0.0045
	δ_{62}	2.18	0.0070			
	δ_{63}	0.76	0.3180			
DIF_M	δ_{70}	4.36	0.3004			
	δ_{71}	1.89	0.6555	β_7	4.66	0.5181
	δ_{72}	-0.34	0.9387			
	δ_{73}	0.20	0.9636			
DIF_VOL_VN	θ_1	-0.01	0.9246			
	θ_2	-0.30	0.0137			

The estimated R^2 of 0.47 indicates that about 47% of variation in the growth rate of import quantity (DIF_VOL_VN) is explained by regression model.

In short-run, although the signs of the exchange rate and income coefficients are mostly positive as expectation, their estimated results are not significant at any level. On other words, exchange rate and income have no effects on the U.S import quantity of Vietnamese shrimp.

All changes in price growths within three months have short-term effects on the U.S import quantity of Vietnamese shrimp. Particularly, the effects of the own prices on import quantity are negative as initial expectation. If the growth of the U.S import prices for Vietnamese shrimp increases by 1% then it leads to an immediate decrease of the U.S import quantity growth for Vietnamese shrimp by 1.04%, 1-month lag growth decrease of 1.11% and 2-month lag growth decrease of 1.4%. The effect of 2-month lag growth is the largest.

The effects of the U.S import price for Thai and India shrimp are also negative, which is unexpected. Usually, the qualities and tastes among the types of shrimps are not too distinct then they are thought to be substitutes for each other. Therefore, the effects of the prices of shrimps from other countries on Vietnamese shrimp export are initially expected to be positive. The estimated results mean that if there is an increase in the U.S import price growth for these two countries, the U.S import quantity growth for Vietnamese shrimp will become smaller. In opposition to the direction of the effects from own price, the largest negative effect of the U.S import price growth for Thai shrimp occurs immediately (-2.99) and it decreases over time (-2.88 for 1-montly lag effect and- 2.46 for 2-month lag effect). The effect of the U.S import price growth for Indian shrimp seem to be weak and not continuously like the own prices or Thai prices. The estimated results for the U.S import price growth for Indian shrimps are significant at 10% level at immediate effect (-1.01) and 2-month lagged effect (-1.28).

However, the effects of the U.S import price for Chinese and Indonesian shrimps are positive as expectation. The increases in import price growth for China and Indonesia make the U.S quantity demanded for Vietnamese shrimp decrease. The magnitudes of these effects on Vietnamese export are larger than those of own price across months. Specifically, if the U.S import price growth of Thai shrimp increases by 1%, the immediate, 1-month lagged effect and 2-month lagged effect on the U.S quantity demanded for Vietnamese shrimp increase by 1.76%, 1.53% and 1.75%, respectively. Similarly, the figures for the immediate, 1-month lag, 2-month lag U.S import price growth of Indonesian shrimp in turn are 1.78%, 2.08% and 2.18%. Therefore, the largest effect of the import price growth for Indonesia on

Vietnamese export falls into the 2-month lag while the largest one falls into the immediate effect for the U.S import price of Thai shrimp.

Like the short-run effects, only the effects of prices on quantity are significant at 1% level in the long-run. Except for the coefficients of the U.S import prices for Indian shrimp, all the estimated price coefficients are significant. Their long-run effects have the same signs as the short-run ones. Among them, in the terms of magnitude, the largest effect on Vietnamese export belongs to the U.S import price growth for Thai shrimp (-5.36). If there is a sustained increase of 1% in the U.S import price growth for Thai shrimp, it will leads, after 3 months, to a total decrease of 5.36% in the U.S import quantity growth of Vietnamese shrimp. The second is the effects of the U.S import price growth of Indonesian shrimp (5.18). If there is a sustained increase of 1% in the U.S import price growth for Indonesian shrimp, it will result in, after 3 months, a total increase of 5.18% in the U.S quantity demanded for Vietnamese shrimp. The third is the effects of the U.S import price growth of Chinese shrimp (4.01). The last one is the own price (-3.18).

CHAPTER 6: DISCUSSION

The estimated results show that the real appreciation of VND against USD has no effect on the U.S import quantity of Vietnamese shrimp in the short-run as well as in the long-run. This result is unexpected, which may be due to that either the data or the model to be improved. For example, the study used the real bilateral exchange rate for regression and analysis. However, the previous studies used the real effective exchange rate and they found the effects of changes in exchange rate on export quantity. Secondly, the model used in the thesis is only the partial adjustment one. It might be not the best one. Therefore, more researches have to be done, particularly using different model specifications and better data.

Although the result is not consistent with Hermann and Lin (1988) and Huy *et al*. (2011), it is consistent with the findings and conclusion of Almarwani *et al*.(2007) and Shane *et al.* (2008). Almarwani *et al*. (2007) said that one policy may not fit all exporters and the effects of changes in exchange rate on quantity vary by specific commodities. It means that changes in exchange rate may impact on one commodity but they may not impact on another commodity. The estimated long-run result possibly implies that the exchange rate is not a proper tool to promote the Vietnamese shrimp export to the U.S. Therefore, to develop the sustainable shrimp export, Vietnamese governors are suggested to take priority over other policies such as improving Vietnamese shrimp competitiveness, encouraging high quality and clean shrimp product export and diversification of the pattern of the shrimp products.

Prices are still the most important factors affecting the U.S quantity demanded for Vietnamese shrimp. Most of the estimated price elasticities are consistent with the theory. Among them, the effect of the U.S import price growth of Thai shrimp on the U.S quantity demanded for Vietnamese shrimp is the largest ones both in the short-run and in the long-run. The second and third largest effects are Indonesia and China, respectively. Therefore, these estimated results seem to be corresponding to the structure of the U.S shrimp import market because Thailand is the largest shrimp supplier. In particular, in 2011, 32.2% of the U.S total shrimp import is from Thailand, the next is Ecuador (13.2%), Indonesia (12.5%) and China excluding Taiwan and Hongkong (7.3%). It might be implied that the market shares of the shrimp competitors impact on Vietnamese export to the U.S market.

Unexpected negative signs of Thai and Indian shrimp on Vietnamese export indicate that more researches on the relationship between Thai, Indian and Vietnamese shrimps imported to the U.S should be carried out in future to explain this issue. China and Indonesia

shrimps are found to be substitutes for Vietnamese shrimp. In practice, Vietnam mostly export black tiger shrimps of big size i.e 20-26 pieces or less than 15 pieces per pound while China and Indonesia mostly export white leg shrimps of small sizes. During the period of economic crisis, to save income, the consumers might tend to buy more small-sized shrimps, since the average import prices of Vietnamese shrimp are always higher than those of China and Indonesia (Figure 3). As a result, this may lower the price of Vietnamese shrimp in the U.S market.

For recent years, Vietnamese shrimp farmers mostly farm black tiger shrimps while white leg shrimps are farmed a lot in China and Indonesia. There are a couple of reasons why the prices of black tiger shrimps are higher than that of white leg shrimps. The first reason may be due to higher farming costs. The farming cost of white legs shrimp is lower than that of black tiger shrimp because white leg shrimp has many advantages. Specifically, the productivity of white leg shrimp is high. This shrimp is easier processed due to its softer shell. Moreover, this type of shrimp has a good ability of disease resistance. Nevertheless, when they are 3-month old, it can be harvested. Meanwhile, over 4-month old black tiger shrimp can be harvested. The second reason may be that Chinese and Indonesian shrimp farms get familiar with modern farming technique which helps them save costs. To improve Vietnamese shrimp's price competitiveness, Vietnamese governors are suggested to have long-term shrimp farming plan and subsidy policies of seeds and farming technique training for shrimp farmers.

The income growth is found to have no effect on the U.S demanded of Vietnamese shrimp. The import value of Vietnamese shrimps occupies a small proportion of the U.S Gross Domestic Products. In other words, the scale of GDP which is used as a proxy for income effect is too larger than the U.S import value of Vietnamese shrimps. However, due to the unavailability of better monthly data of personal income or personal expenditure on food or seafood, GDP data are decided to be used in regression. Therefore, it is not surprising when GDP is found to have no effect on Vietnamese shrimp quantity imported to the U.S.

Finally, the limitations of data are found to depress the estimated results. It is implied that the construction of yearly and monthly databases need to be taken priority over and improved. Good databases are very important for scientific researches as well as in the government's decision and management. The second lesson learnt from this study is that the scale of data and the type of data are also important for getting good estimated results.

CHAPTER 7: SUMMARY

During 2000-2011, shrimps are the most important export fisheries products in Vietnam to the U.S and it is a top three largest receiver of Vietnamese shrimps beside Japan and EU. After signing the Bilateral Trade Agreement in 2000, the U.S import quantity of Vietnamese shrimp increased sharply. However, in late 2003, after the U.S imposed anti-dumping duties on Vietnamese shrimp, the import quantity dropped. Then, it fluctuated for 2004-2011 and its growth rates were lower than that of the period 2000-2003.

According to the plan of Vietnamese fisheries export development for the period 2015-2020, shrimp still maintains its important role in Vietnamese fisheries exports and the U.S still remains its traditional importing market. To meet the targets of improving Vietnamese fisheries export, the governors are using exchange rate as a motivating tool. At present, Vietnamese exchange rate regime is classified into the conventional fixed peg arrangement. The exchange rate is anchored against USD. In recent years, the nominal value of VND has continuously been devalued. In contrast to the increasing trend of the nominal value, the real value of VND has been revalued due to higher Vietnamese CPIs than the US CPIs. Some empirical studies show that depreciation of one currency will encourage exporting but some studies show that depreciation of one currency will either affect export or not, it depends on specific commodities and specific importing markets. Hence, it was necessary to investigate the effects of exchange rate on Vietnamese shrimp imported to the U.S.

The main purpose of the thesis is to examine the effects of real bilateral exchange rate VND/USD on the U.S demand for Vietnamese shrimp between 2002:03 and 2011:12. Furthermore, Thailand, China, Indonesia and Indian are proposed to affect Vietnamese shrimp export because they are major shrimp suppliers in the U.S market. Consequently, in modeling, the U.S demand for Vietnamese shrimp is dependent on real bilateral exchange rate, own price, prices of Thailand, China, Indonesia, India and the real U.S Gross Domestic Products (GDP).

The thesis tried with two kinds of model: a first differenced model and a partial adjustment model. The partial adjustment model proves to be better, because it avoids spurious correlation problem and has higher R^2. Nevertheless, its results are quite reasonable and significant. The estimated results show that changes in the real exchange rate VND/USD

have no effects on the U.S import demand for Vietnamese shrimp both in the short-run and the long run. Meanwhile, it is found that the effects of prices on Vietnamese shrimp imported to the U.S are significant both in the short-run and in the long-run (except Indian prices). The signs of the effects of Thai and Indian shrimp on Vietnamese export are unexpectedly negative, while the signs of the effects of Chinese and Indonesian shrimp are positive as expectation. The long-run magnitudes of the effects of the U.S import price growth of Thai shrimp (-5.36) and Indonesian shrimp (5.18) are the largest ones. Finally, the change in the US real GDP has no effect on its demanded quantity of Vietnamese shrimp.

In conclusion, exchange rate should not be expected as a sustainable export motivating tool for shrimp. Instead, the factors of prices are found to impact on Vietnamese shrimp imported to the U.S largely. Therefore, Vietnamese governors and exporters are encouraged to consider increasing the supply of high quality, clean and diversified shrimp products, supporting seeds and farming technique training program for shrimp farmers. Furthermore, Vietnamese governors are suggested to construct long-term and detailed shrimp farming and shrimp export development plans to achieve the target of sustainable shrimp export. Nevertheless, the construction of good monthly and yearly databases is implied to be taken into consideration and improved for the purpose of scientific researches and the government's decision and management. Finally, one lesson was learnt from this study. It is that the scale of data and the type of data are important for getting good estimated results.

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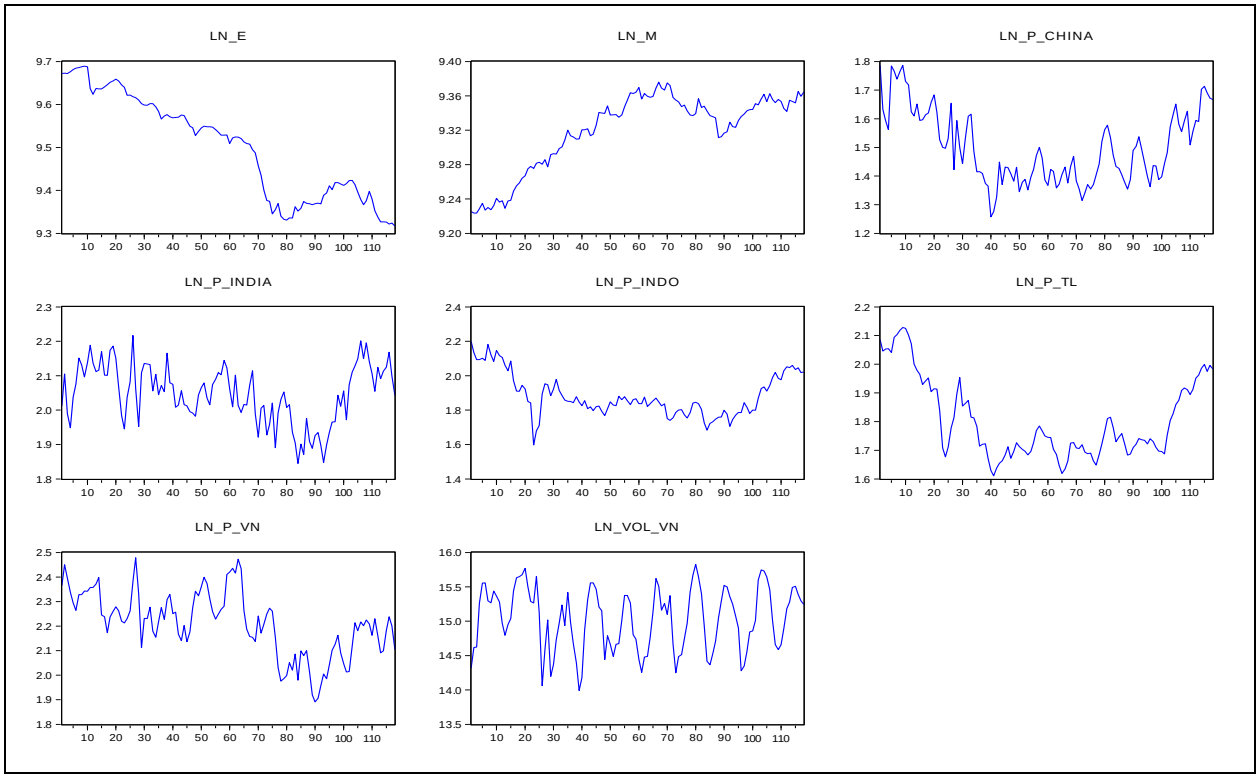
APPENDIX

Appendix 1A. Graphs of the series at level



Appendix 1B. Graphs of the series at first difference