EXCHANGE RATE, INTERNATIONAL TRADE AND FDI: EMPIRICAL EVIDENCE FROM CHINA

by

Linxi Wu

A thesis submitted to the faculty of
The University of North Carolina at Charlotte
in partial fulfillment of the requirements
for the degree of Master of Science in
Economics

Charlotte

2016

Approved by:

_____
Dr. Hwan-Chyang Lin

_____
Dr. Craig A. Depken, II

_____
Dr. John M. Gandar

ABSTRACT

LINXI WU. Exchange rate, international trade and FDI: Empirical evidence from China. (Under the direction of DR. HWAN-CHYANG LIN)

In this paper we investigate the dynamic relationships between international trade, foreign direct investment, and the real exchange rate of China. The analysis is based on a vector auto-regression (VAR) model using historical data.

The empirical results suggest the reciprocal cause-and-effect relationships among the three variables in consideration of the long term.

Recently, the trade surplus and FDI are important source of the pressure of RMB appreciation, RMB appreciation will not make China's trade balance worse in a certain period of time, but it will have a negative effect on FDI inflows.

We suggest that, in terms of exports, China should export more technology intensive and capital intensive products, and the export products should also be more diversified; In terms of exchange rate, China should continue to carry on the reform of exchange rate along the original independent, controlled and gradual principles, and realize the internationalization of RMB. Thus it can not only can effectively attract more foreign investment, but also promote the development of Chinese economy.

ACKNOWLEDGMENTS

I am grateful to my advisor Dr. Hwan-Chyang Lin, for his guidance and patience while helping me formulate this work.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

Exchange rate, Foreign Direct Investment and trade are three important topics in international economics. The actual influence among them is still an open and controversial question. The bilateral relationship is referred in many thesis, but the study on the trilateral relationship is rare. The recent debate on persistent trade imbalances and on the resurgence of non-traditional trade restrictive measures has led to a renewed interest in better understanding the effect of exchange rates on international trade.

This paper contributes to an improved understanding about the relationship between exchange rates, FDI and international trade by investigating into the dynamic time series data of them.

By using VAR model for regression we empirically approve that FDI improves the trade balance in the long term: increases in FDI lead to RMB devaluation, and reduces in FDI will lead to RMB appreciation. Correspondingly, RMB devaluation helps the inflow of FDI, the RMB appreciation reduces FDI, and at the meanwhile the stability of RMB real effective exchange rate is conducive to attracting FDI. Also, devaluation of the RMB reduces imports and RMB devaluation promotes China's exports. Increasing exports contributes to the devaluation of the RMB, vice versa. Therefore, FDI and depreciation both improve the trade balance. Due to the J-curve effect, the improvement of RMB depreciation on trade balance lags by about two

years. The export volume has no significant effect on FDI.

CHAPTER 2: THEORETICAL BASIS, LITERATURE REVIEW AND HISTORICAL RESEARCHES

2.1 Development of International Trade and Studies

2.11 Development of International Trade

International trade strategy is an imposed on the import and export trade by a country in a given period. It consists of an overall strategy, the import and export commodity strategies, services liberalization strategy and so on. Meanwhile, the selection and usage of international trade strategy will undoubtedly be closely related to reform and evolution of the international trade system of one country.

Broadly speaking, trade policy can be divided into protective trade policies and Free Trade policies. There are many factors affecting national trade policy formulation of countries, such as their domestic economic structure, the competitiveness of their products in the international market, and the impact of governmental problem. However, looking from an international trade policy history, different trade theories have a profound impact on the choice of national trade policies in each period. Moreover, the selection of trade policy also depends on the economic situation in different periods. Primitive accumulation of capital during the fifteenth to seventeenth century when mercantilism was prevailing, including currency variance theory and the balance of trade emphasized the capital cumulative effect of exports. Therefore, in this period, mandatory protectionist trade policies were implemented.

When time moves to the mid-eighteenth century after the industrial revolution, the classical economists, represented by A.Smith and D.Ricardo, pursued free trade policies. This is based on the theories of international trade according to absolute advantage and comparative advantage. The main theory is intend to achieve efficient allocation of domestic resources via international trade, and ultimately improve the welfare of the entire world. Then through a long period of time (the capitalist free competition period), free trade doctrine and protectionism coexisted. It is worth mentioning that since the eighties of the twentieth century, there appears a new wave of protectionism.

Since the 1980s, Krugman, Helpman and other economists create New Trade Theory. On the basis of the new trade theory, Grossman, Spencer, Brander, Dixit and others took the scale economies and imperfect competition as a precondition, used the theory of industrial organization and market structure theory as a research tool, and proposed Strategic Trade Policies. "Strategic trade policies" refers to a government use of production subsidies, export subsidies or protection market and other policy instruments to support the growth of the national industry and enhance their competitiveness in the international market under the conditions of imperfect competition and scale economies, thereby seeking extra income of scale economies and the like, moreover, took the opportunity to looting for market share and industry profits of others. It means under imperfect competition, the country implements trade policies not only destructive to its economic benefits, but may improve their welfare. One of the representatives of the Strategic Trade Policies, Krugman specifically

mentioned that large amount of economic rent, which means high monopoly profit is one of the criteria to identify strategic sectors. Strategic trade theory has shaken the optimality of free trade policy under the conditions of scale economies and imperfect competition. It proved the rationality of government intervention and proposed that appropriate utilization of tariffs, subsidies, and other strategic trade policy measurements will help to improve the welfare of a country's trade. This central conclusion is contrary to traditional trade theory.

2.12 International Trade Strategy and New Trade Theory

The formation of each country’s trade policies is not only effected by the global economic environment, and the country’s economic development, the development of trade theory also has a profound impact on a country to formulate regional trade policy. The trade theory is the cornerstone of the emergence of strategic trade policy.

From the development of trade theory, the early 1980s is undoubtedly a watershed in international trade theory and policy research. Taking a perfectly competitive market structure as the basic assumptions, the trade theory before 1970s successfully explained inter-industry trade, international factor mobility, technology advantages decided division and other issues. But in the 1960s and 1970s, traditional trade theory was challenged by a series of empirical studies. For example, Grubel and Lloyd (1975) pointed out that the vast majority of world trade takes place between OECD countries. The explanation for intra-industry trade has become the starting point of trade theory after the 1970s. New Trade Theory is defined by Krugman (1979,

1980, 1981) and the work of Lancaster (1979, 1980), Hlepman(1981), Brander(1981), Brander&Krugman(1983). Because these efforts are based on the basis of imperfect competition, the new trade theory is imperfect competitive international trade theory.

So, what kind of impact the New Trade Theory will have on the formation of realistic trade policies? The traditional trade theory on the basis of perfect competition derives laissez-faire trade policies. The trade theory based on imperfect competitive would of course question it. The first model about the strategic trade policy of the new trade theory is from Brander & Spence. They believe that traditional trade theory is based on a perfectly competitive market structure, the corresponding free trade naturally become the optimal policy. However, imperfect competition and scale economies is the most common phenomenon in the contemporary world. In many industries, business is controlled by a limited number of companies, quite powerful enough to influence the market price. According to industry theory and game theory research, Brander & Spencer creatively discussed the effect of government subsidies for export production and trade under the conditions of imperfect competition and scale economies. They established the basic framework of the Strategic Trade Policy Studies.

The following scholars developed a variety of models reflecting the strategic trade policy ideas on this basis. From the point of modeling, the strategic trade policy theory consists of two models:

（1） Profit transfer theory based on internal scale economies. The core idea of this type of model is that monopoly profits are

transferred from foreign to domestic agents. The increase of their monopoly profits is the reduction in foreign monopoly profits. Based on the different ways of the transfer of profits, models in this category can be divided into "export subsidies" model and "import protection in order to promote export" model.

（2） Economic theory based on external scale economies. The production activities actually exist externalities. However, these external economies are not fully internalized by manufacturers. These companies often lack the motivation to invest in research and development. If the government can give adequate protection and support for such industries or companies, it will be able to promote the development of these industries and related industries and obtain long-term strategic interests, such as the external effects model of strategic subsidies to high-tech industries (such as computers, electronics and aerospace industries).

In summary, the strategic trade policy model of new trade theory is based on trade theory of imperfect competition and scale economies developed in the 1980s. It is the reflection and exemplification of the above-mentioned theories in the field of international trade policy. Different with the traditional free trade policy theory, Strategic Trade Policy of new trade theory sophisticatedly demonstrates a country may impose trade intervention policy under imperfect competition and improve their own economic profit welfare by extracting and transferring the economic profit of others. The mainstream view of traditional trade theory believes that government

intervention leads to distortions in cultivating resources, resulting in decreased national welfare. For example, tariff and non-tariff barriers restrict imports, and export subsidies result in a net loss of national welfare. Strategic trade policy theory believes that under the conditions of scale economies and imperfect competition, a government can make use of R & D subsidies, export subsidies, production subsidies, import tax, protection of the domestic market, and other policy instruments to support the growth of the national strategic industries. These policies enhance international competitiveness, promote the development of related industries, thereby reap the benefits of scale economies, seize market share of international competitors, and transfer monopoly profit.

2.2 Related Researches on International Trade, FDI and Exchange Rate

2.2.1 Related Research on The Relationship Between International Trade and The Real Effective Exchange Rate

As a currency relative parity between the two countries, any fluctuations of exchange rate will change the relative prices of domestic products and foreign products, thus affecting the residents' demand for imported products and export products, thereby affecting the trade balance of a country. Generally speaking, exchange rate depreciation reduces the price of domestic goods relative to foreign products, which induces domestic residents to reduce the demand for foreign products while increasing foreign residents' demand for their products. If a country's import and export demand elasticities to meet Marshall-Lerner condition, then the devaluation will improve a country's trade balance.

Since the implementation of a floating exchange rate regime in 1973, a large number of studies about the impact of the real effective exchange rate on a country's imports, exports, and trade balance have been published. Connoly & Taylor (1972), Laffer (1974), Krugman & Taylor (1978) use single variable equations to study the impact of the real effective exchange rate volatility on trade balance. Miles (1979) and Bahamani-Oskooee (1985) extended the univariate equations to multivariable equations to study the business effect of real effective exchange rate volatility and studied "J-curve effect" of fluctuations in exchange rates. These studies generally find that the real effective exchange rate fluctuations have a significant impact on a country's trade balance. But some studies have made the exact opposite to the above research conclusion. For example, Rose (1991) used the data form the year 1974 to 1986 to test G7 countries, the test result showed that cointegration relationship does not exist between the real effective exchange rate and the import and export trade of the G7 countries. The depreciation of the exchange rate does not improve international trade balance of these countries. The test of Chua and Sharma (1998) for Korea, Philippines, Thailand, Singapore, and the test of Wilson (2001) for Singapore, Malaysia, South Korea also came to the same conclusion.

Many scholars in China test the relationship between the real effective exchange rate and the exports and imports of China. Cointegration analysis of Li Haibo (2003) illustrated that a long-term equilibrium relationship exists between the RMB exchange rate and international trade. By contrast, cointegration analysis for the RMB exchange rate and trade relations of Xie Jianguo and Chen Ligao (2002) showed that

devaluation has no significant impact on improving the trade balance.

2.2.2 Related Researches on The Relationship Between FDI and Real Effective Exchange Rate

Theoretically, exchange rate fluctuations can affect foreign direct investment (Dewanter, 1995) through multiple channels. Firstly, the exchange rate depreciation lead labor costs and other production costs to relatively decline, resulting in domestic production has a cost advantage. From the perspective of investing countries, this means that investments in the host country become more affordable. Meanwhile, the reduced labor costs lead to a rise in demand for labor, which indirectly increases the rate of return on capital of the host country. Lower production costs and higher capital investment rate of return will undoubtedly lead to increased foreign direct investment of the host country (Ajami & Bamiv 1984, Cushman 1985, Gross & Trevino 1996).

In addition, to the cost - benefit way can affect foreign direct investment, exchange rate fluctuations can also affect foreign direct investment by incomplete capital market channels (Froot & Stein, 1991). In terms of incomplete capital theory, the cost of external financing is more expensive than the cost of internal financing. Any change in the status and wealth of an investor will be transferred to the demand for investment. Different from the investment due to cost advantages, FDI due to incomplete capital market channels are generally state-owned merged by foreign companies. Therefore, both the cost advantages and incomplete capital market channels, the depreciation of the real effective exchange rate the result in rising FDI.

Another way exchange rate fluctuations affect FDI is the investment country's relative appreciation of the exchange rate will lead to investment alternatives for export. The relative appreciation of the exchange rate will lead to investment country's exports being more expensive. Making the investment country's exports lose any cost advantage. Thus, the investor companies will readjust their production layout, and shift manufacturing enterprises from investing country to the host country (Froot & Stein, 1992). This results in the host country's currency depreciation relative to the currency of the investment country, which will lead to a larger scale direct investment to the host country. Conversely, if the host country's exchange rate rising, it will not be conducive to the host country to attract more foreign direct investment.

Empirical studies of existing literature confirms this relationship between the exchange rate and the foreign direct investment. By using the foreign direct investment data during 1973 to 1990, Froot and Stun (1991) found that the depreciation of the dollar exchange rate will lead to more foreign direct investment. Caves's (1988) study also demonstrated that the relative appreciation of the investment country's currency to dollar is one of the important reasons to explain direct investment to the United States. Pan's (2002) study shows that an investment country's currency appreciation will lead to investment companies tend to occupy a higher share of investment in joint venture in China. In addition, studies of Cushman (1988), Ito (1996), Goldberg and K1ein (1997), and Beak (2001) have shown that the exchange rate depreciation of the host country will attract more foreign direct investment, while investment country's exchange rate appreciation will encourage

investment companies to make more foreign direct investment.

As for the impact of FDI on the host country's real effective exchange rate, it generally believed that foreign direct investment can affect the host country's real exchange rate in two ways. Firstly, the direct approach. Foreign direct investment directly affects the real effective exchange rate of the host country by affecting capital flows in the different stages of investment and import and export trade of a country (Ito, 1996). Another approach is indirect. It means the entry of foreign capital. On the one hand, intensified competition in the relevant industry, increases the productivity of related industries. On the other hand, Technology Spillover Effects of FDI and the learning effect of the domestic industry can also improve labor productivity of domestic enterprises. Therefore, foreign direct investment promotes real appreciation (Balasa, 1975) of a country's exchange rate. Of course, this effect of FDI performance is more long-term than immediate.

CHAPTER 3: INTERNATIONAL TRADE, FDI AND REAL EXCHANGE RATE TRANSMISSION MECHANISM AND THE HYPOTHESIS PUT FORWARD

From the analysis above, a common feature of previous studies is pairwise study the relationship between trade, FDI and exchange rates, which undoubtedly helps to simplify the analysis. While relations with the interaction among the three interdependent financial transactions to enhance the status of the transaction in the international economy increasingly close. There have been some scholars to study the three factors in a single framework. For example, Obstfeld (1984) established a theoretical framework for analyzing the relationships among international trade balance of capital flows (FDI), extraordinary items (most notably imports, exports), and exchange rates. Goldberg and Klein (1997) use panel data to investigate the relationships among trade, FDI and real exchange rate, and they find that in Southeast Asian countries the real exchange rate impacts trade and FDI, and FDI also promotes trade. On the contrary, the real exchange rate in developing countries in Latin America has little impact on FDI; FDI promotion has a very weak impact on trade. Therefore, I test the mutual influence among international trade, FDI and real effective exchange. Data relevant to economic variables of China will be used in the next chapter to do empirical research to verify the hypothesis.

3.1 Nominal Exchange Rate (NE) and Real Effective Exchange Rate (REER)

For an open economy like China, the exchange rate is a crucial economic variable. It will directly affect China's external competitiveness, the international balance of payments, and its inflation situation. A large number of theoretical and empirical researches show that a real impact on the international competitiveness of the product and macroeconomic performance of a country is the changes in the real exchange rate. Therefore, to objectively and accurately portray the magnitude of exchange rate changes needs to do research on the real effective exchange rate of the RMB. A large number of theoretical and empirical domestic and international research shows a real impact on the international competitiveness of the products and macroeconomic performance of a country by changes in the real effective exchange rate. Historically some of the devaluation policies in developing countries does not work. Because they were unable to effectively curb inflation, the result is the rise of the real effective exchange rate. On the one hand, it shows that the real exchange rate is an important indicator of a country's international competitiveness of products. On the other hand, there is a lag effect in the nominal exchange rate of international trade adjustment process. Thus, all the empirical analysis in this paper is based on the real effective exchange rate.

From Figure 1, we see the isolated cases of real effective exchange rate of RMB (REER) and nominal exchange rate of RMB (NE). The main reason for the separating trend of real effective exchange rate of RMB (REER) and nominal exchange rate of RMB (NE) is the exchange rate policies of the Chinese central bank can’t well reflect

the real power of RMB and the development of China’s economy. However, the variable real effective exchange rate can truly reflect the real comparison between the RMB and the dollar. Why does the real effective exchange rate of RMB reflect China's economic situation? Specifically, during 1998 to 2000, the RMB appreciated against the US dollar, because the Chinese economy successfully weathered the Asian financial crisis. Countries in the world have taken note of the potential of China's economy, so a lot of investment came into China from neighboring countries, which enabled the rapid development of the Chinese economy. While the RMB was in the state of devaluation from the second quarter of 2000 to the first half of 2002. I think this is due to the "deflation" phenomenon of Chinese economy during this period. From the end of 2002, private capital began to force the Chinese economy causing another round of investment boom. As a result, the demand for raw materials increased rapidly. There is a new round of rapid economic development, and the comprehensive national strength improved significantly. Therefore, the figure reflects the decline of actual effective exchange rate of RMB.

Therefore, to accurately portray the change of RMB exchange rate and accurately reflect the economic changes in China, the RMB real effective exchange rate is indeed an effective tool. Therefore, indicators characterizing the RMB exchange rate in this paper is actually real effective exchange rate rather than the nominal exchange rate of RMB.

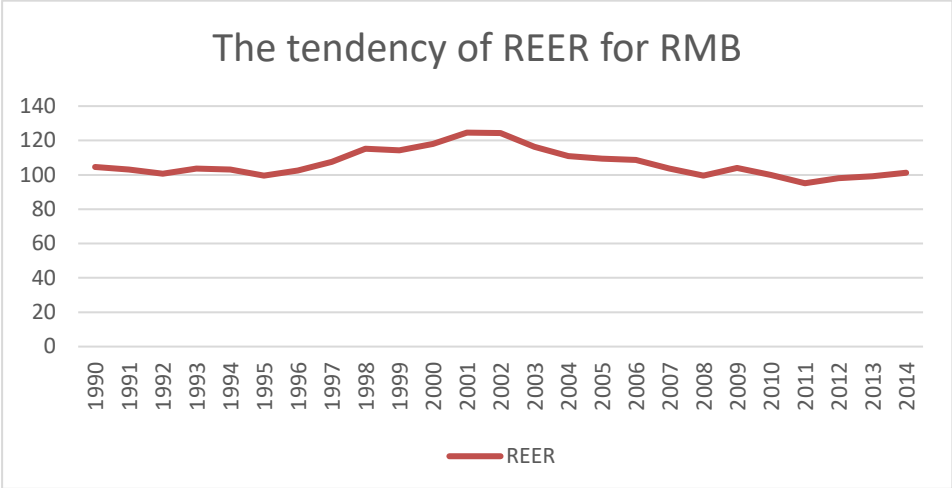

Figure 1: The Tendency of REER for RMB

3.2 The Calculation of The real effective exchange rate (REER)

The actual exchange rate is the starting point and basis of studying the exchange rate. It has an extremely important role in exchange rate theory. The real exchange rate in this paper we selected is "the real effective exchange rate" According to the real exchange rate calculation method, it can be roughly divided into three categories: price index adjustment approach, ratio of tradable prices and non-tradable price method, the real effective exchange rate method.

① Formula of price index adjustment method:

$$R_1 = P_f / P$$

Wherein, P_f and P are the representatives of price index of foreign and Chinese respectively. In actual selection of the data, generally use the consumer price index or the GDP deflator.

From the dynamic comparative perspective, the method to calculate the change in the real exchange rate and the nominal exchange rate of RMB is not entirely

consistent.

② Formula of ratio of tradable prices and non-tradable price method:

$$R_2 = P_t/P$$

Wherein, P_t and P respectively represent tradable price index and non-tradable goods price index.

Generally speaking, the real exchange rate calculated by this method is considered to be a currency concept of the relative price of this two products. The advantage is a good reflection of changes in a country's international competitiveness. For example, if the real exchange rate rise, indicating that the price of tradable rise relative to non-tradable goods. It will promote domestic resource flows to the tradable sector, and will improve the country's international competitiveness. Otherwise, it deteriorates. But in reality, it is very difficult to measure the real exchange rate by this calculation method. Therefore, according to the usual practice of scholars, we used the following method:

$$R_2 = WPI_{usa}/RPI_{china}$$

Wherein, WPI_{usa} is US wholesale price index. It represents the actual price of tradable goods.RPI_{china} is China's retail price index.

③ Formula of the real effective exchange rate method:

$$R_{REER} = \log(E \times \frac{P_d}{P_f})$$

Wherein, $\mathrm{E} = \sum \omega_i E_i$, $\omega_i$is the ith country's share in the proportion of China's international trade. E_i is the ith country's currency price of unit RMB(direct quotation). P_d is the domestic price level. It replaced by the GDP deflator. P_f is the

foreign price level. It's calculation formula is $P_f = \sum \omega_i P_i^*$, wherein P_i^* is the wholesale price level of ith country.

We can see a clear difference among the nominal exchange rate, several real exchange rate and real effective exchange rate. Each index reflected the economic implications of different emphases.

3.3 Transmission Mechanism

3.3.1 Transmission Mechanism of International Trade and the RMB Real Effective Exchange Rate

From historical data we can see that since the 1997 Asian financial crisis, in order to avoid negative factors of severe international financial environment for China's economy, the Chinese government has increased the export trade and the export tax rebate ratio in 1997. Meanwhile, there has been a lot of private capital investment flows to industry, especially in terms of mechanical and electrical products. And their main market is the foreign market. By 1998, government incentives seem to be working. At the same time, the export desire of private capital has been realized. Therefore, in 1998, there is a rapid growth of China's exports and net exports have improved greatly.

However, because the Asian financial crisis did not jeopardize China's financial system, the Chinese RMB remained stable in the crisis. That is, while the currencies of other Asian countries devalued the RMB appreciated. So we can see from the figure that the net exports at a low level while exports are hovering low level in the first half of 1999 to 2001.

The world economy gradually improved early in the 21st century. From the fourth quarter of 2001, China's international trade maintained strong growth. By 2002, China's trade surplus reached $32.3 billion, reaching an astonishing annual growth rate of 34.95%. However, due to the trade balance volatility, the import and export balance reduced to $27.94 billion in 2003. By 2004, fluctuations in the trade balance still existed, but China's international trade surplus began to grow. Import and export balance in 2004 was $ 31.92 billion.

According to China economics data, in 2008 China's total import and export volume was 17 trillion and 992 billion 150 million yuan, import and export trade surplus was 2 trillion and 86 billion 840 million yuan. In 2009, despite the impact of the international financial crisis, the total import and export volume still reached 15 trillion and 63 billion 70 million yuan, the favorable balance of trade was 1 trillion and 340 billion 490 million, reached the second place of the world, compared to the world ranking by 1980, which was twenty-sixth. Export-oriented development strategy in China has made great achievements.

At the same time, China's foreign direct investment attraction strategies has also made tremendous achievements, FDI inflows continue to grow, China's actual use of foreign investment in 2009 was $91 billion 800 million, of which the amount of foreign direct investment actually utilized foreign capital was $90 billion 30 million, China became the largest developing country to attract FDI inflows. Foreign capital enterprises play a very important role in promoting China's economic development and export growth, foreign enterprises accounted for a large proportion of China's

foreign trade, and become the main source of China's foreign trade surplus. (Shengbing He and Wenhu Yang, 2008).

The rise of the real effective exchange rate meant the actual depreciation of the currency against foreign currencies. Given America's national strength and economic power in the world and the important position in China's foreign economic relations. And given the dollar is the key currency in the international financial system. In this paper, the real effective exchange rate of the dollar to reflect the real effective exchange rate of the RMB.

As we all know, from late 1996 and early 1997, the nominal exchange rate of RMB against the US dollar remained at about 8.27: 1 under the control of the Chinese central bank. This situation continued until July 2005. The central bank officially announced that the RMB was to implement a controlled float. Meanwhile, the real effective exchange rate of RMB has large fluctuations during this time. The RMB is actually in a state of appreciation against the US dollar during 1998 to 2000 while in a state of devaluation until the first half year of 2002. However, China's price level is relatively rapidly recovered in March 2003. There was a substantial appreciation of the RMB against the US dollar. Since China joined the WTO, China's exchange rate has become the focus of controversy all over the world. The United States is urgently suggested the appreciation of the yuan against the dollar to reduce China export sales in the U.S. market and seize market share for the US industries. So that the U.S. trade deficit with Chinese can relatively goes down. In order to avoid excessive damage of growing Chinese export related to the interests of the EU, the EU is also hoping that

the RMB can appreciate. Japan is eager to curb the rapid development of China through the appreciation of the RMB. In July 21st of 2005, the people's Bank of China announced that China began to implement based on market supply and demand, reference to a basket of currencies, a managed floating exchange rate system. The exchange rate of USD to RMB is 1:8.2765, to the end of June 2008 for the first time the exchange rate reform, the RMB China ushered in the first peak of exchange rate against the dollar at l:6.86. In June 2010 after second reform, the exchange rate of RMB against the U.S. dollar continue to rise, and in November 2011 it reached 1:6.32. Because the European countries continued to exert upward pressure on China, in April 2012, the central bank -people's Bank of China forced to implement the announcement that in inter-bank spot foreign exchange market, the RMB against the U.S. dollar trading price of the floating range expanded from 3‰ to 10‰ in policy, the appreciation trend of RMB continues. The volatility of exchange rate became larger, international trade risk increases, the uncertainty effect to economic increased.

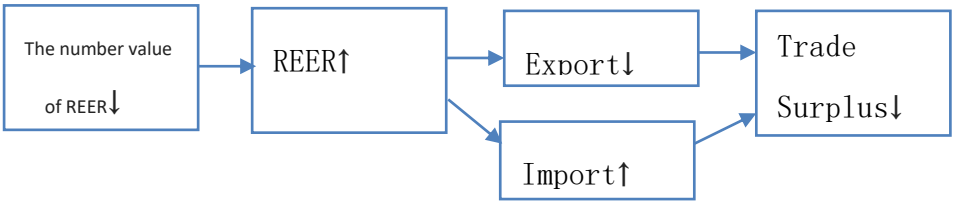

Figure 2: The influence system between REER and Foreign Trade

3.3.2 The Transmission Mechanism of FDI and Real Effective Exchange Rate

The following figure shows tendency of FDI after season adjustment. For FDI, we still should begin with the Asian financial crisis. After China successfully

weathered the Asian financial crisis in 1997, a lot of foreign capital began to flow into China. It reached 43.361 billion dollars in 1998. This is certainly due to the FDI outflows from the surrounding Asian countries. With the gradual revival of the Asian financial crisis and the continued downturn of China’s economy, there is a significant decline in foreign direct investment in 1999 and 2000. Since 2001, "WTO" effect in the use of foreign capital began to emerge due to the gradual restoration of confidence in China's economic growth and the substantive progress in joining WTO. Foreign direct investment in 2001 achieved a 14.9% recovery of growth, reaching the highest level in history. In 2002, annual amount of foreign direct investment reached $ 52.78 billion. Foreign direct investment of China surpassed the United States for the first time, ranking first in the world. $ 52.47 billion of foreign direct investment in 2003 and reached a staggering $ 64.032 billion in 2004, reaching a historical high. It keeps going until 2008, for the first time in history it drop off quite amount. But after the shock on 2008-2009, it continue to growing in an increasing path.

From 2003 to 2014, the real exchange rate of RMB against the U.S. dollar is in the upward trend, at the same time, China foreign exports and FDI inflow is roughly on the increasing trend too. The relationship among international trade, FDI and exchange rate is worth investigating on.

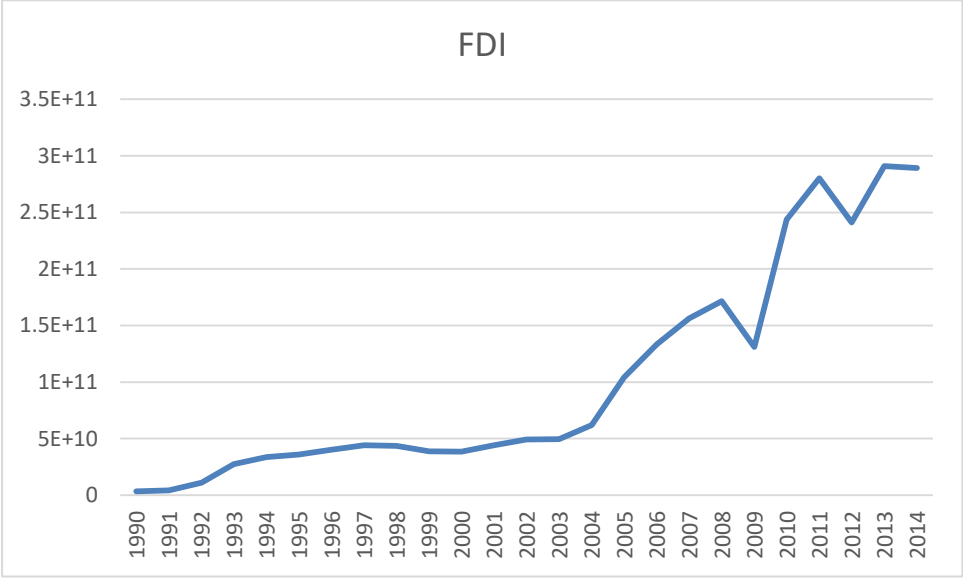

Figure 3: The Changes of FDI over years

3.4 Proposal of Hypothesis

Combining the above research of previous scholars and the author's understanding and analysis of economic phenomena, the following hypothesizes were put forward. And then verified by data of China during 1990 to 2015.

H1: Depreciation of the real effective exchange rate of RMB will lead to more foreign direct investment;

H2: Increased foreign direct investment will lead to the devaluation of the real effective exchange rate of RMB:

H3: Depreciation of the real effective exchange rate of RMB will cut down China's imports and promote China's exports.

CHAPTER 4: METHODOLOGIES AND MODEL BUILDING

4.1 Analytical Methodology

From an empirical point of view, the panel data analysis used by Goldberg and Klein is a good way. The panel data method, however, assumes a one-way causal relationship between the three variables.

Due to the fact that the international trade, FDI, and the real effective exchange rate of RMB may have relationship among each of them, this relationship cannot be fully described by a single equation.

In this paper, a vector autoregressive model (VAR) is used from the perspective of empirical research to analysis of trade, FDI, and the real effective exchange rate interdependence between the two-way causality. The advantages of VAR model is that it can better estimate the dynamic relationship of endogenous variables. At the meanwhile, we can also introduce China's gross domestic product as an independent variable. This is because GDP is a sign of the country's market capacity and production capacity. The higher the GDP, the more active is one country’s economic activity, the greater the market capacity. Therefore, the increase in market capacity means that it requires higher foreign direct investment. Meanwhile, the higher GDP means that a country's economic development level is higher, which means that the country has a good comprehensive economic performance and a higher purchasing power, thus, the import and export will be higher too.

Vector autoregressive (VAR) model was proposed by Sims in 1980. This model uses multiple simultaneous equations, which regress all the endogenous variable's current value to their lag values, to estimate the dynamic relationships of all endogenous variables. It is usually used for predicting time-series data and estimating the influence of random walk to system variables. Also, the VAR model does not include any current variables, so the problem related to autocorrelation of the simultaneous equations model does not exist in the VAR model. Vector autoregressive model is actually the simplification of the vector auto regressive moving average (VARMA) model.

A VAR model describes the evolution of a set of k variables (called endogenous variables) over the same sample period (t = 1, ..., T) as a linear function of only their past values. The variables are collected in a k × 1 vector y_t, which has as the i th element, $y_{i,t}$, the observation at time "t" of the i th variable. For example, if the i th variable is GDP, then $y_{i,t}$ is the value of GDP at time t.

A p-th order VAR, denoted VAR(p), is

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + e_t,$$

where the l-period back observation y_{t-l} is called the l-th lag of y, c is a k × 1 vector of constants (intercepts), A_i is a time-invariant k × k matrix and e_t is a k × 1 vector of error terms satisfying:

1. $\mathbf{E}(e_t) = 0$ — every error term has mean zero;

2. $\mathbf{E}(e_t e_t') = \Omega$ — the contemporaneous covariance matrix of error terms is Ω (a $k \times k$ positive-semidefinite matrix);

3. $\mathbf{E}(e_t e_{t-k}') = 0$ for any non-zero k — there is no correlation across time; in particular, no serial correlation in individual error terms.

A pth-order VAR is also called a VAR with p lags. The process of choosing the maximum lag p in the VAR model requires special attention because inference is dependent on correctness of the selected lag order.

Use VAR in time series data when data not stationary on first difference.(by chashman)

In this paper the endogenous variables series are:

Yt=(EX,IM,GDP,FDI,REED)'

EX: Total annual value of export of China;

IM: Total annual value of import of China;

GDP: Annual Gross Domestic Product of China;

FDI: Foreign direct investment of China, annual value;

REED: Real Effective Exchange Rate of Chinese yuan to US dollar.

In the process of input parameters, we concern most about variable delay interval (Lag intervals), this representative the lags of endogenous variables in VAR model. From the data result, the lag we choose is 3. Because when the lag equals to three the AIC value(-427.676) and value of SC (-324.027) was the smallest (using the Akaike

information criterion (Akaike) (AIC) and Schwartz (Schwartz) criterion (SC) as the choice of lag value standard). At the same time, the only exogeneous variable is constant.

4.2 Data and Interpretation

To satisfy the requirement of VAR model, our sample space is from 1990 to 2014, we find the data from worldbank.org. The basic time is set to 2010, that means 2010=100. We also turn GDP, EX, IM and FDI data to its natural log for calculating convenience.

Table 1: The Data in VAR model:

Time	GDP	FDI	EX	IM	REER
1990	3.59E+11	3.487E+09	5.709E+10	4.922E+10	104.48913
1991	3.815E+11	4.366E+09	6.667E+10	5.921E+10	103.10997
1992	4.249E+11	1.116E+10	7.341E+10	6.975E+10	100.64999
1993	4.429E+11	2.752E+10	6.588E+10	7.463E+10	103.6683
1994	5.623E+11	3.379E+10	1.209E+11	1.156E+11	103.09581
1995	7.32E+11	3.585E+10	1.491E+11	1.323E+11	99.625003
1996	8.608E+11	4.018E+10	1.513E+11	1.39E+11	102.61414
1997	9.582E+11	4.424E+10	1.829E+11	1.424E+11	107.62827
1998	1.025E+12	4.375E+10	1.839E+11	1.404E+11	115.27654
1999	1.089E+12	3.875E+10	1.952E+11	1.659E+11	114.22571
2000	1.205E+12	3.84E+10	2.493E+11	2.251E+11	117.90068
2001	1.332E+12	4.424E+10	2.661E+11	2.436E+11	124.57146
2002	1.462E+12	4.931E+10	3.256E+11	2.952E+11	124.26563
2003	1.65E+12	4.946E+10	4.384E+11	4.131E+11	116.33986
2004	1.942E+12	6.211E+10	5.933E+11	5.61E+11	110.88908
2005	2.269E+12	1.041E+11	7.645E+11	6.623E+11	109.36909
2006	2.73E+12	1.333E+11	9.732E+11	7.949E+11	108.75326
2007	3.523E+12	1.562E+11	1.231E+12	9.635E+11	103.62664
2008	4.558E+12	1.715E+11	1.445E+12	1.144E+12	99.54667
2009	5.059E+12	1.311E+11	1.201E+12	1.004E+12	104.04163
2010	6.04E+12	2.437E+11	1.581E+12	1.399E+12	100
2011	7.492E+12	2.801E+11	1.907E+12	1.751E+12	95.101707
2012	8.462E+12	2.412E+11	2.049E+12	1.819E+12	97.989183

2013	9.491E+12	2.909E+11	2.213E+12	1.954E+12	99.115841
2014	1.035E+13	2.891E+11	2.342E+12	1.959E+12	101.20499

VAR model result figure is showed at Appendix A.

4.3 Data Analyze

4.3.1 Unit Root Test

If there exist a non-stationary time series, through a random process $\{y_t, t=1,2\ldots\}$, if $y_t=py_{t-1}+\varepsilon$, in which p=1, ε_t is a stationary series satisfying $E(\varepsilon_t)=0$, $Cov(\varepsilon_t,\varepsilon_{t-s})=\mu t<\infty(s=0,1,2,3\ldots,)$, then this process is called Unit Root Process. In particular, if $y_t=y_{t-1}+\varepsilon_t$, in which εt is independent distributed and satisfying, then $\{y_t\}$ is Random Walk.

If after the first order difference, a unit root process becomes stationary, which means $y_t-y_{t-1}=(1-B)y_t=\varepsilon_t$, the time series y_t is call Integration (first order differential series), written as I(1). Normally speaking, if a non-stationary time series become into stationary series through d times difference, it can be written as I(d). In which d is a single order integer, also the number of unit root of this series.

There are two kind of unit root test: one is DF test and the other is ADF test. DF test is considering a process $y_t=py_{t-1}+\varepsilon_t$, in which is white noise, if parameter $|p|<1$, then series y_t is stationary, if $|p|>1$, the time series is explosive, then it make no sense. The only thing we need to do regarding this test is to see if |p| is strictly small than 1.

ADF test is the improvement of DF test, this is because the DF test assume the error term is white noise or no autocorrelation, if not, the ADF test will be used. The

ADF test includes lag-dependent variables as a right-hand side variable in the test equation to solve this issue.

In Unit Root Test we still use AIC and SC to make choice of best lag value. From the data we can find the most proper lag value is 3.

Table 2: The Root Inspection Result of EX, FDI, GDP, IM, REER

Variables	ADF	10% significant level	5% significant level	Result
EX	-0.456755	-3. 2474	-3.6219	Non-stationary
FDI	-2.385683	-2.9586	-3.2564	Non-stationary
GDP	0.965375	2.0148	2.8145	Non-stationary
IM	-0.539254	-1.5879	-1.96624	Non-stationary
REER	-3 069296	-3.4158	-3.9874	Non-stationary
△EX	-4.3128	-3.1458	-3.7145	Stationary
△FDI	-3.2548	-3.0158	-3.1145	Stationary
△GDP	-2.9874	-2.1547	-2.6854	Stationary
△IM	-2.0487	-1.5987	-1.9874	Stationary
△REER	-4.6587	-3.5987	-3.9874	Stationary

*△means first order difference

From the result of unit root test we can see, after first order difference, time series EX, FDI, GDP, IM, REER are all stationary, so they are each I(1).

4.3.2 Cointegration Test

The endogenous variables in each series becomes stationary through n order difference, after that we should construct a parameter adjustment matrix to make the time series has a linear form of cointegration relationship. We use Johansen cointegration test method here. This method is proposed by Johansen in 1995 on the likelihood ratio test (LR) method of the parameter matrix.

We find from data that there are 3 values of the likelihood ratio test statistic is greater than the critical value of the 5% level, so you can reject the original hypothesis, there are only 3 co integration relationships, which shows that there is a cointegration relationship between the model variables.

Since there are three cointegrations of each time sequence variable in this model, the vector error correction (VEC) model can be established, and the data can be derived from the Johanson co integration test.

To write one of the integration relationship into mathematical function, let REER be the dependent variable, we can get

$$REER=-0.48EX-0.42FDI-0.002GDP+0.34IM+74.15$$

For the term of international trade export (EX), the changing direction of it is on the contrary of that of the RMB real effective exchange rate. This shows that the increasing of real effective exchange rate of RMB will impact the exports in opposite direction. On the other side, the devaluation of RMB will improve the China’s export capacity, which proved the H3. Coefficient assumption in the model is.0.48, that is to

say, when exchange rate increase by one percent, then foreign trade exports will decline by 0.48 percentage point.

For import (IM), it has the same changing direction with exchange rate. This means when RMB appreciates, imports will increase. On the contrary, if the real effective exchange rate of RMB devaluates, China's imports will be reduced. This also goes with hypothesis H3.

4.3.3 Granger Causality Test

Economic time series often have pseudo related problems, that is, sometimes two economic variables have no relation in economic meaning but the correlation coefficient between them might appears large, which is obviously meaningless.

One way to test if the economic series are pseudo related is called Granger Causality Test. It is based on the theory that in the study of whether the sequence Y is the reason for the sequence x, we first estimate how much the current Y value can be explained by his own lag value, and then verify whether the explained value can be improved by introducing the sequence X. If it is, it is said that the variable X Granger cause variable Y. (At this time, it requires the lag coefficient of X has statistical significance.)

Here we use a Granger Causality Test to see how variable influence each other in this model. In this test:

$$\Delta \mathrm{REER}_t = \sum_{i=1}^{25} [\alpha_{1i} \Delta \mathrm{EX}_{i-t} + \beta_{1i} \Delta \mathrm{FDI}_{i-t} + \gamma_{1i} \Delta \mathrm{GDP}_{i-t} + \rho_{1i} \Delta \mathrm{IM}_{i-t}]$$

The null hypothesis of Granger Causality Test is that X does not Granger cause Y. So here we have H_0: $\alpha_{1i} = \beta_{1i} = \gamma_{1i} = \rho_{1i}$=0 (i=1,2,…,25). If we accept the null hypothesis then there is no Granger Causality. If we fail to reject the null hypothesis, that means in the long term, EX, FDI, GDP, and IM granger cause the REER.

Following is the result of Granger Causality Test:

Table3: Granger Causality Test result after adjustment

H_0	F-Statistics	Significance	Result
REER does not Granger Cause EX	0.15883	0.92252	Accept
EX does not Granger Cause REER	1.22821	0.01006	Reject
REER does not Granger Cause FDI	1.07411	0.38638	Accept
FDI does not Granger Cause REER	3.20450	0.04966	Reject
REER does not Granger Cause GDP	1.27349	0.31516	Accept
GDP does not Granger Cause REER	0.39899	0.75547	Accept
REER does not Granger Cause IM	2.12379	0.13496	Accept
IM does not Granger Cause REER	0.50476	0.03413	Reject

The results are based on the 0.05 significant level.

From above we can see that in the short term, EX, FDI, IM Granger cause REER. This results indicate that the exchange rate does have a relationship with international trade and foreign direct investment, but the GDP does not Granger cause REER,

which means in the short run the Gross Domestic Product does not have direct impact on real efficient exchange rate.

CHAPTER 5: RESULT AND SUGGESTION TO PUBLIC POLICY

5.1 Result

Through the analysts above, we can see that China's international trade, real efficient exchange rate, and foreign direct investment is in dynamic equilibrium in the long run. They have influence on each other in a certain way. Currently, the demand elasticity of import and export in China has gradually increased, the Chinese currency 'RMB' shows obvious 'J curve effect' when devaluation, and the duration of devaluation is quite long. So we cannot make rapid change of the international trade balance by pure price competition strategy such as currency undervalued and lower products' price. Thus, if we want to adjust the trade balance by adjusting the real effective exchange rate of RMB one important thing we should consider is the lag. The policy needs to be well-planned, step by step. Although the hypothesis H3 seems reasonable in theory, from the data results we have, the relationship between real effective exchange rate and exports and imports is not simply positive or negative. We can only conclude that the currency appreciation will not deteriorate the international trade balance in the long term, but in the short term it will worsen the trade balance.

In fact, when foreign investment first come into one country, imports of foreign direct investment enterprises' import driving effect is more than export driving effect. So the influence of early entry of foreign investment on Chinese international trade balance is overall negative. As time past, with the increase of foreign export driving

effect, the overall trade balance will be improved gradually. So totally speaking, from long-term perspective, in China the foreign direct investment can improve the trade balance.

Although FDI appears in some export oriented characteristics, the main factors affect the inflow of foreign capital is not the export volume. Which attracting FDI may still be the high investment profit rate, lower labor costs, preferential policies for foreign investment, and the huge potential market or other specific factors. The appreciation of the real effective exchange rate of RMB will draw down the inflow of foreign direct investment, and the devaluation of the real effective exchange rate of RMB will increase the inflow of China's foreign direct investment, which proves the correctness of the hypothesis H1.

Although since 1998 the nominal exchange rate between RMB and the US dollar remained stable, the real effective exchange rate floated a lot. The foreign trade surplus leads to the appreciation of real effective exchange rate of RMB in a certain period of time, while the increasing of FDI at the early stage will lead to the devaluation of real effective exchange rate of RMB in a small amount. This shows that the H2 hypothesis in this paper is correct in the short term, however, through this study, we find that in the long term increasing FDI will let the real effective exchange rate of RMB appreciate. Therefore, for the impact of FDI on the RMB real effective exchange rate we can not simply say that it is forward or reverse, we can only say that FDI contributes to the stability of the real effective RMB exchange rate.

This study shows that China's large inflows of FDI and foreign trade surplus is an important source of RMB appreciation pressure. Both in the short run and long run, the trade surplus in formation of the pressure of RMB appreciation, and the increasing inflow of FDI in the long term also formed the appreciation pressure of RMB. In a certain period of time the appreciation will not deteriorate Chinese the trade balance, but it will have a negative effect on FDI inflows.

5.2 Suggestions to policy

5.2.1 Suggestion on the international trade policy

At this point, China should not take the one-sided strategy pursuit of expanding the export of international trade. It should not over expand imports in exchange for larger amount of exports. China need not only to take essential protection for the domestic market and the industry, but also pay attention to what kind of industries should be protected, which region of the market should be open wider.

Infant industry protection theory pointed out that the most conducive strategy to the economic development of developing countries is to protect the industries with currently relatively low productivity, but have great potential of increasing the productivity. These industries can raise one country's technology intensive up to a new level.

According to this kind of international trade strategy, at present China needs to focus on protecting the following domestic industrial sectors: Chemical Engineering (including petrochemical), machinery and equipment manufacturing, automobile

manufacturing, high technology parts of the aircraft manufacturing and computer industry (such as the integrated circuit production and software development). Therefore, China should use all trade protection measures, tariff and non tariff, to protect these departments' domestic production. This requires great adjustments to the current tariff and other trade policies.

The real economic problem China faces is the resource per capita is far lower than the average level of the world. To become economically developed, one country must let the production of high-tech products, including machinery and equipment manufacturing to become it's pillar industry. As a result in the international division of labor the country will focus on the production of machinery and equipment and other high-tech products. Based on this analysis, China should actively develop technology intensive, capital intensive industries. At the meantime, it can also cultivate its own brand on this basis, thereby enhancing the international influence of its own products, to attract foreign investment and promote economic development.

5.2.2 Suggestion on the Exchange Rate Policy

In May 15, 2006, for the first time, the RMB exchange rate against the US dollar reached 8:1. 2007 was a year rapid economic development of China. In this year, the RMB exchange rate against the US dollar keep to rise, the dollar against the RMB exchange rate changed from 1:8 in 2006 to about 1:6.8 in 2007 and 2008. The financial crisis caused Chinese exports plummeted, but the exchange rate of RMB the

dollar remained in the range from 6.81 to 6.85. Thereafter until 2015, the RMB exchange rate continue the trend of slightly rising.

In the long term, the China exchange rate system has been criticized by many countries in the world. The exchange rate system was regarded as a means of political control in China. This caused the imbalance of international payments, and then bring the trade friction, also to some extent make the economic structure in China not that reasonable. As the Chinese financial market and financial system became more and more complete, China should gradually open exchange controls, until it reaches a free floating exchange rate. On the other hand, Chinese should appropriately strengthen the regional monetary cooperation. With the broader trade relationship between China and closely neighboring countries in Asia, monetary cooperation is becoming more and more important. The free convertibility can not only promote the regional economic development of member countries, but also maintain financial stability among the members, and then further promote the full free convertibility.

REFERENCES

Leblang D A. Domestic political institutions and exchange rate commitments in the developing world[J]. International Studies Quarterly, 1999, 43(4): 599-620.

Xiagqian L, Guoqiang D. The Influence of Fluctuation of Real RMB Exchange Rate to Chinese Import and Export: 1994—2003[J]. Economic Research Journal, 2005, 5: 003.

Jie, Chen A study of the relation among International trade, FDI and RMB real exchange rate. Chongqing University, 2007.

Shan J. A VAR approach to the economics of FDI in China[J]. Applied economics, 2002, 34(7): 885-893.

Alfaro L, Chanda A, Kalemli-Ozcan S, et al. How does foreign direct investment promote economic growth? Exploring the effects of financial markets on linkages[R]. National Bureau of Economic Research, 2006.

Connolly M, Taylor D. Devaluation in less developed countries[C]//prepared for a conference on devaluation sponsored by the Board of Governors, Federal Reserve System, Washington, DC. 1972.

Bahmani-Oskooee M. Devaluation and the J-curve: some evidence from LDCs[J]. The review of Economics and Statistics, 1985: 500-504.

Chrisman J J, Chua J H, Sharma P. Important attributes of successors in family businesses: An exploratory study[J]. Family business review, 1998, 11(1): 19-34.

Chua S Y, Sharma S C. An investigation of the effects of prices and exchange rates on trade flows in East Asia[J]. Asian Economic Journal, 1998, 12(3): 253-271.

Rajan R S, Beverinotti J. The real exchange rate, sectoral allocation and development in China and East Asia: A simple exposition[J]. Journal of International Development, 2012, 24(4): 401-414.

Hsing Y. Test of the Marshall–Lerner condition for eight selected Asian countries and policy implications[J]. Global Economic Review, 2010, 39(1): 91-98.

Bayoumi T, Lee J, Jayanthi S. New rates from new weights[J]. 2005.

Marquez J, Schindler J. Exchange-rate Effects on China's Trade[J]. Review of International Economics, 2007, 15(5): 837-853.

Shively P A. Stationary time-varying risk premia in forward foreign exchange rates[J]. Journal of International Money and Finance, 2000, 19(2): 273-288.

Wolff C C P. Measuring the forward foreign exchange risk premium: multi-country evidence from unobserved components models[J]. Journal of International Financial Markets, Institutions and Money, 2000, 10(1): 1-8.

MacDonald R. Is the foreign exchange market ‘risky’? Some new survey-based results[J]. Journal of Multinational Financial Management, 2000, 10(1): 1-14.

Kiymaz H. Estimation of foreign exchange exposure: an emerging market application[J]. Journal of Multinational Financial Management, 2003, 13(1): 71-84.

Akhigbe A, Martin A D, Newman M. Exchange rate exposure and valuation effects of cross-border acquisitions[J]. Journal of International Financial Markets, Institutions and Money, 2003, 13(3): 255-269.

Bartram S M. Linear and nonlinear foreign exchange rate exposures of German nonfinancial corporations[J]. Journal of International Money and Finance, 2004, 23(4): 673-699.

Allayannis G, Ofek E. Exchange rate exposure, hedging, and the use of foreign currency derivatives[J]. Journal of international money and finance, 2001, 20(2): 273-296.

Di Iorio A, Faff R. An analysis of asymmetry in foreign currency exposure of the Australian equities market[J]. Journal of Multinational Financial Management, 2000, 10(2): 133-159.

Fatemi A M, Tavakkol A, Dukas S P. Foreign exchange exposure and the pricing of exchange rate risk[J]. Global Finance Journal, 1997, 7(2): 169-189.

Samuelson P A. Theoretical notes on trade problems[J]. The Review of Economics and Statistics, 1964: 145-154.

Pesaran H H, Shin Y. Generalized impulse response analysis in linear multivariate models[J]. Economics letters, 1998, 58(1): 17-29.

Fry M J. How foreign direct investment in Pacific Asia improves the current account[J]. Journal of Asian Economics, 1997, 7(3): 459-486.

Goldberg L S, Klein M W. Foreign direct investment, trade and real exchange rate linkages in Southeast Asia and Latin America[M]. National Bureau of Economic Research, 1997.

Koop G, Pesaran M H, Potter S M. Impulse response analysis in nonlinear multivariate models[J]. Journal of econometrics, 1996, 74(1): 119-147.

Hill H. Foreign investment and East Asian economic development[J]. Asian-Pacific Economic Literature, 1990, 4(2): 21-58.

Graham E M, Krugman P R. The surge in foreign direct investment in the 1980s[M]//Foreign direct investment. University of Chicago Press, 1993: 13-36.

Goldberg L S, Kolstad C D. Foreign direct investment, exchange rate variability and demand uncertainty[R]. National Bureau of Economic Research, 1994.

Froot K A, Stein J C. Exchange rates and foreign direct investment: an imperfect capital markets approach[J]. 1989.

Bénassy-Quéré A, Fontagné L, Lahrèche-Révil A. Exchange-rate strategies in the competition for attracting foreign direct investment[J]. Journal of the Japanese and international Economies, 2001, 15(2): 178-198.

APPENDIX A: THE VAR MODEL RESULT BY SAS

Type of Model	VAR(3)
Estimation Method	Least Squares Estimation

Model Parameter Estimates

Equation	Parameter	Estimate	Standard Error	t Value	Pr > |t|	Variable
GDP	CONST1	5.01232	1.72203	2.91	0.0270	1
	AR1_1_1	0.04800	0.82759	0.06	0.9556	GDP(t-1)
	AR1_1_2	-0.02789	0.08396	-0.33	0.7510	FDI(t-1)
	AR1_1_3	-0.50000	0.23612	-2.12	0.0785	EX(t-1)
	AR1_1_4	0.94790	0.46415	2.04	0.0872	IM(t-1)
	AR1_1_5	-0.00077	0.00541	-0.14	0.8911	REER(t-1)
	AR2_1_1	0.03864	1.28398	0.03	0.9770	GDP(t-2)
	AR2_1_2	0.11316	0.05870	1.93	0.1022	FDI(t-2)
	AR2_1_3	0.21672	0.24881	0.87	0.4172	EX(t-2)
	AR2_1_4	-0.01063	0.47227	-0.02	0.9828	IM(t-2)
	AR2_1_5	0.00720	0.00641	1.12	0.3042	REER(t-2)
	AR3_1_1	0.04371	0.64951	0.07	0.9485	GDP(t-3)
	AR3_1_2	0.02671	0.05874	0.45	0.6653	FDI(t-3)
	AR3_1_3	0.19582	0.20404	0.96	0.3743	EX(t-3)
	AR3_1_4	-0.18017	0.31187	-0.58	0.5845	IM(t-3)
	AR3_1_5	-0.01435	0.00949	-1.51	0.1814	REER(t-3)
FDI	CONST2	19.44296	7.47926	2.60	0.0407	1
	AR1_2_1	-2.95325	3.59448	-0.82	0.4427	GDP(t-1)
	AR1_2_2	0.01442	0.36467	0.04	0.9697	FDI(t-1)
	AR1_2_3	-0.56811	1.02554	-0.55	0.5996	EX(t-1)
	AR1_2_4	1.61211	2.01596	0.80	0.4544	IM(t-1)

1

	AR1_2_5	-0.01054	0.02349	-0.45	0.6693	REER(t-1)
	AR2_2_1	0.64432	5.57672	0.12	0.9118	GDP(t-2)
	AR2_2_2	-0.14485	0.25495	-0.57	0.5905	FDI(t-2)
	AR2_2_3	-0.10239	1.08064	-0.09	0.9276	EX(t-2)
	AR2_2_4	1.29643	2.05121	0.63	0.5507	IM(t-2)
	AR2_2_5	0.00381	0.02785	0.14	0.8957	REER(t-2)
	AR3_2_1	0.50259	2.82101	0.18	0.8645	GDP(t-3)
	AR3_2_2	0.29584	0.25511	1.16	0.2902	FDI(t-3)
	AR3_2_3	0.60453	0.88620	0.68	0.5206	EX(t-3)
	AR3_2_4	-0.70427	1.35453	-0.52	0.6217	IM(t-3)
	AR3_2_5	-0.02983	0.04123	-0.72	0.4966	REER(t-3)
EX	CONST3	5.84021	3.61651	1.61	0.1575	1
	AR1_3_1	-1.95671	1.73807	-1.13	0.3033	GDP(t-1)
	AR1_3_2	0.15021	0.17633	0.85	0.4270	FDI(t-1)
	AR1_3_3	-0.86764	0.49589	-1.75	0.1307	EX(t-1)
	AR1_3_4	1.33123	0.97479	1.37	0.2210	IM(t-1)
	AR1_3_5	-0.01256	0.01136	-1.11	0.3111	REER(t-1)
	AR2_3_1	-0.22061	2.69656	-0.08	0.9375	GDP(t-2)
	AR2_3_2	0.23138	0.12328	1.88	0.1096	FDI(t-2)
	AR2_3_3	0.01308	0.52253	0.03	0.9808	EX(t-2)
	AR2_3_4	1.00032	0.99184	1.01	0.3521	IM(t-2)
	AR2_3_5	0.02171	0.01347	1.61	0.1581	REER(t-2)
	AR3_3_1	0.78761	1.36407	0.58	0.5847	GDP(t-3)
	AR3_3_2	0.10315	0.12335	0.84	0.4351	FDI(t-3)
	AR3_3_3	0.47347	0.42851	1.10	0.3115	EX(t-3)
	AR3_3_4	-0.12253	0.65497	-0.19	0.8578	IM(t-3)
	AR3_3_5	-0.00810	0.01994	-0.41	0.6985	REER(t-3)
IM	CONST4	6.59021	4.75915	1.38	0.2154	1
	AR1_4_1	-2.32532	2.28721	-1.02	0.3485	GDP(t-1)
	AR1_4_2	-0.10893	0.23204	-0.47	0.6553	FDI(t-1)

	AR1_4_3	-1.15343	0.65256	-1.77	0.1276	EX(t-1)
	AR1_4_4	2.33527	1.28278	1.82	0.1185	IM(t-1)
	AR1_4_5	-0.00970	0.01495	-0.65	0.5404	REER(t-1)
	AR2_4_1	1.11049	3.54854	0.31	0.7649	GDP(t-2)
	AR2_4_2	0.23385	0.16223	1.44	0.1995	FDI(t-2)
	AR2_4_3	0.44617	0.68762	0.65	0.5405	EX(t-2)
	AR2_4_4	0.27117	1.30521	0.21	0.8423	IM(t-2)
	AR2_4_5	0.03178	0.01772	1.79	0.1231	REER(t-2)
	AR3_4_1	0.03694	1.79504	0.02	0.9842	GDP(t-3)
	AR3_4_2	-0.01043	0.16233	-0.06	0.9508	FDI(t-3)
	AR3_4_3	0.37520	0.56390	0.67	0.5305	EX(t-3)
	AR3_4_4	-0.34083	0.86190	-0.40	0.7062	IM(t-3)
	AR3_4_5	-0.02702	0.02624	-1.03	0.3427	REER(t-3)
REER	CONST5	6.91541	163.01515	0.04	0.9675	1
	AR1_5_1	-36.74107	78.34383	-0.47	0.6556	GDP(t-1)
	AR1_5_2	8.80946	7.94816	1.11	0.3101	FDI(t-1)
	AR1_5_3	31.56027	22.35221	1.41	0.2077	EX(t-1)
	AR1_5_4	-21.57195	43.93898	-0.49	0.6409	IM(t-1)
	AR1_5_5	0.75660	0.51196	1.48	0.1899	REER(t-1)
	AR2_5_1	63.96104	121.54807	0.53	0.6176	GDP(t-2)
	AR2_5_2	-7.26479	5.55670	-1.31	0.2389	FDI(t-2)
	AR2_5_3	-10.46037	23.55318	-0.44	0.6725	EX(t-2)
	AR2_5_4	9.20329	44.70749	0.21	0.8437	IM(t-2)
	AR2_5_5	-0.30561	0.60701	-0.50	0.6326	REER(t-2)
	AR3_5_1	-15.68601	61.48568	-0.26	0.8072	GDP(t-3)
	AR3_5_2	6.19992	5.56021	1.12	0.3075	FDI(t-3)
	AR3_5_3	18.75637	19.31519	0.97	0.3690	EX(t-3)
	AR3_5_4	-46.26398	29.52281	-1.57	0.1681	IM(t-3)
	AR3_5_5	0.23296	0.89867	0.26	0.8041	REER(t-3)