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Effects of RMB Exchange Rate Fluctuation on China's Foreign Trade

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

A steady and sustaining development of international trade is an important guarantee for a country to achieve the economic improvement. As a significant tool, exchange rate plays an important role in achieving the balance of one country's economy and steady development. It also affects a country's international trade. Due to which, the relationship between exchange rate and trade is widely studied by researchers. The present study is an attempt to study this relationship for China under the time-series framework and provide noteworthy policy implications.

Keywords: RMB exchange rate; foreign trade; ml condition; j-curve effect; trade surplus.

1. INTRODUCTION

Since 2004, RMB had been pegged to U.S dollar at a rate of RMB 8.28 per dollar. And during the Asian financial crisis in 1997, Chinese government announced to the world that China would not depreciate RMB to stimulate the export, and thus won praises from various countries around the world. But along with the accumulation of China's foreign currency reserves and increase of China's trade surplus, whether RMB should be appreciated became the

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hottest topics in the world [1]. A strong wind calling for the revaluation of the RMB has been blowing hard overseas since the end of the 2002. First of all, Japanese finance minister, at the G7 finance minister's meeting, submitted a document similar to the "Plaza Agreement" directed against yen in 1985, which called for the appreciation of the RMB. Later, US Treasury Secretary Snow also indicated that the RMB should be revalued. Because the US dollar is going down, some European and East Asian countries, worried about the competitive impact generated by China's exported commodities to different extents, have also joined the ranks demanding the appreciation of the RMB. As a result, there has appeared a strong force pressing the revaluation of the RMB [2,3].

The People's Bank of China announced that the RMB exchange rate regime would move into a managed floating exchange rate regime based on market supply and demand with reference to a basket of currencies On July 21st, 2005. With this reform measure, the Chinese RMB switched from a peg to the US dollar to a managed float based on a basket of currencies after a 2.1 per cent appreciation with a narrow daily-trading band of 0.3 per cent around the central parity rate set by the Central Bank [4]. This was widely seen as an improvement of the RMB exchange rate regime, giving it greater flexibility. In general, currency depreciation will increase one country's export and diminish its import; in contrast appreciation may reduce one country's export and increase its import. Since the reform of RMB exchange rate regime, RMB has appreciated by 18.7% from 8.11 to 6.83 against US dollar by the end of 2008. However, China's total trade kept growing and its trade surplus didn't decrease. We therefore examine how fluctuations of RMB exchange rate affect China's international trade [4].

Rose and Yellen (2009) in their study found real exchange rate has no effect on export and import in a long-run and short-run when estimate bilateral trade elasticity between US and other countries in the case of U.S data for the period 1960 to 2009. Dees (2011) improves on the previous analysis by separating China's exports and imports into two categories, those processed and the remainder [5,6]. Eckaus (2014) uses aggregate annual data for 1995–2013 to discover that the appreciation of the RMB decreases China's exports to the United States and the share of Chinese imports in total US imports. In the present study, an attempt has been made to show the extent of relationship between fluctuations of RMB exchange rate and China's international trade through time-series analysis.

2. TERIALS AND METHODS

In fact, depreciation of currency does not affect the value of import and export commodity itself. However, through changing their relative prices in international trade it can enhance or weaken their competitiveness in international market. Even if for some reasons, import demands have not diminished after the devaluation, industries which produce the same commodities in domestic will be developed and imports of this kind of goods will be reduced due to the rise of local currency prices of imported goods [7]. In short, depreciation of one country' currency can increase its exports and limit its imports. Real effective exchange rate is the best way to objectively reflect the actual exchange rate of a country situation. Nominal effective exchange rate of a country is unadjusted weighted average value of a country's currency relative to all major currencies being traded within an index or pool of currencies. The weights are determined by the importance a home country places on all other currencies traded within the pool, as measured by the balance of trade. Deducting inflation from nominal effective exchange rate is this country's real effective exchange rate [7,8].

Using multiplicative of X-12-ARIMA method adjust original data and taking logarithm to them. Then taking unit root test to judge if each variable is stable. The next is confirming the level of time lag and making cointegration test. The final step is making equation. Through calculating flexibility of China's export and import demand, we can validate if Marshall-Lerner condition is suited in China, and use general distributed-lag model to analyze J-Curve Effect.

3. EFFECTS OF RMB EXCHANGE RATE'S FLUCTUATION ON CHINA'S TOTAL TRADE VOLUME

3.1 Establishing Econometric Model

In order to simplify, we assume

Domestic Price (P) : $P_D=P_X$
Foreign price (P*) : $P_M=P_F$
Real effective exchange rate(R) : $E\times(P/P^*)$

We have,

$$M_D = M_D (Y_1, R) \quad (3.1)$$

$$X_D = X_D (Y_2, R) \quad (3.2)$$

Where, M_D and X_D are the import and export demand function depends upon their respective incomes and real effective exchange rate. Therefore, the total trade volume (T) can be expressed as follows:

$$T = X_D + M_D = T (Y_1, Y_2, R) \quad (3.3)$$

In a simple regression form,

$$T = \alpha Y1 + \beta Y2 + \lambda R + \mu \quad (3.4)$$

For the interpretation purpose, all the variables have been assumed in logarithmic terms. The benefits of taking natural log in a time-series framework is that one can achieve the level of stationarity at the earliest level of integration. In the log-linear regression, the coefficients are easy to interpret as the problem of different units have been solved and the interpretation becomes easy in elasticity terms.

$$LnT = \alpha LnY1 + \beta LnY2 + \lambda LnR + \mu \quad (3.5)$$

3.2 Data and Construction of Variables

Quarterly data for the present study have been taken from China's total trade volume with its major trading partners from 2010 to 2014. The study has used time series cointegration technique to study the relationship between exchange rate and the volume of trade in China with EU, USA, Japan, Korea and Australia. Following variables are included in the regression to pursue the study's objective.

(1) Chinese total trade volume t is the sum of quarterly total imports and exports with EU, USA, Japan, Korea and Australia in constant prices, and t is logarithms of T.

(2) The rest of variables such as r, y1 and y2 are the logarithms of real effective exchange rate, China's GDP (Y1) and American's GDP (Y2).

As the data is of quarterly in nature which may have fluctuations because of seasons therefore, it is adjusted using multiplicative of X-12-ARIMA method.

3.3 Unit Root Test

The results of unit root test (Table 1) indicate that all variables are of integrated of order 1 so we can proceed to test cointegration among them.

3.4 Lag Length Selection

In order to ensure reliability of long run relationship, one should confirm the level of time lag firstly before doing cointegration test. Under the model of Vector Auto regression (VAR), we can get optimal level of time lag with the help of standard tests AIC and SC. We know that the smaller the value of AIC and SC, better the terseness and veracity of the model. Table 2 shows that the appropriate lag length would be 3 for this time series.

3.5 Cointegration Test

Table 3 is the result of cointegration test to each series of import equation. Only the first trace statistic is bigger than critical value at 5% and 1%, so null hypothesis is rejected and alternative hypothesis is accepted. This means that there is only one cointegrate relationship among t, y_1, y_2, r, and these series have long-run equilibrium relationship.

Table 1. Checking for stationarity

Variable	ADF test statistic		Result
	Level	1st difference	Unit root present or not
t	3.1302	1.5866	Present
	(0.0366)	(0.0426)	
r	0.7685	-0.917664	Present
	(0.0269)	(0.0352)	
y1	0.9994	1.707097	Present
	(0.0168)	(0.0287)	
y2	0.6332	-1.263177	Present
	(0.0349)	(0.0526)	

*Notes: p value is in brackets; * and ** shows the significance at 5 and 1 percent.*
Source: Authors' Calculations in Eviews 6.0

Table 2. Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	155.1567	NA	2.41e-10	-10.7969	-10.6066	-10.7387
1	264.1341	179.0343	3.19e-13	-17.4382	-16.4866	-17.1472
2	287.2096	31.3168*	2.08e-13	-17.9435*	-16.2307	-17.4199

*Notes: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.*
Source: Authors' Calculations in Eviews 6.0

Table 3A. Test of existence of cointegration

Hypothesized no. of CE(s)	Eigen value	Trace statistic	0.01 critical value	Prob.**
None *	0.849762	85.71931	54.68150	0.0000
At most 1	0.558536	34.53986	35.45817	0.0132
At most 2	0.368679	12.46307	19.93711	0.1360
At most 3	0.001653	0.044681	6.634897	0.8326

*Notes: Trace test indicates 1 cointegrating eqn(s) at the 0.01 level; *denotes rejection of the hypothesis at the 0.01 level; **MacKinnon-Haug-Michelis (1999) p-values.*
Source: Authors' Calculations in Eviews 6.0

Table 3B. Cointegrating relationship

Variable	Coefficient	Std. error	t-statistic	Prob.
R	-0.9798**	0.2500	-3.9189	0.0005
y1	0.8490**	0.1151	7.3720	0.0000
y2	1.1183*	0.5203	2.1491	0.0407
c	-5.1056	3.9580	-1.2899	0.2080
R-squared	0.9868	Mean dependent		4.0746
Adjusted R-squared	0.9854	S.D. dependent		0.4814
S.E. of regression	0.0581	Akaike info criterion		-2.7332
Sum of squared resid	0.0911	Schwarz criterion		-2.5482
Log Likelihood	46.365	F-statistic		677.5738
Durbin-Watson stat	2.0211	Prob (F-statistic)		0.0000

*Notes: * and ** indicates the level of significance at 5 and 1 percent.*
Source: Authors' Calculations in Eviews 6.0

3.6 Establishing Cointegrationg Equation

In a regression form, the long run relationship can be written as:

$$t=-0.9798r+0.8490y1+1.1183y2-5.1056 \quad (3.6)$$

Through the stability test to residual of total trade volume equation we can get that it is stable. So there is long-run stable relationship among t, r y_1 and y_2. From the long run if RMB appreciate 1 percent, China's total trade volume will decrease 0.98 percent. This is because import and export of processing trade have close linkage and the fluctuation of exchange rate affected export firstly. The elasticity of total trade volume to China's GDP and world GDP is 0.85 and 1.12. Because China's export is more than import, China's foreign trade volume is impacted greater by the world economy than China's economy itself.

4. CONCLUSION

The results show that econometric analysis to export is consistent with the theory. There are also some other reasons for export reduction: the rising of raw material costs and labor costs led to the increase of export enterprises' production costs; the development of India, Indonesia and Vietnam' processing trade occupied China's export market share; because of U.S. subprime loan crisis, the reduce of global import demands and implementation of international trade protection influenced China's export greatly.

As a result, RMB appreciation will not reduce China's trade surplus. The essential reason of China's huge trade surplus is China's unreasonable trade structure. In the context of global industrial restructuring, a large number of

processing industries transferred to China. These foreign-invested companies imported raw materials, manufacturing equipments and parts from their home countries and then manufactured in China, and finally exported these products to other countries. All these exports were included in China's export which led to China's trade inauthentic surplus. At the same time, products manufactured by foreign-invested enterprises were sold in China domestic market. These products substituted China's import and future increased China's trade surplus.

The huge trade surplus brought more and more trade frictions between China and its trade partners. It made foreign exchange reserve increase rapidly, increased the pressure of RMB appreciation, and enhanced the degree of dependence on foreign trade. It also intensified the excess liquidity and the risk of inflation.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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