Impact of Exchange Rate Changes on Inflation: Case of China

by

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A research project submitted in partial fulfillment of the
requirements for the degree of Master of Finance

Saint Mary's University

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Date: August 30, 2013

Acknowledgements

I would like to sincerely express my appreciation to my supervisor Dr. J. Colin Dodds for his guidance, help and encouragement to complete this report. I also would like to thank all professors in the MFIN program for giving me the opportunity to study this program and cultivate financial skills. In addition, I would like to thank my parents who gave me a lot of advice and assistance. Most importantly, I would like to express appreciation to my friends.

Abstract

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August 31, 2013

The purpose of this paper is to analysis the effect of Chinese exchange rate changes to domestic inflation by using the VAR model. Choosing the nominal effective exchange rate and consumer price index from July 2005 to June 2013 as the sample interval, we estimate the VAR model between the two variables and analyse the data. The results of the effect of exchange rate pass-through to inflation show that there is a negative relationship between the nominal effective exchange rate and consumer price index, and the pass-through ratio has a hysteretic nature. The appreciation of the RMB has the ability to curb inflation in China, but the effect is limited.

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Chapter 1: Introduction

1.1 Background

Recently, there are two significant issues in China's economic development- the RMB appreciation and inflation. First, under economic globalization, the foreign exchange rate is the merchandising ratio used in currency trade between countries. It is important to the monetary system and policy of a country. In the case of China, Xiao (2013) argued in the People Daily that the Chinese yuan has increased 33% against the U.S. dollar in 8 years. Such a large increase in the exchange rate is bound to affect China's macro-economy, in particular, inflation.

Second, the changes in the exchange rate will affect the price of imports and exports directly, and then influence the price of final products. Moreover, this year, Inman (2013) reported that China overtook the US to become the first major trading nation in the world. As a result, the effect of foreign exchange rate on China is increasingly strong. Therefore, not only economists but also citizens are concerned about changes in the foreign exchange rate.

This paper has as its scope to research the effect of exchange rate changes, (the Chinese yuan) against the US dollar, on Chinese inflation. The intent is to reveal the internal relation between inflation and exchange rates, and then show how the Chinese macro-economy was influenced by the currency exchange rate.

As we know, the first result of exchange rate changes is the price of imports and exports. Next, the price of industrial products, retail goods and customers will be affected. This is

because enterprises buy raw materials, production equipment and imported energy from foreign countries. However, those things have an effect on production costs of enterprises, and then change the price of final goods. We can find that there should be a transmission mechanism between exchange rate and commodities.

Initially, the theory of exchange rate transmission is based on the law of one price that the exchange rate changes of a country must lead to its domestic price changes at the same pace. The conditions of this law are complete exchange rate pass-through, perfectly competitive markets, full information, zero transaction costs, and zero duties and so on. In the real word, however, these conditions cannot be satisfied, so exchange rate transmission is incomplete. For example, the value of the US dollar decreased 40% from 1985 to 1991, but its trade deficit decrease from 117.7 billion dollar to 66.8, it is almost 33%. Therefore, more economists have been researching the problem of exchange rate transmission.

In the case of China, since the policy of reform and the opening of the economy, the Chinese foreign exchange administration system has changed in any times. From 2003, Chinese currency- RMB- was under great pressure to let its value rise. In July 21, 2005, the Yuan rose 2.1% against the dollar in one night, from 8.2765 RMB converted one dollar to 8.11. July 19, 2013, however, 6.1751 RMB was equal to one dollar.

During eight years, the Yuan has appreciated 34 percent already against the dollar. Traditional macroeconomic theory believes that with the significant appreciation of the RMB, it must decrease import goods in China, and then, reduce the consumer price

index (CPI). However, the year-on-year growth rate of CPI in June, 2003 was 0.3%, which is lower than 2.7%, for this rate in June, 2013.

The difference between theory and reality make people think of the lack of the traditional macroeconomic theory. Since the Chinese exchange rate mechanism is more flexible and resilient, choosing China as an example to study the relationship between exchange rate changes and macroeconomic is of great theoretical and practical significance.

1.2 Research content

This paper can be separated into four parts; literature review, methodology, analysis result and recommendations, to introduce the impact of RMB exchange rate changes to inflation.

Firstly, Chapter 2 will review the literature covering exchange rate transaction's theoretical research, quantitative analysis and macro effects. The collapse of the Bretton Woods System, and the era of floating exchange rate, has led many scholars to study this topic. However, most of the studies were about developed countries. Before the 1990s, China implemented a fixed exchange rate system, so enterprises were not sensitive to RMB exchange rate changes. However, since the reform in 1994, the RMB exchange rate is now more volatile and especially after the reform in 2005, the RMB appreciated quite quickly, many scholars began to study this topic.

Chapter 3 covers the methodology, where I introduce a theoretical model and the VAR model, which we use to analyze the data. The data sample is from January 2005 to December 2012. Nominal effective exchange rate and consumer price index are used as variables in the VAR model.

Chapter 4 we will analyse the results of using the VAR model to determine why RMB appreciation and inflation appeared at the same time and the effect of RMB exchange rate pass-through to price. The methods we will use in the VAR model are balance test, Granger Causality Test, choose of lag period, stability test, impulse response function analysis, and variance decomposition.

Chapter 5 will draw lessons from the past and give some recommendations about how to improve the problem of inflation in China. The recommendations will be discussed from the perspective of macroeconomic development strategy, RMB appreciation's strategy and other aspects.

Chapter 2: Literature review

2.1 The theory of exchange rate pass-through

2.1.1 Traditional open macroeconomic perspective

The area of exchange rate pass-thought originates from a traditional open economy. At the end of the seventies of the last century, Western countries led by U.S. were beginning to regress in terms of their economics with rises in unemployment and consumer prices. Moreover, in 1971, the Bretton Woods System collapsed and with it fixed exchange rates. From this period on macroeconomic external balance and domestic inflation become a hot policy oriented topic.

In a traditional open economy, the normal assumption is that in a perfectly competitive market that there are no entry barriers to an industry. The Mundell-Flemming Model is an example of this. Many of these models were based on the Purchasing Power Parity to achieve market balance and the effect of exchange rate changes to price and the exchange-rate mechanism also use the Law of One Price and the Purchasing Power Parity. Yi(2008) argued that from the basic function of a currency's purchasing power, to analyze the currency trade problem was very logical, so it is important to use the Law of One Price and the Purchasing Power Parity in this topic.

These fluctuations of exchange rates and price of commodities are based on a stable real exchange rate, the backward effect of nominal rate and inflation changes are counteracted. In other words, under a floating exchange rate system, nominal rate changes will lead to the price of import and export goods changing, and then thus

solving the problems of both current account surpluses and deficits. However, the Purchasing Power Parity ignores non-tradable goods, and does not consider the effect of capital flows and their affect on exchange rate.

To begin with, scholars generally considered an incomplete exchange rate pass-through as just reflecting a temporary phenomenon in cycle changes. Branson (1972) thought elasticity of exchange in the long-term is stronger than short-term. In the short-term, exchange rate pass-through is not complete. However, if the time is long enough and market is perfectly competitive, supply elasticity goes to infinity, and exchange rate pass-though goes to infinity also. Because of price stickiness in the short term, furthermore, exchange rate pass-though may be temporary.

Magee (1973) introduced an assumption that business contracts can affect exchange rate pass-though. In the first stage of exchange rate pass-though, the price trading contract is certain, so it will not change will the nominal exchange rate. In this situation, short-term exchange past-though is zero and the contract price is denominated in the importer's currency. In the other situation, if the contract price is denominated in the exporter's currency, short time exchange rate pass-though is complete; the price of exporter is reflected by nominal exchange rate changes. Market power and negotiating power of both sides will determine which situation will occur.

Ghosh and Wolf (1994), however, modified the theory. Except for factors of market power and negotiating power, menu cost also determines the price. Therefore, even if the contract price is denominated in an exporter's currency, short term exchange pass-

though sometimes will be incomplete. In addition, asset specificity and other factors, in the short time, manufactures may simply prefer to take a loss, rather than change the scale of production (Menon, 1995).

2.1.2 Microeconomic perspective

In fact, a lot of microeconomic research shows that incomplete exchange rate pass-though is the most general. Because of macroeconomic models are too strict, many scholars began to study exchange rate pass-though from a microeconomic viewpoint, including industrial organization and sunk cost perspectives.

The explanation of industrial organization theory was studied by Dornbusch (1987), Krugman (1986) and Knetter (1989). This theory explains incomplete exchange rate pass-though, because the effect of structural changes and the behaviour of industrial organization will can lead to incomplete competition in world markets. In other words, price changes are not totally affected by exchange rates, so the premise of perfect exchange rate pass-thought does not exist.

Second, Frout and Klemerer (1989) proved that firms can acquire compensation from price changes in the future. They will spend costs on advertising and distribution networks for improving consumer loyalty and entering a new market. In the expectation they will increase prices in the future. In conclusion, firms would not decrease scale or increase price easily, despite exchange rates changes. So, exchange rate pass-though is not perfect.

2.1.3 New open macroeconomic perspective

Since the 1990's, under the new open macroeconomic frame work, scholars use explanations of incomplete exchange rate pass-through to reconsider exchange rate pass-through system in a macroeconomic perspective.

The macroeconomic policy and inflation environment has a significant effect on exchange rate pass-through. Using macroeconomic variables as intermediate variables, we can find out that exchange rate changes do not impact domestic inflation greatly. At the time of the south-east Asian financial crisis, Taylor (2000) argued that when there is a high level of competitive pressure and low level of inflation all over the world, firms could not transfer the effect of exchange rate changes to prices of export goods. And he also considered that there is an interaction between monetary policy and exchange rate pass-through. Another example, Choudhri and Hakural (2001) used the date of exchange rate changes in seven countries during 1979-2000 to test the assumption of Taylor (2000). They found those average inflation index and exchange rates pass-though have a significantly positive relationship across countries over different periods.

2.2 The econometric research of exchange rate pass-through

Firstly, the price of import and export goods is affected by exchange rate pass-through. Yang (1997) used a Dixit-Stiglitz model to research the extent of the import price impact of bilateral exchange rate changes between America and 17 trading, its partners. He found incomplete exchange rate pass-through generally exits, and there is a significant difference among different industries and goods, but there is not very much difference among countries. Tange (1997) used a polynomial distributed lag model to estimate the

exchange rate pass-through coefficient of Japanese export firms. The result is very low. However, for Germany, the coefficient is high. Moreover, there is a transmission from import price to consumer price. Sekine (2006) collected 1974-2004 data from six developed countries - America, Japan, Italy, Germany, France and British, and then he used a single equation stochastic volatility model and its parameters change over time. He found that if the inflation index is low, the effects from import prices to consumer prices will be closely related to this low inflation and market penetration. However, the transmission effect from exchange rate changes to import prices is not significant.

In China, Zhou (2010) used a Structural Vector Autoregression model (SVAR) to study RMB effective rate impacts consumer price index (CPI). His result was the Nominal Effective Exchange Rate (NEER) of RMB had an incomplete pass-through to CPI. This effect to import price is stronger than consumer prices.

2.3 Macroeconomic effects of exchange rate pass-through

In the open economy, the changes of exchange rate should affect currency policy in a country. And the conductive relation between exchange rate and currency policy is determined by the elasticity of exchange rate pass-through. If the exchange rate pass-through has high elasticity, the changes of exchange rate will the affect domestic price level and trade balance; and they will greatly impact governments, choice of currency policy. If the exchange rate pass-through has low elasticity, it means exchange rate pass-through is incomplete and governments will consider that the inside economy, then the currency policy as almost independent.

Choudhri and Hakura (2002) through their research funded that there is positive relation between inflation and exchange rate changes, and then the relation should help the country control inflation by using currency policy and keep low inflation.

Another hot topic is the choice between floating and fixed exchange rate systems. The exchange rate pass-through is one of the measures which determine the choice of exchange rate regime.

Devereux and Engel (1999) analyzed the sticky price and the exchange rate system in incomplete exchange rate pass-through. In the local currency pricing (LCP), the fixed exchange rate is more stable when financial markets are fluctuating than the floating exchange rate. However, if this shock is not significant and the currency system in the country is steady, the floating exchange rate will protect the economy from external economic changes by using the effect of exchange rate pass-through. In this situation, a floating exchange rate is better than fixed exchange rate. However, producers' currency pricing (PCP), although the currency system in the country is steady, the change of exchange rate will affect consumer expectations so even free floating exchange rate is not necessary a good choice.

Chapter 3: Methodology

3.1 Theoretical model

Exchange rate changes initially affect import goods price, and then, the price of imported goods impact final domestic goods. The paper utilises the theoretical model of Bailliu and Fujii (2004) and Jeevan Kumar Khundrakpam (2007) to analyse, and the econometric model of Ghosh and Rajan (2008). We obtain the following equation.

$$cpi_{t1} = \beta_0 + \beta_1 neer_t + \beta_2 ipi_t + \beta_3 gdp_t + \beta_4 m2_t + \beta_5 int\, r_t + \varepsilon_t \quad \text{.....3.1}$$

In Equation 3.1, the import price index (IPI) means foreign control variable. NEER is the nominal effective exchange rate, and we chose RMB/US$ in this paper. Gross domestic product (GDP), money supply (M2) and interest rate (INTR) are all domestic control variables.

3.2 Time periods

In six decades of RMB existence it has gone through four reforms. From 1949 to 1979, China implemented a planned economy. In this period, exchange rate was uniformly formulated by government. From 1980 to 1993, China earned foreign exchange through exports. Due to America adopting a moderate easing of fiscal policy and tight monetary policy, the value of U.S. dollar saw gradual appreciation. China used a single exchange rate instead of dual exchange rate and RMB exchange rate was reduced many times. From 1994 to 2004, the national economy entered a time of adjustment time.

In 1997 the Asian economic crisis began and the Chinese government used many policies to keep the RMB exchange rate stable. U.S. dollar against RMB was between

8.27 and 8.3. From July 2005 to now, China started to implement market supply and demand-based and managed floating exchange rate system. This strategy means that the RMB exchange rate is no longer pegged to the Dollar, and the RMB exchange rate mechanism has become more flexible. This paper just chose July 2005 to June 2013 to study the relationship between exchange rate changes and inflation. The last period is a relatively complete exchange rate system, and, in this period, exchange rates have had a high relationship with the emerging market economy.

3.3 Econometric model

3.3.1 Introduction of VAR model

The traditional theoretical models that describe the relationship among variables indicate static relationships, not dynamic. Using the non-structural method can explain the dynamic relations.

The VAR model is a vector autoregressive model, which a developed by Sims in 1980. This model is not based on economic theory but uses simultaneous equations. In every equation, endogenous variables are tested on lagged value of endogenous variables to estimate the dynamic relation of total endogenous variables. The VAR model includes the time series analysis, the effect of random disturbance term changes to variables and so on. Through a series of analysis, we can determine the relationships among variables.

$$Er_t = a_{11}Er_{t-1} + a_{12}Ir_{t-1} + b_{11}Er_{t-2} + b_{12}Ir_{t-2} + c_1 + \mu_{1,t} \quad \text{.....3.2}$$

$$Ir_t = a_{21}Er_{t-1} + b_{21}Er_{t-2} + b_{22}Ir_{t-2} + a_{22}Ir_{t-1} + c_2 + \mu_{2,t} \quad \text{.....3.3}$$

In Equations 3.2 and 3.3, Er_t and Ir_t are the returns of RMB exchange rate and inflation rate, a_{ij}, b_{ij} and c_i (i = 1, 2; j = 1, 2) are estimated parameters. In this model, the estimated value of each factor measures how important it is to market and transfer effect between markets.

3.3.2 Variables used and analysis

Because, in this paper, we only consider the relationship between exchange rate and inflation, we choose NEER and CPI as variables.

After the reforms of exchange rate of RMB, the NEER mainly changes around the US dollar, but it is also affected by the currencies of Japan, Europe, and Korea and so on. There are two reasons to choose NEER as the return of the RMB exchange rate. First, NEER is calculated by using trade volume weighting. Compared to nominal exchange rate, it reflects Chinese exchange rate changes more objectively. Second, as this paper is researching the effect of exchange rate changes to price of commodities, the real exchange rate already includs the price impact factor, NEER is better to this paper's research. Finally, we obtain the data from Bank for International Settlement, and then, we use the ratio to moving average-multiplicative to adjust.

This paper chooses CPI to stand for the inflation rate because CPI is an index that reflects the price changed trend and range of consumer goods and services purchased by the residents in a country. This index is close to a resident's daily life, and shows price changes in the consumer market. CPI datum are from National Bureau of Statistics of

China is year-on-year statistics. We use ratio to moving average-multiplicative to adjust again.

In Tables 3.1 and 3.2, the variables are ΔCPI and ΔNEER from July 2005 to June 2013, and the sample size is 95. For simple data input, we just used 2005M01 instead of July 2005 and used 2012M13 instead of June 2013. The means show that the NEER and CPI were increasing in the period and the value of RMB was appreciating. In Table 3.1, the Jarque-Bera and Probability show that ΔCPI is normal distribution, and in Table 3.2, ΔNEER is not normal distributed.

Table 3.1

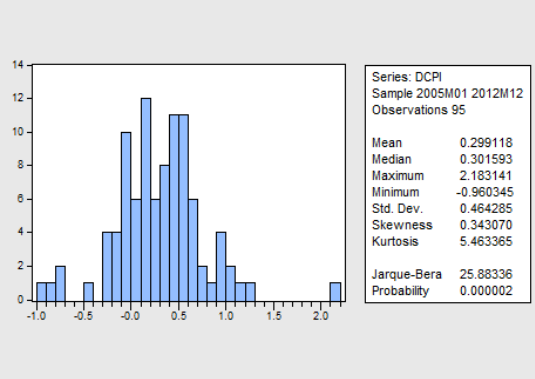
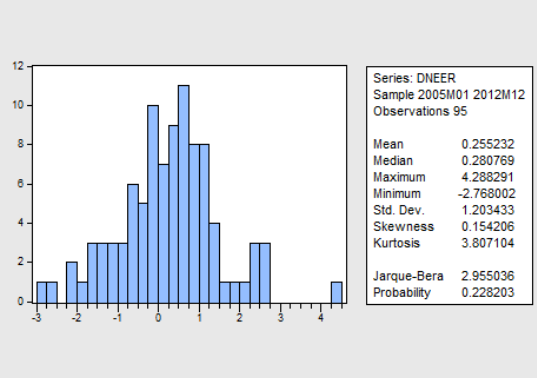


Table 3.2



Chapter 4: Analysis of results

4.1 Balance test

There are two differences between balance and unbalance sequences. First, the variance, covariance and mean do not change with time in balance sequences. However, over different times, these values of unbalance sequences are not the same. Second, due to the special characteristic, we can use balance sequences to predict the future data. Unbalance sequences do not have this characteristic because their statistics are random.

The method for test balance is a unit root test. This paper use the Augmented-Dickey-Filler test (ADF) of Dickey and Fuller (1979) to get the results and use the Phillips-Perron (PP) of Phillips and Perro (1988) to verify the results.

Table 4.1

Variable	ADF Test	PP Test
NEER	-0.78	-0.45
ΔNEER	-6.37	-6.35
CPI	-0.44	-0.10
ΔCPI	-3.27	-9.18

This paper uses Eviews 6.0 to test the statistics. In the Table 4.1, Δ denotes the first difference operator and the 1% critical value is -3.50. If the ADF test and PP test are larger than the critical value, the sequence will not have a unit root, it is in balance. If the ADF test and PP test are smaller than the critical value, the sequence will have a unit

root, and it is unbalanced. So the NEER sequence and CPI sequence are not balanced sequences and the ΔNEER sequence and ΔCPI sequence are balanced.

4.2 Granger Causality Test

The Granger Causality Test is a method to test a pair of variables whether they have causal relationship. We did a cointegration test first and got the precondition of Granger Causality Test. If the lag intervals are one to three, there is a cointegration relation between NEER and CPI.

Table 4.2

Pairwise Granger Causality Tests
Date: 08/14/13 Time: 22:56
Sample: 2005M01 2012M12
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
DCPI does not Granger Cause DNEER	92	0.26895	0.8476
DNEER does not Granger Cause DCPI		5.11932	0.0026

In Table 4.2, we choose lag as three, and DNEER and DCPI are ΔNEER and ΔCPI, which are proved balanced sequences. Using the unbalanced sequence to do its Granger Causality Test will lead to spurious regression. The probability of ΔNEER does not Granger Cause ΔCPI is 0.0026, which smaller than 0.05. So we consider that NEER is unidirectional pass-through to CPI.

4.3 Estimate VAR model

Table 4.3

Included observations: 94 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	CPISA	NEERSA
CPISA(-1)	0.911489	-0.341754
	(0.10564)	(0.26385)
	[8.62860]	[-1.29528]
CPISA(-2)	0.119849	0.430251
	(0.10974)	(0.27410)
	[1.09210]	[1.56968]
NEERSA(-1)	-0.151478	1.267098
	(0.03962)	(0.09896)
	[-3.82313]	[12.8039]
NEERSA(-2)	0.106957	-0.380759
	(0.03766)	(0.09405)
	[2.84036]	[-4.04835]
C	1.105968	1.182736
	(0.66928)	(1.67164)
	[1.65248]	[0.70753]
R-squared	0.997702	0.977125
Adj. R-squared	0.997598	0.976097
Sum sq. resids	16.23366	101.2726
S.E. equation	0.427084	1.066721
F-statistic	9658.522	950.4172
Log likelihood	-50.83846	-136.8827
Akaike AIC	1.188052	3.018781
Schwarz SC	1.323334	3.154063
Mean dependent	115.8474	98.16578
S.D. dependent	8.714788	6.899565
Determinant resid covariance (dof adj.)		0.199120
Determinant resid covariance		0.178501
Log likelihood		-185.7718
Akaike information criterion		4.165358
Schwarz criterion		4.435921

In Table 4.3, NEERSA and CPISA are seasonally adjusted NEER and likewise with CPI. We can obtain that the R-squared are 0.997702 and 0.977125, so the model can explain almost 99% of variances. The model is reasonable.

4.4 Lag period

When we choose a lag period, there are two problems we should consider. First, we should choose a larger lag period for adequately reflecting the dynamics. Second, an

oversize lag period may lead to the numbers of estimated parameters increase. And then, too many estimated parameters cause a loss of freedom degrees. Due to this contradiction, we prefer to a limited lag period.

Table 4.4

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-554.6449	NA	1069.845	12.65102	12.70732	12.67370
1	-188.7067	706.9261	0.286348	4.425153	4.594062	4.493202
2	-175.7575	24.42702	0.233693	4.221761	4.503276*	4.335176*
3	-171.9653	6.981086	0.234900	4.226483	4.620605	4.385265
4	-164.6121	13.20231*	0.217829*	4.150275*	4.657003	4.354423
5	-163.1928	2.483679	0.231264	4.208928	4.828262	4.458442
6	-161.1962	3.403432	0.242455	4.254458	4.986399	4.549339
7	-160.3547	1.396015	0.261116	4.326244	5.170790	4.666490
8	-157.1269	5.208533	0.266568	4.343793	5.300946	4.729406

* 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

We can see, in Table 4.4, SC and HQ consider the optimal lag period is two day, but LR, FPE and AIC choose four periods. Considering the sample size, the longer lag period, the less freedom and the effectiveness of the model will be questioned, so we chose two lag periods in the VAR model.

4.5 Stability test of VAR

In Table 4.5, we can see the eight inverse roots of AR characteristic polynomial are all in the unit circle. So the VAR model is stable and we can use this model to do an impulse analysis.

Table 4.5

Roots of Characteristic Polynomial
Endogenous variables: CPISA NEERSA
Exogenous variables: C
Lag specification: 1 2
Date: 08/14/13 Time: 23:28

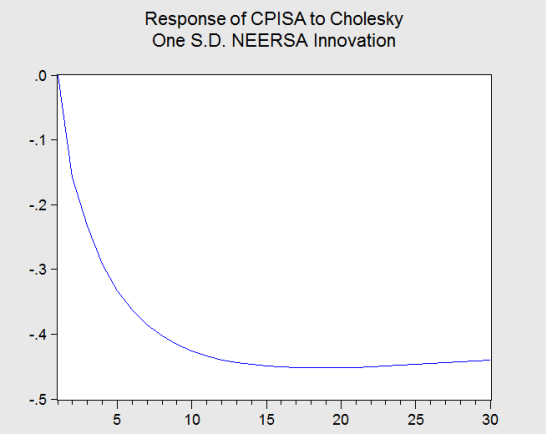
Root	Modulus
0.996049	0.996049
0.816350	0.816350
0.565506	0.565506
-0.199318	0.199318

No root lies outside the unit circle.
VAR satisfies the stability condition.

4.6 Analysis of impulse response function

Traditional econometric models need to have a theoretical basis first, but the VAR model does not need to know the relationship between variables. It always observes the effect of error term changes to systematic dynamics. In another words, when we give a shock to the model, the VAR can know the changes of others variables. This analysis method is called the impulse response function method.

Figure 4.1



In Figure 4.1, after CPI got a one stand deviation positive impulse from NEER, the CPI increased immediately. This means the effect of exchange rate changes to inflation is negative, but this effect is not significant. From the second period, the effect was increasing; it means the effect has hysteresis quality. In the eighteenth period, the maximum negative effect is -0.452198%, and then the influence weakened slightly.

Table 4.6

Period	2	4	6	8	10	15	20	25	30
CPI	-0.1582	-0.2330	-0.3629	-0.4027	-0.4259	-0.4493	-0.4518	-0.4470	-0.4397

Table 4.6 shows the transmissibility from NEER to CPI. RMB appreciation can decrease inflation and the price in this country. However, this inhibiting effect has a lag period and the pass-though is incomplete. The largest transmissibility is 0.452198 in the eighteenth period.

4.6 Variance decomposition

Variance decomposition can explain the importance of different shocks. Different from impulse analysis, the variance decomposition considers that when CPI changes 100%, what percentage is contributed by itself and how many by others factors. We can get the effect of each random disturbance variable to CPI from variance decomposition. In this paper, we just analyse the weighted effect from NEER and CPI itself to CPI changes.

Table 4.7

Period	S.E.	CPISA	NEERSA
1	0.427084	100.0000	0.000000
2	0.620813	93.50067	6.499327
3	0.816317	88.09053	11.90947
4	1.001599	83.59990	16.40010
5	1.177464	80.15084	19.84916
6	1.343760	77.46420	22.53580
7	1.501039	75.34113	24.65887
8	1.649959	73.63326	26.36674
9	1.791207	72.23700	27.76300
10	1.925435	71.07896	28.92104
11	2.053239	70.10640	29.89360
12	2.175157	69.28066	30.71934
13	2.291673	68.57288	31.42712
14	2.403220	67.96109	32.03891
15	2.510184	67.42833	32.57167
16	2.612916	66.96126	33.03874
17	2.711728	66.54931	33.45069
18	2.806904	66.18395	33.81605
19	2.898700	65.85827	34.14173
20	2.987347	65.56658	34.43342
21	3.073054	65.30421	34.69579
22	3.156013	65.06724	34.93276
23	3.236397	64.85239	35.14761
24	3.314365	64.65689	35.34311
25	3.390059	64.47841	35.52159
26	3.463613	64.31495	35.68505
27	3.535148	64.16478	35.83522
28	3.604773	64.02643	35.97357
29	3.672591	63.89863	36.10137
30	3.738696	63.78027	36.21973

In Table 4.7, we can see the CPI is mostly affected by itself and, the influence of NEER increases. However, after the twentieth period, the effect of NEER to CPI just changes slightly. In the fifteenth period, 32.57167% changes of CPI are explained by NEER, and the rest 67.42833% are explained by CPI itself. From the reasons of variance decomposition, NEER changes can explain a part of CPI changes.

Chapter 5: Conclusions and Recommendations

5.1 Conclusion

This paper used the VAR model to estimate the effect of NEER changes to CPI from July 2005 to June 2013. We obtain three reasons. First, the relationship between the NEER and CPI is negative. The NEER is Granger Causality to CPI. Second, the exchange rate pass-through is not completely. It has a lag period. Third, the NEER can explain a part of CPI changes.

In conclusion, from July 2005 to June 2013, RMB appreciation was good for a decrease CPI. In other words, RMB appreciation was curbing inflation. However, the effect of RMB appreciation in curbing inflation was affected by the incomplete exchange rate pass-through and the lag period.

5.2 Recommendations

Using RMB appreciation to curb inflation is not a straightforward policy tool. First, there is a precondition of the appreciation method that the domestic market should have exchange rate pass-through to consumer price as completely as possible. However, how consumer prices are affected by exchange rates is not perfect and has a lag period. So curb inflation not only depends on exchange rate policy, but also the need to build international coordinated mechanism and effective currency policy.

Moreover, implementing credit policy and structural currency policy can control domestic asset price bubbles. This method can improve currency flow rate, thereby reduce inflation.

China should increase internal demand, which can decrease degree of depend on foreign capitals, and extend imports, which can balance trading. In addition, RMB appreciation should follow crawling peg and controllable principal, and avoid greatly appreciation in short term.

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Appendix A: Data of CPI and NEER

Date	NEER	CPI	Date	NEER	CPI	Date	NEER	CPI	Date	NEER	CPI
07-2005	88.06	101.8	07-2007	90.82	105.6	07-2009	101.31	98.2	07-2011	98.07	106.5
08-2005	88.5	101.3	08-2007	90.89	106.5	08-2009	100.48	98.8	08-2011	98.69	106.2
09-2005	88.86	100.9	09-2007	90.6	106.2	09-2009	99.08	99.2	09-2011	101.54	106.1
10-2005	90.18	101.2	10-2007	89.64	106.5	10-2009	97.69	99.5	10-2011	102.71	105.5
11-2005	91.17	101.3	11-2007	89.14	106.9	11-2009	97.05	100.6	11-2011	103.49	104.2
12-2005	90.79	101.6	12-2007	90.39	106.5	12-2009	97.77	101.9	12-2011	104.79	104.1
01-2006	89.22	101.9	01-2008	91.17	107.1	01-2010	98.24	101.5	01-2012	105.19	104.5
02-2006	89.85	100.9	02-2008	91.66	108.7	02-2010	99.62	102.7	02-2012	104.12	103.2
03-2006	89.96	100.8	03-2008	90.62	108.3	03-2010	99.34	102.4	03-2012	104.94	103.6
04-2006	89.37	101.2	04-2008	91.42	108.5	04-2010	99.47	102.8	04-2012	105.13	103.4
05-2006	87.43	101.4	05-2008	92.79	107.7	05-2010	102.01	103.1	05-2012	106.07	103
06-2006	88.77	101.5	06-2008	94.21	107.1	06-2010	103.15	102.9	06-2012	106.52	102.2
07-2006	88.88	101	07-2008	94.44	106.3	07-2010	101.58	103.3	07-2012	106.31	101.8
08-2006	88.76	101.3	08-2008	96.86	104.9	08-2010	100.15	103.5	08-2012	105.81	102
09-2006	89.5	101.5	09-2008	99.46	104.6	09-2010	99.84	103.6	09-2012	104.97	101.9
10-2006	90.29	101.4	10-2008	103.89	104	10-2010	97.98	104.4	10-2012	105.64	101.7
11-2006	89.67	101.9	11-2008	106.33	102.4	11-2010	98.76	105.1	11-2012	106.89	102
12-2006	89.18	102.8	12-2008	103.63	101.2	12-2010	99.85	104.6	12-2012	106.56	102.5
01-2007	90.56	102.2	01-2009	104.51	101	01-2011	99.7	104.9	01-2013	107.38	102
02-2007	90.87	102.7	02-2009	107.29	98.4	02-2011	99.32	104.9	02-2013	108.32	103.2
03-2007	90.36	103.3	03-2009	107.96	98.8	03-2011	98.57	105.4	03-2013	110.11	102.1
04-2007	89.8	103	04-2009	106	98.5	04-2011	97.87	105.3	04-2013	111.02	102.4
05-2007	90.35	103.4	05-2009	103.15	98.6	05-2011	98.05	105.5	05-2013	112.71	102.1
06-2007	91.16	104.4	06-2009	101.84	98.3	06-2011	98.2	106.4	06-2013	112.84	102.7

Appendix B: Effect of Cholesky (d.f. adjusted) S.D. NEERSA Innovation CPISA

Period	
1	0.000000
2	-0.158269
3	-0.233051
4	-0.291829
5	-0.332667
6	-0.362952
7	-0.385573
8	-0.402747
9	-0.415879
10	-0.425952
11	-0.433661
12	-0.439517
13	-0.443905
14	-0.447120
15	-0.449392
16	-0.450904
17	-0.451800
18	-0.452198
19	-0.452191
20	-0.451857
21	-0.451256
22	-0.450441
23	-0.449450
24	-0.448319
25	-0.447073
26	-0.445736
27	-0.444325
28	-0.442856
29	-0.441340
30	-0.439786

Cholesky Ordering: ...