

The Study of American Quantitative Easing Monetary Policy's Spillover Effects on China's Inflation

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Abstract—After the outbreak of the financial crisis in 2008, the United States began quantitative easing monetary policy, different from traditional policy, which has aroused many countries' opposition and concerns. At the same time, China has experienced a sustained inflation. Whether is there some connection between QE and China's inflation? Whether has quantitative easing monetary policy caused a large scale of international market liquidity significantly? The paper analyzes the transmission channels of quantitative easing monetary policy to China's inflation, and takes cointegration test of economic variables by using data from November 2009 to August 2012. It finds that U.S. quantitative easing monetary policy induces China inflation through international commodity prices, international capital flowing and balance of payments.

Keywords- *Quantitative Easing Monetary Policy; Inflation; Transmission Channels; Cointegration test*

I. INTRODUCTION

The outbreak of subprime crisis in 2007 led to the global financial crisis and economic recession. To prevent the spread of the crisis, American and other major developed economies have taken unconventional monetary policy. By the end of 2012, the U.S. Federal Reserve Bank started four round quantitative easing monetary policy (QE) to stimulate the U.S. economy. Expansionary monetary policy of such a large scale, the other economies of the world, especially emerging market economies, expressed lots of worries that the Fed's ultra-loose monetary policy will cause the large number of dollars to flow to other countries, especially to the emerging economies, resulting in capital inflows, currency appreciation, overheating of the economy and other issues. In contrast, Ben Bernanke, the Fed Chairman, said at the International Monetary Fund (IMF) and World Bank Annual Meetings in October 14, 2012, QE monetary policy can not only help to accelerate the recovery of the U.S. economy, but also to support the global economy, including emerging economies, by stimulating consumption and growth of the United States. The debate needs more research on this issue whether the quantitative easing monetary policy in the United States has significant impact on other economies? As a emerging economic powers, there is very close economic ties between China and the United States. Whether dose the U.S. quantitative easing monetary policy bring new pressure to China on controlling inflation problem? The paper

attempts to discuss this issue and provide recommendations for relevant policy.

II. LITERATURE REVIEW

The U.S. Fed. takes quantitative easing monetary policy only for a short time, so there are not many research in this field. The foreign researches pay more attention to the effect of the quantitative easing monetary policy in Japan or the United States. The issue, the QE policy impact on the Chinese economy, is lack in domestic research field. The related researches are as follows:

Kim and Roubini (2000) make empirical research using the SVAR model, and find that U.S. expansionary monetary policy has an impact on output and inflation of the Group of 7 countries, not including the United States.^[1]

Mackowiak (2007) studies the impact of U.S. monetary policy on emerging markets, and find that external shocks has a greater impact on emerging markets, but has no effect on the choice of exchange rate regime.^[2]

Sousa and Zaghini (2007) find that the global monetary shock causes the output in G5 economies to decline for short-term, and the price level to rise.^[3]

Zhang Linjie (2011) finds that the growth of foreign exchange has a direct impact on inflation by selecting foreign exchange and commodity prices from 2007 to 2010 and using the VAR model.^[4]

Zhuang Jia (2009) believes that U.S. monetary policy has positive effect on China's output, which means that the U.S. expansionary monetary policy's impact on China's output is also expansionary.^[5]

Liao Qin (2011) analyzes China inflation by selecting CPI, M2, the international crude oil prices and a one-year commercial lending rates from 2006 to 2009 to have ADF test and EG test. It shows that total sum of social retail goods, investment, as well as the price of crude oil, commercial lending rates and other supply-side factors have a significant impact on inflation, conversely, the number of money supply has no apparent effect.^[6]

Chen Lei and Hou Peng (2011) constructs a panel VAR model and find that U.S. quantitative easing monetary policy lead to international capital flows to emerging economies, so that these countries face to inflationary pressures.^[7]

Ye Fei (2011) analyzes transmission mechanism of the U.S. quantitative easing monetary policy to Chinese economy. It finds that the policy increase China money

supply and RMB faces upward pressure by conducting in trade.^[8]

Zhang Liqing (2011) also believes that if a large number of liquidity caused by U.S. quantitative easing flows to emerging market economies, these economies may face risks of the financial turmoil of. And QE policy will lead to the depreciation of the US dollar.^[9]

In short, the quantitative easing monetary policy is becoming a hot issue in the field of monetary economics and theoretical frontiers. However, the time of the implementation of U.S. quantitative easing monetary policy is limited, more researches need more time. And the issue of U.S. quantitative easing monetary policy impact on China and other economies, is still lack of sufficient attention, which is the paper attempts to give an answer.

III. THE CHANNELS OF AMERICAN QUANTITATIVE EASING MONETARY POLICY AFFECTS TO CHINA'S INFLATION

Essentially, quantitative easing monetary policy means "credit easing", which promotes economy recovery by repairing the credit markets. Quantitative easing monetary policy has injected a lot of liquidity to the market in the worldwide, not only in the United States. It will have an impact on other countries through different channels. As one of the largest emerging economies, China will inevitably be affected by QE. How expansionary monetary policy caused the inflation in other countries? There are three main channels: international trade, international capital flows and the international balance of payments. In the real economy, the above three channels are not entirely independent and their association are complex.

Since the implementation of U.S. quantitative easing monetary policy in 2008, the international commodity prices rose sharply, at the same time, China's economy has shown the feature of continued appreciation of the RMB and apparent increasing of foreign exchange reserves.

A. Price of international commodities

According to data released by the National Bureau of Statistics of China, China's crude oil, iron ore and soybeans dependence on foreign countries in more than 50%, especially soybean import dependence has been as high as 80%. International commodity prices continue to rise leading the prices of imported goods in China to increase. American quantitative easing monetary policy started in November 2008, the food, steel and crude oil prices stopped the downward trend began to rise slowly in the following months. It can not be denied that the Fed's quantitative easing monetary policy has played a certain role in the price of the commodity. During the same period, China imported goods price index and the international commodity import price trend is basically the same. It was down subject to the impact of the economic crisis, but ,during the quantitative easing monetary policy, it has been slow to rebound. Therefore, it can be speculated that the quantitative easing monetary policy in the United States has had an impact on the price of Chinese imports by commodity goods.

B. International capital flowing

After the financial crisis, the Federal Reserve has maintained a low interest rate of 0 - 0.25% range, at the same period, China deposit and lending interest rates are much higher than in the United States. The benchmark lending rate has been maintained at a level more than 5%, the benchmark deposit rate has been unchanged at 1.5%. Under the circumstance of low interest rates and depreciation expectation in US dollars, high interest After 2010, China has repeatedly raised its benchmark interest rate, which provided the conditions for the transfer of funds. Hot money inflowing lead to more inflationary pressures. Investment to physical assets, especially gold and mineral resources has increased, which would drive the price of gold and mineral resources to rise rapidly, resulting to inflation.

C. Foreign exchange reserves growing

The spreads led to international capital flows and resulted in foreign exchange reserves growing sharply. The figure1 shows that from January 2009 to December 2012, Chinese total sum of foreign exchange reserves has increased significantly.

The increasing foreign exchange reserves have an impact on the price mainly through three ways: (1) There is no corresponding increase in the amount of output, which drives up prices. (2) Market interest rates is falling due to the increasing in the money supply, which encourage people to consume and cause prices to rise. (3) In the capital market, the decline in interest rates will promote the increase in the price of securities. Profit-driven funds will turn to investment in physical assets and stimulate the labor demand, thus promoting the increase in workers' wages, resulting in cost-push inflation.

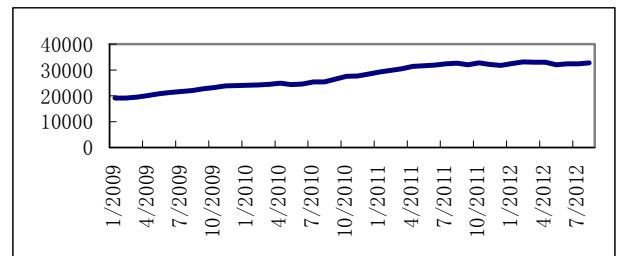


Figure 1. 2009.01-2012.12 China's total sum of foreign exchange reserves (Unit: 100 million U.S. dollars)

IV. EMPIRICAL ANALYSIS OF QE AND CHINA'S INFLATION

A. Variables and data

From above, we can guess that QE affects China inflation in these ways: the prices of international goods increasing dramatically; international capital flowing and foreign exchange reserves growing apparently. Thus, we can have an empirical analysis on the relationship between U.S. quantitative easing monetary policy and China inflation. There are three variables: the consumer price index (CPI),

imported goods price index (PII) and foreign exchange reserves value (FER).CPI is selected as the dependent variable, PII and FER as independent variables. They are tested whether there is long-term stability of the proportional relationship by cointegration test.

Consumer Price Index is the price of a basket of products and services relative to a base period. The data is from the website of National Bureau of Statistics of China.

Price Index of Import Goods is a relative number reflecting for a certain period changes in prices level of imported goods magnitude, direction, trend and regularity of time in a country or region. The data is from the website of China Customs Statistics.

Foreign Exchange Reserve are foreign exchange assets holding by the central government, as the part of international reserve assets. The data is from the website of the People's Bank of China.

Since the first round of U.S. quantitative easing monetary policy began in November 2008, it is taken into account the lag of policy effects and data availability, the sample time is from November 2009 to August 2012. Meanwhile, in order to eliminate the heteroscedasticity in the data, we take natural logarithm of all data.

B. Unit root test

To avoid the phenomenon of false regression caused by the regression analysis of non-stationary time series, the smooth of variables should be taken ADF unit root test before cointegration test. The ADF test results are calculated by the econometric software Eviews6.0,shown in the table 1.

TABLE I. THE ADF TEST STATISTIC OF VARIABLES

	ADF test statistic	Test critical values		
		1%	5%	10%
LnCPI(0)	-1.228765	-3.646342	-2.954021	-2.615817
LnPII(0)	-0.922777	-3.646342	-2.954021	-2.615817
LnFER(0)	-1.468194	-3.646342	-2.615817	-2.619160

From table 1, it can be seen that LnCPI, LnPII and LnFER all have unit root under 1%, 5%, 10% confidence level, which means they are non-stationary time series.

TABLE II. THE ADF TEST STATISTIC OF FIRST-ORDER DIFFERENCE TIME SERIES

	ADF test statistic	Test critical values		
		1%	5%	10%
LnCPI(1)	-4.228765	-3.646342	-2.954021	-2.615817
LnPII(1)	-3.468194	-3.646342	-2.954021	-2.615817
LnFER(1)	-3.969778	-3.646342	-2.954021	-2.619160

Table 2 shows that LnCPI and LnFER first-order difference is stationary under 1% confidence level, and LnPII first-order difference is stationary under 5% confidence level. It can be considered that LnCPI, LnPII and LnFER are a unit root time series, which means that we can

have cointegration test to determine whether there are long-term stable relationship between the three variables.

C. Cointegration test

We use the two-step test method was proposed in 1987 by Engle and Granger, also known as EG Test. There are two steps as follows:

Firstly, we establish the equation :

$$Y = a + bX + e \quad (1)$$

then use the OLS method estimating equations and calculate the non-equilibrium error, get:

$$\hat{Y} = \hat{a} + \hat{b} X \quad (2)$$

$$\hat{e} = Y - \hat{Y} \quad (3)$$

Which is called cointegration regression or static regression.

Secondly, we test the unit root of residuals. If it is a stationary series, variables can be considered as (1,1) cointegration. If it is a unit root series, variables can be considered as (2,1) cointegration.

TABLE III. THE REGRESSION RESULT OF VARIABLES

	Coefficient	Prob.
C	-58.72105	0.0000
LnPII	5.857414	0.0000
LnFER	3.157297	0.0000

Thereby, we obtain the regression equation:

$$\text{LnCPI} = -58.72105 + 5.857414\text{LnPII} + 3.157297\text{LnFER} + e$$

Then, we test the stationarity of residuals using the ADF unit root test.The result is shown in Table 4.

TABLE IV. THE ADF TEST STATISTIC OF RESIDUALS

ADF test statistic	-1.370692	1% Critical Value	-2.531706
		5% Critical Value	-1.814357
		10% Critical Value	-1.061642

From table 4, we can see that ADF test statistic of residuals is significantly more than 10% critical value. Thus, the variables are cointegrated, which means there is a long-term stable relationship among the variables of CPI,PII and FER.

V. CONCLUSIONS AND SUGGESTION

A. Conclusions

According to the regression equation, we can draw the following conclusions:

Imported goods price index ,foreign exchange reserves and China inflation are positively related, as we estimated. Quantitative easing monetary policy has led the international commodity prices to rise and have effects on China inflation by importing goods. Foreign exchange reserves has grown

apparently due to international trade and capital flowing, which leads more money supplying to markets.

B. Suggestion

First of all, respond to American new round quantitative easing monetary policy putting new inflation pressure on China, China should implement steady even moderately tight monetary policy instead of loose monetary policy. The strength of China monetary policy can not be too high, fine-tuning being more favorable. At the same time, to avoid significant fluctuations in liquidity, it is appropriate to fine-tune liquidity through open market operations.

Secondly, China economy should reduce reliance on the U.S. dollar. China should solve the problem of trade imbalances and reduce foreign exchange reserves, optimize the export structure, increase the added value of export commodities, and imports strategic materials as reserves. To speed up the internationalization of the RMB, China should promote the RMB as an international reserve currency, to fight for the pricing of international commodity goods. China should strengthen the management of foreign exchange, adjust to the foreign exchange structure, and control the scale of U.S. dollar assets.

Finally, Chinese government should control capital inflow strongly. In the long run, China does need to achieve the liberalization of the capital account. However, like many emerging market economies, China has also enhanced temporary inflow controls in the face of the extraordinary increase capital inflows. From the operating level, China should not only strengthen the assurance of the authenticity of the current account transactions, but also consider the gratuitous reserve system on short-term capital inflows, or impose tax on the short-term capital inflows directly.

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