An Empirical Analysis of the Impact of High Foreign Exchange Reserves on Inflation in China

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Abstract. This paper studies the effect from the perspective of theoretical and empirical analysis of foreign exchange reserves on inflation, by establishing VAR model, impulse response function and variance decomposition and other measurement methods to get the answer that the foreign exchange reserve is Grainger causality of inflation, and explain the variance of inflation of about 7% changes in conclusion. Finally, some corresponding recommendations of policy are given according to the empirical results.

Introduction

In recent years, with the acceleration of economic globalization, and the expansion of China’s opening up to outside world, China’s foreign exchange reserves from 165.514 billion US dollars in 2000 rose to 3843.018 billion US dollars in 2014. It is of great practical significance to study the impact of foreign exchange reserves on inflation. This paper starts from the theoretical and empirical analysis, studies the transmission mechanism of foreign exchange reserve to inflation, and provides a reference for policy making.

1. Literature Review

1.1 Foreign literature review

Foreign scholars have done a lot of research on the impact of foreign exchange reserves on inflation. Neely and Rapach (2008) studied the impact of global inflation on inflation in countries. It was concluded that the inflation of each country is explained by the global inflation of 34% [1]. Ciccarelli and Mojon (2005) believed that the change in inflation from the international business cycle and commodity price changed in the long term by the impact of national monetary policy [2].

1.2 Domestic literature review

Domestic scholars believe that foreign exchange reserves can cause significant changes in inflation. Zou Xuan (2011) studied the inflationary pressure mechanism of excessive foreign exchange reserves and the serious excess capacity [3]. Li Tao, Zhong Changbiao, and Huang Lei (2011) used VAR model to confirm that foreign exchange reserves had a significant impact on inflation in the long run [4]. Chen Xiaolin (2011) showed that there was no significant correlation between China’s foreign exchange reserves and inflation [5]. Zhang Jun, Yuan Tianang (2014) confirmed that the rapid growth of foreign exchange reserves had a significant impact on the inflation rate through quantitative analysis [6]. Shi Yanjun (2014) through the VAR model found that China's foreign exchange reserves and inflation, although there is a long-term co integration relationship [7].
2. Variable Selection

2.1 Variable selection

Based on monthly data from January 2005 to February 2015, this paper studies the relationship between China’s foreign exchange reserves and inflation, including the CPI, PPI, and GDP deflator. Therefore, in this paper, the exchange rate through the conversion between units, will be converted into RMB, the exchange rate of central bank website published on the average exchange rate of each month, said FR in the measurement. In order to eliminate the influence of heteroskedasticity, we take the logarithm of these variables, respectively, LNCPI, LM2, and LNFR.

2.2 Data analysis

2.2.1 Estimation and analysis of VAR model

In order to establish the VAR model effectively, we must first determine the reasonable lag order:

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1148.728</td>
<td>31.31467*</td>
<td>5.84E-13*</td>
<td>-19.56891*</td>
<td>-18.71760</td>
<td>-19.27693*</td>
</tr>
<tr>
<td>7</td>
<td>1166.100</td>
<td>7.718434</td>
<td>7.26E-13</td>
<td>-19.45327</td>
<td>-17.86029</td>
<td>-18.80685</td>
</tr>
</tbody>
</table>

Figure 1. Determination of the lag order of the VAR model.

From Figure 1, we can get the following regression equation:

\[
\begin{align*}
\begin{bmatrix}
\Delta LNCPI \\
\Delta LNM2 \\
\Delta LNFR
\end{bmatrix}_t &= \begin{bmatrix}
0.0046 \\
-0.002 \\
0.0101
\end{bmatrix} + \begin{bmatrix}
0.1966 & 0.1647 & 0.0969 \\
0.1252 & 0.0400 & -0.0411 \\
0.0161 & 0.0750 & 0.2449
\end{bmatrix} \begin{bmatrix}
\Delta LNCPI \\
\Delta LNM2 \\
\Delta LNFR
\end{bmatrix}_{t-1} + \\
\begin{bmatrix}
-0.047 & -0.1089 & -0.0236 \\
-0.1406 & 0.016 & 0.0610 \\
0.4096 & 0.0005 & 0.043
\end{bmatrix} \begin{bmatrix}
\Delta LNCPI \\
\Delta LNM2 \\
\Delta LNFR
\end{bmatrix}_{t-2} + \\
\begin{bmatrix}
-0.0428 & -0.098 & 0.0320 \\
-0.0745 & 0.3617 & -0.0581 \\
-0.1092 & 0.1049 & 0.2556
\end{bmatrix} \begin{bmatrix}
\Delta LNCPI \\
\Delta LNM2 \\
\Delta LNFR
\end{bmatrix}_{t-3} + \\
n\begin{bmatrix}
-0.0591 & -0.1997 & 0.0074 \\
0.1915 & -0.1819 & 0.0070 \\
-0.1882 & 0.2771 & 0.0509
\end{bmatrix} \begin{bmatrix}
\Delta LNCPI \\
\Delta LNM2 \\
\Delta LNFR
\end{bmatrix}_{t-4} + e
\end{align*}
\]

In order to ensure that the impulse response function and variance decomposition are valid, the VAR model established above must be tested for stationarity. It can be seen from Figure 2 that no root falls outside the unit circle, indicating that the VAR (4) established above satisfies the stationary requirement.
2.2.2 Variance decomposition

In order to get a more intuitive understanding of the impact of foreign exchange reserves and money supply on the CPI, this paper makes an overall variance decomposition of the data from January 2005 to February 2015. From the results of variance decomposition, we observe the relative importance of the impact of each variable. The output of the software is shown in Figure 3.

We can see from Figure 3, from the first period to the tenth period, the inertia of the consumer price index itself explains most of the variance, from the first to tenth shows a decreasing trend, but the amount is still , And the contribution rate of foreign exchange reserves stabilized around 7%. The influence of broad money gradually increased in the first five periods, and stabilized from the fifth period, accounting for about 20%.

2.3 Empirical conclusion

In this paper, Chinese from January 2005 to February 2015 the foreign exchange reserves, broad money supply monthly data and CPI analysis, the following conclusions are obtained: China reserves, money supply and consumer price index are non-stationary series, but the first-order difference stationary sequence, which can be used to develop VAR model. In the established VAR (4) model, the stability of the model is verified. From the variance decomposition table, we can see that the consumer price index is more than 70% of the variance of its own inertia, the impact of foreign exchange reserves accounted for about 7%, and the impact of the broad money supply accounted for about 20%.
3. Policy Suggestion

3.1 Transformation of economic development

From the above analysis we can see that the key to increase China foreign exchange reserves is double surplus of international payments, and the current account surplus is mainly derived from the goods and services trade surplus, so the need to change the export-oriented and foreign investment fundamentally driven economic development, reduce dependence on the international market. The focus shifted to stimulate domestic consumption. In addition, China exports mostly rely on the cheap raw materials and labor, in the increasingly fierce international competition today, China should change the current world factory appearance, and the focus is to promote the development of service industry and manufacturing industry funds, promote the optimization and upgrading of industrial structure, and actively encourage domestic enterprises to “go out” to expand foreign direct investment, which can transfer the domestic relatively backward production technology, and develop the overseas market.

3.2 Rational use of existing foreign exchange reserves

In recent years, most of the research results from domestic and foreign scholars in the study of the appropriateness of China’s foreign exchange reserves show that China’s foreign exchange reserves are too much. In order to ease the pressure of foreign exchange reserves on domestic inflation, the scale of foreign exchange reserves should be controlled within a reasonable range. First, it is necessary to increase the gold reserves. At present, China’s gold reserves are relatively low, so China can appropriately increase the gold reserves, and improve the advantages of international reserves. The two is to focus on foreign equity investment, the foreign exchange reserves of China's foreign exchange fund established in 2009, but its investment is not large, we can consider the appropriate increase in its size. Finally, the foreign exchange reserve can be used for non-financial assets investment, including public infrastructure, strategic materials, advanced technology and rare metals.

3.3 Deepen the reform of the foreign exchange system

As mentioned above, the implementation of the mandatory exchange settlement system is an important reason for the growth of foreign exchange reserves in China, which makes the foreign exchange market not fully liberalized. With the development of economy, the increase of China’s import and export trade, the central bank should gradually cancel the foreign exchange settlement system. The proposal of this paper is from the mandatory exchange settlement system to change the proportion of foreign exchange system, so as not cause significant changes in the foreign exchange market, and can give full play to the enthusiasm of the import and export enterprises. From the mandatory exchange settlement into a voluntary settlement system can be part of the foreign exchange reserve in the hands of residents, so the private foreign exchange act as a reservoir effect, so in the foreign exchange market, the central bank will not need to buy a large number of foreign exchange, so foreign exchange will be reduced, while the base currency is not passive. At the same time to establish a flexible exchange rate mechanism to gradually relax the floating range of exchange rates. When the foreign exchange market oversupply, the currency will usually face the pressure of appreciation, if a country adopt floating exchange rate system, exchange rate appreciation can make the balance between supply and demand, if a country takes the national exchange rate system, they have to buy foreign currency in the foreign exchange market, the currency value throws ease the pressure, the exchange rate remained unchanged. But at the same time, foreign exchange reserves will increase, from floating exchange rate perspective, China should establish a reasonable exchange rate floating range.

Conclusion

With the acceleration of economic globalization and the continuous improvement of China’s opening to the outside world, China’s foreign exchange reserves also showed a growing trend, but
the high foreign exchange reserves also brought instability to China’s economic development. The amount of sustained growth makes the price level rising, whether the foreign exchange reserves caused by the price level of pressure is the main content of this paper. It is proved that the foreign exchange reserve is the Granger cause of inflation, and explains the variance of inflation about 7%. The reasonable and effective use of foreign exchange reserves can better promote the development of the domestic economy.

References


