Analysis on the Impact of RMB Exchange Rate Fluctuation on China's Inflation

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Abstract: With the acceleration of the socialization process, the relationship between countries is getting closer and closer. A large amount of international capital begins to flow into China, and the fluctuation of RMB exchange rate and the fluctuation of inflation become more frequent. This paper makes an empirical analysis of the impact of RMB exchange rate fluctuations on China's inflation. The results show that the exchange rate fluctuation has a negative correlation with China's inflation, but the degree of impact is small and there is a time lag, and the exchange rate fluctuation has an incomplete transmission to China's inflation. China should continue to promote the process of exchange rate marketization, continuously improve the exchange rate formation mechanism, and effectively control inflation in combination with other relevant policies such as fiscal policies.

1. Introduction

With the accelerating pace of economic globalization, the world is increasingly connected as a whole, and the exchanges between various countries are increasingly frequent. Since 1978, our country reform and opening-up, China's economic development is very rapid, trade are increasingly frequent, a large number of international capital inflow, the China's balance of payments data shows that the current account and the nature reserve of financial accounts, double surplus reserve assets has increased dramatically in our country, China's RMB exchange rate fluctuations and changes of domestic inflation also increasingly frequent.

Throughout the world, before the mid-1960s, the price level of all countries in the world was relatively stable; Since the mid-1960s, inflation has become a regular and worldwide phenomenon. In the history of our country, there have been four times of relatively serious inflation, and the excessively high inflation will harm the development of our country's economy and society, and have a relatively serious impact on output, employment and other aspects. Especially in recent years, with the rapid development of China's economy, inflation has become more and more serious, which has caused a certain impact on the development of China's macro economy, and some thorny livelihood issues have emerged.

The exchange rate measures the external value of our currency, while the inflation rate measures the internal value of our currency. Both of these two indicators can well measure the level of China's economic development, reflect the trend of economic development, but at the same time, in turn, will also have a certain impact on it. Therefore, this paper hopes to find out the impact of exchange rate fluctuations on China's inflation rate by analyzing the two indicators of exchange rate and inflation rate, so as to provide relevant basis for China's formulation of monetary and fiscal policies.

2. Mechanism analysis of the impact of RMB exchange rate fluctuation on China's inflation

2.1 The micro impact of RMB exchange rate fluctuations on China's inflation

(1) Direct influence on channels

The fluctuation of RMB exchange rate has an impact on China's inflation, and its direct impact is mainly through the influence of the price changes of imported goods to have an impact on inflation, which can be further divided into two types.

One is that the change of import price has a direct impact on China's price index. Take the rise of the RMB exchange rate as an example. When the exchange rate rises, the RMB depreciates, which is beneficial to exports and unfavorable to imports. The quantity of imported goods decreases, and the price of imported goods will rise, which further leads to the rise of the domestic price level and makes the domestic inflation more fierce.

The other is through the price changes of imported raw materials and intermediate products have an impact on China's inflation. Take the rise of the RMB exchange rate as an example. When the exchange rate rises, the RMB depreciates, which is conducive to exports and detrimental to imports. The quantity of imported raw materials and intermediate products declines and the price rises, and the price of final products produced rises.

(2) Indirect influence channels

The change of RMB exchange rate not only has an impact on China's inflation through the change of import product prices, but also has an indirect impact on China's inflation through other ways.

Substitute price: The change of the RMB exchange rate indirectly affects the degree of inflation in China through the change of the price of import substitutes. Take the rise of the RMB exchange rate as an example. When the exchange rate rises, the RMB depreciates. This leads to a decrease in imports, so people's original focus on the demand for imported goods will turn to the domestic market with the decrease in the quantity of imported goods, and seek for import substitutes. As a result, the demand for substitutes will increase and the price of substitutes will rise accordingly, and the domestic price level will rise, thus exacerbating the domestic inflation.

Money supply: The change of RMB exchange rate can have a certain impact on China's inflation through the change of the money supply, but there are two opposite effects of the exchange rate change on the money supply, so that it has two different impacts on China's inflation.

2.2 The macro impact of RMB exchange rate fluctuations on China's inflation

(1) Current project path

The change of RMB exchange rate has an impact on China's inflation through current account. The RMB exchange rate down, for example, is the appreciation of the renminbi exchange rate drops, exports to reduce imports to increase, the current account deficit, foreign exchange supply less than demand, foreign currency appreciation, in order to maintain the stability of the RMB exchange rate, the central bank to buy yuan sell foreign currency, the monetary supply will decline, at this time can alleviate the pressure of inflation.

(2) Capital and financial project paths

Changes in the RMB exchange rate will also affect inflation by affecting capital and financial accounts. In the RMB exchange rate down, for example, when exchange rate drops, the appreciation of the renminbi, investors will continue to the expected appreciation of formation, so as to attract foreign investment to make a lot of capital inflow, and further increase the investment in the domestic assets, making asset prices rise, people's wealth increases, so consumers will increase consumer spending, exacerbate inflationary pressure.

3. Empirical analysis

3.1 Data selection and description

Before the empirical analysis of the impact of exchange rate fluctuations on China's inflation, the index data used are described as follows:1. Exchange rate indicator, expressed by NEER, the nominal effective exchange rate of RMB. This paper studies the relationship between the exchange rate and inflation. The real effective exchange rate is expressed by the nominal effective exchange rate of RMB, which excludes the inflation factor. 2.The inflation index is expressed by the consumer price index (CPI). 3.Money supply M2. M2 is the money supply index that is most closely related to inflation. 4. Import price index IPI. The change of exchange rate has a greater impact on the price of imported goods than on the impact of imports and exports. Therefore, the import price index is used as an explanatory variable in this paper.

In addition, 161 monthly data from July 2005 to November 2018 were selected for the indicators in this paper. This paper USES eviews6.0 to analyze and process the data.

3.2 Descriptive statistics

In order to eliminate heteroscedasticity and prevent pseudo-regression, the logarithms of four groups of variables were taken to make the data more stable, which were denoted as LNNEER, LNCPI, LNICI and LNM2. The descriptive statistical values of these four indicators are shown in table 1:

Table 1. Descriptive statistics of variables

	LNNEER	LNCPI	LNICI	LNM2
mean	4.660915	4.631161	4.624762	13.59493
median	4.663533	4.62791	4.623992	13.69853
maximum	4.847724	4.688592	4.809742	14.41059
minimum	4.468434	4.587006	4.377014	12.53165
standard deviation	0.114813	0.01926	0.098348	0.574124
Divergence from	-0.116535	0.68775	-0.388215	-0.29955
kurtosis	1.735936	3.94951	2.685303	1.788057
Jacques-bella values	11.08338	18.74021	4.708425	12.261
probability	0.00392	0.000085	0.094968	0.002175
observations	161	161	161	161

Table 1 shows the descriptive statistical results among the four variables. It can be seen that the standard deviation of LNCPI is small, indicating that the volatility of inflation rate is small, while the volatility of exchange rate and m2, the broad monetary quantity, is large.

3.3 Unit root test

Since the data selected in this paper belongs to the time series data, the stationariness of the data should be tested before the model is established to avoid false regression or false regression. Therefore, we first conducted ADF unit root test on the selected data. Then observe whether the corresponding p value of unit root test is less than a significance level. If it is less than, it indicates that the data is stable; if it is greater than, it indicates that the time series data is not stable.

Table 2. ADF test list

variable	Check type (C,T,K)	ADF statistics	1% critical value	5% critical value	10%critical value	p values	conclusion
LNNEER	(C,T,1)	-2.530099	-4.016806	-3.438334	-3.143451	0.3134	Not smooth
LNCPI	(C,0,0)	-2.015205	-3.471454	-2.879494	-2.576422	0.2802	Not smooth
LNM2	(C,T,0)	0.205902	-4.016433	-3.438154	-3.143345	0.9979	Not smooth
LNICI	(C,0,1)	-2.497681	-3.471719	-2.87961	-2.576484	0.1179	Not smooth
D(LNNEER)	(C,T,1)	-7.812112	-4.017185	-3.438515	-3.143558	0.0000	smooth
D(LNCPI)	(C,0,0)	-13.14685	-3.471719	-2.87961	-2.576484	0.0000	smooth
D(LNM2)	(C,T,0)	-13.52943	-4.016806	-3.438334	-3.143451	0.0000	smooth
D(LNICI)	(C,0,1)	-6.935785	-3.471987	-2.879727	-2.576546	0.0000	smooth

According to the test results in table 2, we can find that at the confidence level of 5%, the unit root test of the original data LNNEER, LNCPI, LNM2 and LNICI failed, indicating that the data is

not stable. Therefore, we carried out first-order difference on the four data, and continued the unit root test on the data after the difference. At this time, the data results showed that all of them had passed the test, and the first-order difference sequences of all variables rejected the null hypothesis at the significance level of 5%. Therefore, the first-order difference sequences of all variables were stable.

3.4 Co-integration test

It has been explained above that LNNEER, LNCPI, LNM2 and LNICI are of the same order of integration, so next we need to test whether there is a long-term equilibrium relationship between the four, that is, whether the four are co-integrated. In this paper, the Johansen co-integration test is adopted. Before the variable is tested, the optimal lag order is determined. Therefore, this paper first establishes a model according to various variables to determine the optimal lag order. According to the judgment criterion, we can determine that the second order of hysteresis is the optimal order, because it has passed three tests and is the most.

Table 3. Hysteresis order table

Lag	LogL	LR	FPE	AIC	SC	HQ
0	762.2323	NA	4.47E-10	-10.17761	-10.09697	-10.14485
1	1813.18	2031.363	4.14E-16	-24.06954	-23.66632*	-23.90572*
2	1834.491	40.04751*	3.86e-16*	-24.14082*	-23.41504	-23.84595
3	1847.808	45.30929	4.00E-16	-24.1048	-23.05645	-23.67887
4	1864.702	50.93256	3.96E-16	-24.1168	-22.74587	-23.55981

After determining the hysteresis second order as the optimal hysteresis order, we will conduct Johansen test on the basis of hysteresis second order, observe the test results, and see the co-integration relationship among variables. The results are shown in table 4:

Table 4. Results of co-integration test

null hypothesis	eigenvalue	trace statistic	5% confidence level	conclusion
None	0.180845	63.67582	47.21	refuse
At most 1	0.105897	31.9581	29.68	refuse
At most 2	0.048144	14.16055	15.41	Not refuse
At most 3	0.03894	6.315252	3.76	refuse

Table 4 shows that at the significance level of 5%, there are at least two co-integration relations among the four variables. The co-integration vector: $\beta^T = (1.0000, 0.516975, 0.831239, -0.064219)$

then the co-integration equation is: $LNCPI = 0.516975LNICI + 0.831239LNM2 - 0.064219LNNEER$

It can be seen from the above equation that the coefficient of LNM2 is positive, indicating that there is a positive correlation between M2 and CPI. The increase of liquidity will increase the inflation rate. The coefficient of LNICI is positive, indicating that imports are positively correlated with inflation, which is also the manifestation of imported inflation. The coefficient of LNNEER is negative, but its impact is small, which just reflects the current situation of China. The reason is that the inflow of international funds leads to the overissuance of currency and the existence of expectation factors, which makes the indirect impact of exchange rate on inflation greater than the direct impact, which leads to the phenomenon of currency appreciation and devaluation in China.

3.5 Granger causality test

The co-integration test results only prove the long-term equilibrium relationship between CPI, import, M2 and RMB exchange rate, but whether this equilibrium relationship constitutes a causal relationship still needs further verification. In this paper, according to AIC and SC criteria, the lag period is selected as 2, and the variables are subject to granger causality test. The test results obtained by Eviews are shown in table 5:

Table 5. Granger causality test of exchange rate and inflation

variable	The null hypothesis	lag	Sample number	F value	P value
LNNEER	LNNEER is not the granger cause of LNCPI	2	159	2.78509	0.0362
LNCPI	LNCPI is not the granger reason for LNNEER	2	159	2.40426	0.1017
LNICI	LNICI is not the granger cause of LNCPI	2	159	5.25995	0.0062
LNCPI	LNCPI is not the granger cause of LNICI	2	159	3.62427	0.029
LNM2	LNM2 is not the granger reason for LNCPI	2	159	0.28764	0.0457
LNCPI	LNCPI is not the granger cause of LNM2	2	159	1.59563	0.2061
LNNEER	LNNEER is not the granger cause of LNICI	2	159	4.97057	0.0081
LNICI	LNICI is not the granger cause of LNNEER	2	159	3.00405	0.0525
LNNEER	LNNEER is not the granger cause of LNM2	2	159	3.1215	0.0469
LNM2	LNM2 is not the granger reason for LNNEER	2	159	3.05574	0.05

According to the test results in table 5, there is a two-way causal relationship between import and CPI during the lag period 2. M2 is the cause of CPI, and CPI is not the grange cause of M2; The exchange rate is a one-way granger cause of inflation because its p value is less than this significance level. China's exchange rate has shown a trend of continuous decline, which indicates that the appreciation of RMB has attracted the inflow of international funds, which will force the central bank to issue excess currency and generate inflation.

4. Conclusions and Suggestions

4.1 Conclusions

In this paper, through studying the impact of exchange rate changes on China's inflation, makes an empirical analysis based on time series data, sorting can draw the following conclusions: 1. the measurement inspection result shows that RMB nominal effective exchange rate NEER negative correlation with the consumer price index (CPI, NEER can rise, led to a decline in the CPI, NEER falling CPI rise. This shows that exchange rate fluctuations have an impact on China's inflation, and the impact is often in the opposite direction. 2. At the same time, it is noted that the impact of exchange rate changes on China's inflation is relatively small. The coefficient of -0.064219 indicates that when the nominal effective exchange rate of RMB changes by one unit, the cpi changes by only 0.064219 units. This shows the incompleteness of the exchange rate fluctuations in China's inflation transmission, the effect of RMB exchange rate fluctuations is not fully transmitted and reflected in the changes in China's inflation rate, and this effect is often weakened by the impact of other aspects on the way of transmission. 3. This incomplete pass-through effect also indicates that the RMB exchange rate change can cause the change of import price index, money supply M2 and other indicators, and thus have an impact on inflation. 4. In addition, there is an obvious lag effect on the impact of exchange rate fluctuations on inflation. In the case of lag period 2, granger causality test is passed. This shows that the impact of RMB exchange rate change on China's inflation is not immediately manifested, and the pass-through effect of the exchange rate often has a time lag, and the change of the RMB exchange rate will play an obvious role in China's inflation only when there is a lag of 2 periods.Based on the above analysis, this paper puts forward the following Suggestions: improve the formation mechanism of RMB exchange rate and promote the process of exchange rate marketization. A variety of policies are jointly adopted to cope with China's inflation. In addition to adjusting China's inflation rate through relevant exchange rate policies, certain fiscal policies and monetary policies can also be adopted for adjustment. When dealing with inflation, we can adopt a more flexible exchange rate policy without worrying about the impact of the pass-through effect in the short term.

4.2 Suggestions

Based on the above analysis, this paper puts forward the following Suggestions: 1. Improve the formation mechanism of RMB exchange rate and promote the process of exchange rate marketization. Exchange rate fluctuations have an impact on China's inflation, so China should further improve the exchange rate formation mechanism, so that it can better reflect the supply and demand of the foreign exchange market. In 2017, a "counter-cyclical factor" was introduced into the quotation mechanism of the central parity rate of the RMB exchange rate, all of which were designed to better reflect the market's supply and demand. Exchange rate liberalization is also a very important measure to realize the internationalization of RMB. It can well adjust the structure of China's import and export trade, improve the business model of trading enterprises, and make China's exchange rate mechanism more transparent and flexible. Of course, in the process of exchange rate liberalization, the relevant departments should also pay attention to prevent risks. Exchange rate system reform is an important measure, to further strengthen the supervision in the process of driving, because the market means that the exchange rate is more likely to change with the change of the market both at home and abroad, so in order to effectively prevent the spread of the risk, reduce the loss on currency fluctuations, to strengthen the financial supervision and keep the stability of financial markets. 2. A variety of policies have been adopted in combination to deal with inflation in our country. The empirical analysis of this paper shows that the impact of exchange rate fluctuations on China's inflation is relatively small, so in addition to adopting relevant exchange rate policies to control China's inflation rate, we can also adopt certain fiscal policies and monetary policies to adjust. As mentioned above, the actual inflation is a monetary phenomenon, so in order to prevent vicious inflation, our country should according to the actual situation of the market to provide a moderate amount of money supply, to avoid excess issue caused by the domestic market the general level of prices generally rise continuously, cause certain influence to people's life level, and further harm to the healthy development of our country's economy. 3. Be more flexible in using exchange rate policy. According to the above conclusion exchange rate changes on China's inflation rate of transfer is not completely, there are other aspects in to weaken the effect of factors, and the influence degree and there is a certain lag, so when dealing with the inflation can adopt a more flexible exchange rate policy, rather than in the short term concerns the effects of the transfer effect. Flexible use of exchange rate policy can also further reduce risks and maintain the stability of financial markets.

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