Analysis of the Influence of RMB Exchange Rate Changes on China's Foreign Direct Investment

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Abstract

With the promotion of "going out" and "One Belt and One Road" strategy, the Outward Foreign Direct Investment of China develops rapidly. The exchange rate of RMB also presents an intermittent upward trend after the "two exchange rate reforms". This paper selects the annual data from 1994 to 2018 and establishes a model to empirically analyze the relationship between the changes of RMB exchange rate and the Outward Foreign Direct Investment of China. The results show that in the long term, the real effective exchange rate of RMB has a significant effect on China's OFDI, and the appreciation of RMB is conducive to the development of China's OFDI. However, China's OFDI has no significant impact on the real effective exchange rate of RMB. Finally, based on the empirical results, the author puts forward some policy suggestions on RMB exchange rate.

Keywords

Changes of Exchange Rate; The Real Effective Exchange Rate of RMB; The Outward Foreign Direct Investment.

1. Introduction

With the full implementation of the "going out" strategy, higher requirements have been placed on my country's foreign direct investment, which has also driven the rapid development of my country's foreign direct investment. In 2013, Chairman Xi proposed the "One Belt, One Road" strategic idea, which further promoted the substantial increase of my country's foreign direct investment. During the implementation of the "One Belt, One Road" strategy, with the acceleration of the internationalization of the RMB, the environment for my country's foreign direct investment has undergone major changes. In recent years, the exchange rate of RMB has also undergone relatively drastic changes. A common perception is that the appreciation of the renminbi will increase China's foreign direct investment, because domestic investors can exchange less renminbi for greater profits, while the foreign direct investment that China attracts will decrease due to the appreciation of the renminbi. . But is this the case? Under my country's two exchange rate reforms in 1994 and 2005, along with the "going out" strategy and the "One Belt, One Road" strategy's favorable policies for international trade, will fluctuations in the RMB exchange rate significantly affect China's foreign direct investment? Whether direct investment will significantly affect the fluctuation of the RMB exchange rate is a question that will be empirically analyzed in this paper.

The academic community generally believes that the location selection determinants of a country's OFDI include economic, geographic, cultural, and political factors. The main force of China's OFDI is state-owned enterprises, whose strategic focus is to acquire scarce natural resources such as minerals and oil. Two-tier motivation and government support will relatively weaken the impact of economic, geographical, and cultural factors on China's OFDI. However, as the proportion of SOEs in China's OFDI stock has dropped significantly, the impact of political

factors on China's OFDI is weakening. In terms of geographic factors, geographic distance can affect transportation costs. The impact of economic factors on OFDI should be very far-reaching, including the exchange rate and the level of economic development of the host country (expressed in GDP) as well as the level of China's economic development.

2. Literature Review

Foreign research on exchange rate and foreign direct investment originated from the capitalization theory proposed by Aliber in the last century. Aliber argues that FDI generally flows from countries with strong exchange rates to countries with weaker currencies. Goldberg & Kolstad (1994) empirically analyzed the two-way flow between the United States and the United Kingdom, Canada, and Japan, and selected the data as quarterly data. The devaluation of the home country's currency will lead to a decrease in the outflow of foreign direct investment. Exchange rate fluctuations are positively correlated with FDI. The real exchange rate Fluctuations in the U.S. increased OFDI to Canada and Japan, as well as to the U.S. from the United Kingdom and Canada. Goldberg & Klein (1997) empirically analyzed that the exchange rate of the US dollar has a positive effect on the foreign direct investment of the United States in Latin America, and the exchange rate of the yen also has a positive effect on the foreign direct investment of Japan to Southeast Asian countries.

After China's exchange rate reform in 1994, domestic scholars paid more attention to exchange rate. Wang Fengli (2008) used cointegration test and error correction model to test the impact of exchange rate and exchange rate volatility on China's foreign direct investment from two different perspectives, short-term and long-term. The change of exchange rate has a positive impact on China's foreign direct investment, while the impact of exchange rate volatility on China's foreign direct investment is not significant. Luo Hao (2013) empirically analyzed the impact of China's exchange rate reform on China's foreign investment, and the RMB exchange rate is the one-way Granger reason for China's foreign direct investment. Wang Dandan and Fu Daishan (2018) introduced the mechanism of foreign direct investment by exchange rate and empirically demonstrated through VAR model that foreign capital inflow will promote the rise of my country's exchange rate, but the change of exchange rate has no significant impact on foreign investment. Through panel data research, Li Xiaomeng et al. found that the increase of foreign direct investment will reduce the exchange rate fluctuation of China, Malaysia, India and South Korea in descriptive statistics.

Looking at the previous related research, we can see that most of the theories are researched on developed countries. There are few literatures focusing on the impact of exchange rate levels on my country's foreign direct investment, and most of them are qualitative research, while quantitative related research is relatively small. rare. The research significance of this paper is also that my country's national conditions are different from those of developed countries. Therefore, it is impossible to simply draw the impact of China's exchange rate on foreign direct investment by applying the models and research conclusions that predecessors used in developed countries. We need to make a corresponding analysis based on the special national conditions of our country. In particular, my country has also undergone reform and opening up, two exchange rate reforms, and the "One Belt, One Road" strategy that is currently being implemented, which will have a certain degree of impact on my country's economic situation and exchange rate. Therefore, the results of the empirical analysis are also unknown.

Based on previous studies by scholars and the inferences of the authors of this paper, two hypotheses can be put forward:

Hypothesis (1): Whether from a long-term or short-term perspective, changes in the exchange rate have a positive impact on China's foreign direct investment.

Hypothesis (2): China's GDP has no significant impact on China's foreign direct investment, but the host country's GDP will promote China's foreign direct investment in the host country.

3. Descriptive Statistics

3.1. Historical Development of RMB Exchange Rate

In 1994 and 2005, the renminbi underwent two exchange rate reforms, after which the exchange rate reforms had a greater impact on the exchange rate of the renminbi. Luo Hao (2013) empirically analyzed the impact of the two exchange rate reforms on the exchange rate by introducing dummy variables. With a negative correlation, the exchange rate reform in 2005 led to a positive correlation between the exchange rate and. Since 1994, the RMB has been showing a trend of appreciation. On July 21, 2005, the exchange rate was 1 US dollar to 8.2765 yuan. Since then, the renminbi has appreciated all the way. In May 2006, it broke the 8 yuan mark and appreciated to 1 US dollar to 7.96724 yuan; in 2008, it broke the 7 yuan mark and appreciated to 1 US dollar exchanged to 6.9576 yuan; until January 5, 2014, the appreciation reached the highest point of 1 US dollar exchanged to 6.1005 yuan. Since then, the renminbi began to depreciate and depreciated to 1 US dollar exchanged for 6.9489 yuan on December 21, 2016. Then, the RMB entered the appreciation channel again, from the exchange rate of 1 US dollar to RMB 6.9489 on December 21, 2016, to the exchange rate of 1 US dollar to RMB 6.2764 on April 2, 2018. Later, the renminbi depreciated to 6.9671 yuan per US dollar on November 1, 2018.

3.2. The Historical Development of My Country's Foreign Direct Investment Scale

In the first 20 years after the reform and opening, my country strictly restricted the foreign direct investment of residents. Therefore, from 1983 to 2004, the scale of China's foreign direct investment was only between US$100 million and US$6.9 billion. Since 2005, encouraged by the state's policy of encouraging enterprises to "go global", especially driven by the "One Belt, One Road" construction, the scale of China's foreign direct investment has increased rapidly, from 13.7 billion US dollars in 2005 to 2016. 216.4 billion US dollars, although the scale of China's foreign direct investment in 2017 and 2018 has decreased, it remains at about 100 billion US dollars.

3.3. The Relationship between RMB Exchange Rate and the Scale of My Country's Foreign Direct Investment

Judging from the data, the development trends of the RMB exchange rate and the scale of China's foreign direct investment basically show two directions. The appreciation of the renminbi has given Chinese companies a cost advantage in outbound investment activities, thereby increasing their profits. In addition, the state has provided enterprises with a relatively relaxed environment and policy support in terms of foreign direct investment, which has also attracted many enterprises to devote themselves to foreign investment activities. All the above show that there is a certain correlation between changes in the exchange rate level and my country's foreign direct investment. Theoretically, if a country's GDP is growing, then the country's economic situation will be better, which may promote foreign direct investment.

4. Model Building

4.1. Data Source and Processing

Since China adopted exchange rate reforms in 1994 and 2005 respectively, the renminbi remained relatively stable for more than a decade after the exchange rate reform in 1994. After the subprime mortgage crisis in 2008, the RMB exchange rate fluctuated significantly. In recent

years, Sino-US trade relations have become increasingly tense. With the continuous reduction of interest rates by the United States, the RMB has depreciated to a certain extent, breaking the 1:7 mark in 2018. Therefore, this paper selects the relevant data from 1994 to 2018 to conduct an empirical analysis on the relationship between China's exchange rate changes and foreign direct investment.

Based on the relevant data of my country from 1994 to 2018, a vector autoregressive model (VAR) including the RMB real effective exchange rate (REER), gross domestic product (GDP) and foreign direct investment (OFID) was established to analyze the relationship between changes in the real effective exchange rate of the RMB and the foreign direct investment (OFID). The dynamics of foreign direct investment.

To maintain the stationarity of the data, logarithmic processing was adopted for the variables. Build the model as follows:

$$lnOFDI=a+b*lnREER+c*lnGDP+\mu$$

The data on China's foreign direct investment comes from the United Nations Conference on Trade and Development (UNCTAD), and the unit is US$ million.

The REER data of the RMB real effective exchange rate comes from the monthly data released by the Bank for International Settlements (BIS), and the weighted average is used to calculate the annual average value of the RMB real effective exchange rate from 1994 to 2018 (see Table 1). The real effective exchange rate of RMB, REER, is the weighted average of the bilateral nominal exchange rates between the RMB and the currencies of trading countries, which can more truly reflect the external value and relative purchasing power of the RMB.

GDP data comes from the International Monetary Fund IMF, in millions of dollars. The measurement software used in the empirical analysis of this paper is STATA14.

Table 1. Annual average of RMB real effective exchange rate from 1994 to 2018

Year 2 / 5,000Translation results	*REER*	Year	*REER*
1994	69.41417	2007	88.81167
1995	77.38417	2008	96.43417
1996	85.59167	2009	100.8267
1997	92.20417	2010	99.99917
1998	97.63667	2011	102.5792
1999	92.795	2012	108.7133
2000	93.20667	2013	115.72
2001	97.47	2014	118.445
2002	94.97083	2015	129.485
2003	88.22	2016	124.6433
2004	85.51667	2017	120.9875
2005	84.6225	2018	122.5517
2006	85.76083		

As shown in the figure below, it is a trend graph between lnGDP, lnOFDI and lnREER from 1994 to 2018. Both OFDI and GDP have a clear upward trend over time, while the change of REER

over time is not very obvious. The graph also reflects from the side that the real effective exchange rate of RMB REER and GDP may have an impact on OFDI of foreign direct investment.
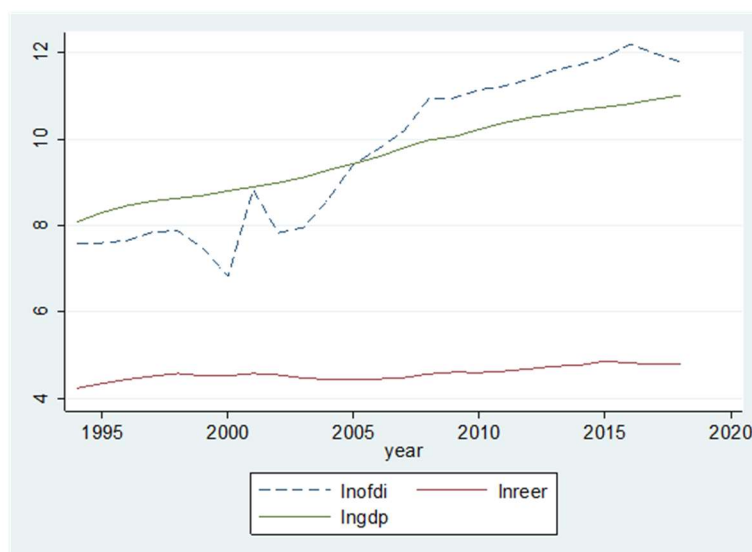

Figure 1. Trend chart of the impact of RMB real effective exchange rate and gdp on OFDI

5. Empirical Analysis

5.1. Stationarity Test

When analyzing time series data, the condition for establishing error correction model is that there is a cointegration relationship between variables. Therefore, cointegration analysis and unit root test are firstly performed on the variables. In this paper, the ADF unit root method is used to test the unit root test and the results are as follows:

Table 2. ADF Inspection

sequence	(c, t, p)	ADF value	5% threshold	conclusion
Ln REER	(0,0,0)	-1.705	-3.240	Not obvious
D ln REER	(0,0,1)	-3.053	-3.600	obvious
Ln GDP	(0,0,0)	-0.758	-3.240	Not obvious
D ln GDP	(0,0,1)	-2.831	-3.600	obvious
Ln OFDI	(0,0,0)	-2.629	-3.240	Not obvious
D ln OPDI	(0,0,1)	-6.398	-3.600	obvious

The test results show that all test values of the original series are greater than the critical value, indicating that the original series are non-stationary; after the first-order difference, the test values of the variables are all less than the critical value, indicating that the first-order difference becomes a stationary sequence, that is, all The variables are all non-stationary first-order single-integration processes, which meet the requirements of co-integration tests, so we use this sequence for long-term co-integration tests.

5.2. Johansen Cointegration Test

5.2.1. Firstly, the Lag Order of the Model is Determined by AIC and BIC Criteria.

Table 3. AIC, BIC

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Selection-order criteria
Sample:  1998 - 2018                            Number of obs      =        21

 lag     LL        LR      df     p      FPE       AIC       HQIC       SBIC

  0    -13.1787                        .000937   1.54083    1.57321    1.69005
  1    81.6342   189.63    9   0.000   2.7e-07  -6.63183   -6.50229   -6.03496*
  2    94.4309   25.593    9   0.002   2.0e-07* -6.99342   -6.76673   -5.94889
  3    104.761   20.659    9   0.014   2.1e-07  -7.12005*  -6.79621*  -5.62788
  4    113.374   17.227*   9   0.045   3.2e-07  -7.08326   -6.66227   -5.14343

Endogenous:  lnofdi lnreer lngdp
 Exogenous:  _cons
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According to the AIC criterion, the lag order is the third order, and according to the BIC criterion, the lag order is the second order. To ensure the robustness of the model, the third order lag is selected conservatively.

5.2.2. The Cointegration Rank Test was Carried Out, and the Test Results are Shown in the Following Table:

Table 4. Cointegration rank test results

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                Johansen tests for cointegration
Trend: trend                                     Number of obs =       22
Sample:  1997 - 2018                             Lags =                 3

                                                    5%
maximum                              trace      critical
  rank    parms       LL     eigenvalue  statistic    value
   0       24    87.210568        .        57.9887    34.55
   1       29    105.97296    0.81835      20.4639    18.17
   2       32    113.93208    0.51498       4.5457     3.74
   3       33    116.20493    0.18667

                                                    5%
maximum                               max      critical
  rank    parms       LL     eigenvalue  statistic    value
   0       24    87.210568        .        37.5248    23.78
   1       29    105.97296    0.81835      15.9182    16.87
   2       32    113.93208    0.51498       4.5457     3.74
   3       33    116.20493    0.18667
```

It can be seen from the above table that the cointegration rank is 1, then rank=1.

5.2.3. Based on the above Information, Use STATA to Build an Error Correction Model.

Table 5. Error correction model

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         Johansen normalization restriction imposed

    beta  |   Coef.    Std. Err.     z     P>|z|    [95% Conf. Interval]

_ce1      |                                .
  lnofdi  |       1        .          .      .            .          .
  lnreer  |  19.15933   3.399754    5.64   0.000     12.49593   25.82272
   lngdp  | -4.380333    .41433   -10.57   0.000     -5.192405  -3.568261
   _cons  | -58.65168       .        .      .            .          .
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As shown in the figure, the p-values are all 0.000, which is significant. In the above analysis, we can see that there is a long-term stable equilibrium relationship between China's foreign direct

investment, exchange rate and GDP. On the basis of the test, we have established a long-term cointegration relationship. The cointegration equation is:

$$Lnofdi=-58.65168-19.15933lnreer+4.380333lngdp$$

The follow-up test for the existence of autocorrelation in this VECM model obtained a P value > 0.05, so the hypothesis of no autocorrelation was accepted. And in addition to the unit root assumed by the VECM model itself, all the characteristic roots of the adjoint matrix fall within the unit circle, so it is a stable system.

5.3. Granger Causality Test

Through the cointegration equation, it can be seen that there is a negative correlation between the RMB exchange rate and OFDI, because the decline in the real effective exchange rate (REER) represents an increase in the RMB exchange rate. Therefore, the appreciation of the RMB exchange rate will promote the growth of foreign direct investment; while GDP and foreign direct investment are positively correlated, that is, the increase of GDP will promote the growth of foreign direct investment.

However, the cointegration test can only show whether there is a long-term equilibrium relationship between foreign exchange rates and foreign direct investment, but it cannot explain the causal relationship between these variables. Therefore, we need to carry out the Granger causality test on the basis of the cointegration test. The Granger causality test is a test for judging causality. The Granger causality test solves the problem of whether x causes y. It mainly depends on how much the current y can be explained by the past x, and whether the added lag value x increases the degree of explanation. You can say "y is caused by x Granger" if x helps in the prediction of y, or if the correlation coefficient between x and y is statistically significant.

Table 6. Granger causality test

Original Hypothesis	F Statistic	P Value	Conclusion
Ln REER is not a Granger reason for Ln OFDI	5.695	0.009	reject the null hypothesis
Ln OFDI is not a Granger reason for Ln REER	1.961	0.147	accept the null hypothesis
Ln GDP is not a Granger reason for Ln OFDI	1.895	0.089	reject the null hypothesis
In OFDI is not a Granger reason for Ln GDP	2.646	0.079	accept the null hypothesis

Under the 5% confidence level, the real effective exchange rate of RMB is the Granger cause of China's OFDI, and the GDP is not the Granger cause of China's OFDI; and China's OFDI is not the GDP and the real effective exchange rate of the RMB. Granger reasons for exchange rates. There is no obvious Granger causality between China's GDP and OFDI, while the real effective exchange rate of RMB has a one-way guiding relationship with OFDI. This shows that GDP has no significant impact on OFDI, while the real effective exchange rate of RMB (REER) has a significant impact on OFDI.

5.4. Impulse Response Function Analysis

Using impulse response function analysis, given the shock of 1 unit standard deviation of the variable, and observing the performance of ln OFDI in different periods, it can be concluded that the impact of 1 unit shock on ln OFDI in different periods. Impulse response function is used to analyze the impact of GDP and RMB real effective exchange rate changes on OFDI. The analysis results are shown in Figure 2 and Figure 3, respectively.
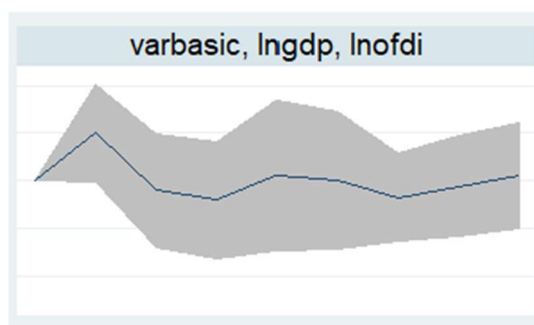
Figure 2. Impulse Response Function Analysis Plot
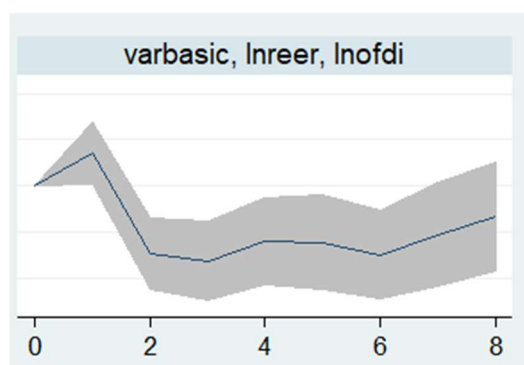

Figure 3. Impulse Response Function Analysis Plot

As can be seen from Figure 3, the impact of the real effective exchange rate of RMB on OFDI starts from the first period. After a shock to the real effective exchange rate of RMB in this period, it is a positive response to OFDI in the current period, and then has been a negative response, that is, the real effective exchange rate of RMB Changes in the effective exchange rate have a long-term negative effect on OFDI, and with the passage of time, the effect becomes larger and larger, and then gradually stabilizes. The impact of GDP on OFDI was a positive response in the first period, and then gradually stabilized. 5.5 Variance Decomposition.

Table 7. Variance decomposition results

Forecast Period	Ln OFDI	Ln REER	Ln GDP
1	100.000	0.000	0.000
2	89.537	3.2619	|7.2012
3	60.807	34.1208	5.0724
4	50.1936	45.9248	3.8816
5	45.6092	51.1728	3.2181
6	40.2295	56.935	2.8355
7	35.7913	61.515	2.6936
8	34.4698	63.0251	2.5051

It can be seen from Table 7 that in the eighth period, the contribution of OFDI itself to its own variance gradually decreased, and it was only 34.4698 in the eighth period. The contribution rate of RMB real effective exchange rate to OFDI is 63.0251%, indicating that the real effective exchange rate of RMB has a significant impact on OFDI, while GDP has a contribution rate of 2.5051% to OFDI. But the effect is not significant.

6. Conclusion

In the long run, the RMB real effective exchange rate REER has a significant negative effect on China's OFD1, that is, the appreciation of the RMB helps the development of China's foreign direct investment, while the impact of GDP on China's foreign direct investment is not significant. There is no long-term equilibrium relationship with OFDI. The Granger causality test shows that the RMB exchange rate is a single cause of foreign direct investment.

In the short term, the real effective exchange rate of RMB, REER, has no effect on China's OFDI. The reason may be that my country's foreign direct investment is not eager to obtain benefits, but has gone through a long stage of investment first and then harvest. The gross domestic product (GDP) has no significant effect on China's OFDI in the long term or in the short term. The results of this study show that due to the appreciation trend of the RMB in recent years, my country's foreign exchange reserves have decreased, which has led to the deterioration of my country's foreign trade environment.

7. Policy Recommendations

7.1. Maintain a Slight Appreciation of the RMB.

From the above analysis, it can be inferred that the appreciation of the RMB exchange rate helps Chinese enterprises to go global and increase foreign direct investment, which has a positive impact on China's foreign direct investment. However, the rate of appreciation should not be too large or too fast, otherwise it will lead to a large depreciation of the foreign exchange reserves of the state in a short period of time, which will severely impact the national economy and may lead to economic paralysis. Japan in the 1990s is a good example. After the rapid appreciation of the yen in the short term, Japan's economy has been in a weak state for the past ten years and has not yet recovered. In the long run, the exchange rate of RMB should be kept stable to be more conducive to the development of foreign direct investment.

7.2. Policies are Appropriately Inclined Towards Foreign Direct Investment.

We will further implement the "going out" strategy and further implement the "One Belt, One Road" strategy to ease the pressure of the continuous appreciation of the RMB. To a certain degree of help for domestic enterprises engaged in international trade and international investment.

7.3. Continue to Promote the Internationalization of RMB.

In recent years, especially after China's entry into the WTO, the process of currency internationalization has been accelerating. Currency internationalization can better perform functions such as currency settlement and will also reduce the exchange rate risk of investment companies in the long run. Although in 2005, the RMB exchange rate abandoned the peg to the US dollar and adopted an exchange rate system with reference to a basket of currencies. But today, the renminbi remains volatile relative to the pound, yen and euro. Therefore, it is still necessary to continue the process of RMB internationalization.

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