

# The Impact of Exchange Rate Fluctuation on Economic Growth

## – Empirical Studies Based on Different Countries

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**Abstract**—Under the condition of open economy, the trade between countries is getting closer and closer. Therefore, the exchange rate fluctuation become an important factor affecting the country's economic growth. In order to deeply understand the mechanism of the effect of exchange rate fluctuations on economic growth, a large number of data collected from the World Bank were excluded and screened in this paper, and data of 125 countries from 1997 to 2017 were obtained to build panel models. Through regression analysis, foreign direct investment has a significant positive effect on economic growth. Exchange rate fluctuation has different effects on economic growth in different countries. However, the impact of exchange rate fluctuation on economic growth through foreign direct investment channels is greater than that through foreign trade channels.

**Keywords:** *exchange rate fluctuation, foreign direct investment, foreign trade, economic growth*

### I. INTRODUCTION

Generally speaking, economic growth theory emphasizes capital, labor, technology and other factors that directly affect economic growth. But with the development of economic globalization and integration, more and more countries participate in the world division of labor system and partition of economic interests by virtue of its own comparative advantages. At this time, foreign economy is no longer simply an exchange of materials, but a part of a country's economic development. With 40 years of reform and opening up and the development of export-oriented economy, foreign trade has made a great contribution to China's economic growth, making China one of the countries with the highest dependence on foreign trade in the world. The trade war between China and the United States, the appreciation of the RMB exchange rate and other external pressures have exerted a huge impact on China's development of an export-oriented economy and slowed down the speed of China's economic growth. Although we have been seeking to rely on domestic demand to stabilize the growth of our economy, we still need to seize the opportunity of economic globalization, participate in international competition, to promote the high-quality development of our economy.

Exchange rate is the most important resource allocation signal in the world market and the most important adjustment lever in international trade, which has an important impact on capital flows. What's more, international trade and capital flows have a broad impact on a country's economic growth through internal links with various economic activities such as investment, consumption, price, money supply, foreign exchange reserves and employment. Therefore, the research on exchange rate has been concerned, because of its importance for economic growth.

There are two mechanisms by which exchange rates affect economic growth. On the one hand, the depreciation of local currency exchange rate increases the price of foreign products, reduces the demand for foreign products, promotes the consumption of domestic products, and reduces the foreign price of exports, thereby enhancing the competitiveness of domestic exports, stimulating investment and exports, and then promoting economic growth. On the other hand, the appreciation of local currency exchange rate will reduce the level of export, promote capital outflow and worsen the trade balance, which is not conducive to economic growth and stability. Therefore, the judgment and decision of the appreciation or depreciation of the exchange rate is a difficult problem for the economic policies of many countries. Since the exchange rate will affect economic growth through investment, consumption, price, money supply, foreign exchange reserves, employment and other ways, the impact of exchange rates on economic growth is not as simple as theoretical analysis. Krugman's "impossible triangle law" also explains the complexity of the exchange rate operating mechanism.

From July 21, 2005, the RMB exchange rate was no longer concentrated in the USA dollar, but began to implement a managed floating exchange rate system based on market supply and demand with reference to a basket of monetary policies. Therefore, the change of exchange rate not only needs to consider the needs of domestic economic development, but also needs to consider the international status and environment, which is more complex. It can be seen that the relationship between exchange rate and economic growth is affected by many factors, so we need to analyze its internal mechanism of action and judge its direction and

relative degree. This paper mainly analyzes the impact of exchange rate on foreign investment and trade, studies the relationship between exchange rate and economic growth, and provides some ideas and methods for the management of China's exchange rate.

## II. LITERATURE REVIEW

Under the situation of economic globalization, domestic and foreign currencies of a country are interest rate and exchange rate respectively. The importance of exchange rate to the development of world economy is self-evident. Through investment, trade and other channels, enterprises and governments of various countries make production factors flow among different sectors, industries and countries, so as to improve production efficiency, optimize resource allocation and promote economic development. At the same time, it also enhances the impact of exchange rate on the world's macroeconomic. The Bretton Woods System collapsed in 1971 when the US refused to provide dollars to other Central Banks. Since then, domestic and foreign scholars began to study the impact of exchange rate on economic growth from different directions.

### A. Direct Impact of Exchange Rate on Economic Growth

Liu Lixin and Li Pengtao(2019)[1] pointed out that exchange rate has different influences on economic growth under different conditions based on the background of RMB two-way floating and economic structure transformation, respectively studied from two perspectives of directional and non-directional changes in exchange rate. Zhang Yang(2018)[2] pointed out that exchange rate has a significant impact on economic growth taking exchange rate as the intermediate target. Ba Shusong and Hu Jun(2019)[3] sorted out the theoretical and empirical studies on real exchange rate policy and economic growth in recent years in three historical periods, based on the development history and evolution logic of competitiveness and stability real exchange rate policy. They pointed out that it is very important to build a policy of exchange rate that takes into account both competitiveness and stability under the current economic situation.

### B. Indirect Impact of Exchange Rate on Economic Growth

First, the exchange rate can affect economic growth through foreign direct investment. In an open economy, outbound investment is crucial to a country's economic growth. Fu Yuanhai, Tang Weibing and Wang Zhanxiang(2010)[4] concluded that localization of production and participation of foreign enterprises had different effects on economic growth performance of domestic industries based on the panel data of 27 manufacturing industries. Gao Tiemei and Kang Shulong(2006)[5] established the variable parameter model and error correction model based on the state-space model and Kalman filter. From the perspective of aggregate demand, they pointed out that foreign direct investment promoted China's economic growth, but it was lower than the contribution rate of domestic investment to economic growth. Second, exchange rates can also affect economic growth by changing a country's import and export trade. In the new economic background, the trade between countries become

more and more frequent, import and export trade in the process of national economic development is more and more influential. Pei Changhong(2010)[6] concluded that there is a clear positive correlation between economic growth and the change of import trade structure based on the different background of a country's economic growth in terms of growth and deceleration, and optimizing import trade structure is an important part of improving economic supply. Yang Xiaoqin and Zhou Shiyuan(2015)[7] concluded that the growth of national economy will promote the growth of import and export trade, while the growth of import and export trade has little impetus to the development of national economy.

According to the literature, it is not clear that the exchange rate influences economic growth through foreign investment and import and export trade due to the differences in the system, economic structure, trade environment and consumption preference among countries. By referring to the research results of scholars above, we will construct a dynamic model with data from 125 sample economies. By adding the multiplicative terms of exchange rate and foreign direct investment and import and export trade into the model respectively, this paper discusses how exchange rate influences economic growth through the channels of foreign investment and import and export trade.

## III. EMPIRICAL RESEARCH

### A. Select Variables

Referring to the literatures of Schnabl (2008)[8], Lu Wanqing and Chen Jianliang(2007)[9], the real GDP growth rate was selected as the indicator to measure economic growth (gdp). This index reflects a country's economic growth rate and it is continuous. Local currency exchange rate changes was selected as the explanatory variables, and nominal exchange rate growth rate under indirect pricing method was selected as the indicator to measure exchange rate changes (erg). Exchange rate rise, domestic currency appreciation; The exchange rate fell, the domestic currency depreciated. According to the research results of Schnabl (2008), Ding Zhijie and Xie Feng(2017)[10] and other scholars, the following variables were selected as control variables, and the specific explanation was shown in table I.

TABLE I. DESCRIPTION OF VARIABLES

Name of variables		Meaning of variables
The interpreted variable	gdp	Real gdp growth rate (%)
Core variable	erg	Rate of exchange rate growth (%)
Controlled variables	fdi	Proportion of foreign direct investment in gdp (%)
	trade	Trade volume as a percentage of GDP (%)
	gov	Government purchases as a percentage of GDP (%)
	old	Aging (%)
	town	Urbanization (%)
	cpi	Rate of inflation (%)

B. Model Construction

Exchange rate fluctuations can directly affect economic growth or indirectly affect economic growth through foreign direct investment and trade. Because this paper studies the individual differences between 125 countries and by F test and Hausman test, it is concluded that a fixed effect model should be established. The specific model is set as follows:

i. Study the direct impact of exchange rate on economic growth.

$$gdp_{i,t} = \alpha_i + \beta_1 erg_{i,t} + \beta_2 fdi_{i,t} + \beta_3 trade_{i,t} + \beta_4 gov_{i,t} + \beta_5 old_{i,t} + \beta_6 dtown_{i,t} + \beta_7 k_{i,t} + u_{i,t} \quad (1)$$

Note: i and t respectively represent the country i and period t.

ii. Study the impact of exchange rate on economic growth through foreign direct investment, and add the interaction item of exchange rate growth rate and foreign direct investment proportion into this model.

$$gdp_{i,t} = \alpha_i + \beta_1 erg_{i,t} fdi_{i,t} + \beta_2 fdi_{i,t} + \beta_3 trade_{i,t} + \beta_4 gov_{i,t} + \beta_5 old_{i,t} + \beta_6 dtown_{i,t} + \beta_7 k_{i,t} + u_{i,t} \quad (2)$$

iii. Study the impact of exchange rate on economic growth through trade, and the interaction between exchange rate growth rate and trade is added into the model.

$$gdp_{i,t} = \alpha_i + \beta_1 erg_{i,t} trade_{i,t} + \beta_2 fdi_{i,t} + \beta_3 trade_{i,t} + \beta_4 gov_{i,t} + \beta_5 old_{i,t} + \beta_6 dtown_{i,t} + \beta_7 k_{i,t} + u_{i,t} \quad (3)$$

C. Empirical Analysis

1) Data sources

The data in this paper comes from the world bank database, and the selected sample period was 1997-2017. According to the range of the sample period, countries with serious data gaps were excluded, and a few missing data were supplemented by the method of moving weighted average.

2) Regression results

In this paper, GDP growth rate was taken as the explained variable, and the stationarity test of each variable in the model was conducted before regression analysis. It was found that all the remaining variables were stationary variables except urbanization which is a first-order single integration. Therefore, we added the first difference item of urbanization into the model. After the model test of the regression results, it is concluded that the fixed-effect model should be selected. At the same time, due to the feedback effect of domestic economic growth on foreign direct investment, namely the endogenous problem, the two-stage least square method (TSLS) is adopted in this paper for parameter estimation. The selected instrumental variable is the lag period of foreign direct investment. Specific regression results are shown in table II.

TABLE II. GDP GROWTH RATE IS THE TSLS REGRESSION RESULT OF THE EXPLAINED VARIABLE

Model Variable	(1)	(2)	(3)
fdi	0.7802*** (13.534)	0.8112*** (13.7144)	0.8232*** (13.9857)
trade	-0.0263*** (-3.4273)	-0.0241*** (-3.1300)	-0.0236*** (-3.0297)
erg	-2.3017*** (-4.7249)		
erg*fdi		-0.1390*** (-5.8110)	
erg*trade			-0.0337*** (-6.6066)
gov	-0.1592*** (-3.4612)	-0.1416*** (-3.0221)	-0.1350*** (-2.8621)
old	-0.1339*** (-1.1403)	-0.1395 (-1.1709)	-0.1476*** (-1.2316)
dtown	-0.9272 (-1.4855)	-0.8175 (-1.2913)	-0.9262** (-1.4538)
k	-0.0077 (-0.9204)	-0.0242*** (-3.9015)	-0.0061 (-0.8250)

<sup>a</sup>. Note: \*\*\*, \*\* and \* mean significant at the statistical level of 1%, 5% and 10% respectively. The values in brackets are t values, as shown in the following tables.

According to the regression results in table II, foreign direct investment of a country keeps the same direction as its economic growth. For all countries, other things being equal, a

1% increase in the share of foreign direct investment adds an average of 0.7802 percentage points to the country's economic growth rate. There is a negative relationship between exchange rate fluctuations and economic growth. The regression results show that for all countries, with all other factors unchanged, every 1% increase in the exchange rate growth rate will reduce the economic growth rate by 2.3017 percentage points on average. At the same time, the proportion of trade volume in GDP has an opposite relationship with the economic growth rate, mainly because the speed and effect of foreign trade on pulling the economic has slowed down. From the point of view that the exchange rate indirectly influences the economic growth through foreign direct investment, the coefficient of the interaction between the exchange rate growth rate and the proportion of foreign direct investment is -0.139 at the significance level of 1%. This shows that for all countries, with other factors unchanged, the marginal effect of foreign direct investment on economic growth rate increases by 0.139 percentage points for every 1% reduction in exchange rate growth rate. It also indicates that when the domestic currency depreciates, the same amount of foreign currency will be exchanged for more domestic currency. At the same time, it reduces the price of domestic factors of production, thus reducing the domestic operating costs of foreign enterprises and attracting more foreign investment. On the one hand, it promotes the economic growth through technology spillover effect. On the other hand, it alleviates the employment problem to a certain extent. Finally, from the perspective that exchange rate indirectly affects economic growth in the form of foreign trade, the coefficient of the interaction between exchange rate growth rate and trade is -0.0377 at the significance level of 1%. It shows that for all countries, when other factors remain unchanged, the marginal effect of foreign trade on economic growth rate will decrease by 0.0377 percentage points for every 1% increase in exchange rate growth rate. An appreciation of the domestic currency makes exports more expensive abroad. As a result, the country will restrain the export, at the same time, it will lower the price of imported goods at home, and expand the import, which will lead to the economic growth rate.

### 3) Robustness test

In this paper, the explanatory variable is replaced by per capita GDP growth rate for regression, and TSLs method is still adopted for robustness test of the model. The significance of coefficient and its influence on GDP growth rate are generally consistent with the expected direction, indicating that the model is set effectively and the regression results are real and reliable. The specific regression results are shown in table III.

TABLE III. PER CAPITA GDP GROWTH RATE IS THE TSLs REGRESSION RESULT OF THE EXPLAINED VARIABLE

Model	(1)	(2)	(3)
Variable			
fdi	0.7387*** (13.2174)	0.7676*** (13.3885)	0.7814*** (13.6918)
trade	-0.0238*** (-3.2059)	-0.0217*** (-2.9060)	-0.0212*** (-2.8131)
erg	-2.2768*** (-4.8213)		
Erg*fdi		-0.1310*** (-5.6502)	
Erg*trade			-0.0212*** (-6.6510)
gov	-0.1217*** (-2.7306)	-0.1055*** (-3.3241)	-0.0982*** (-2.1478)
old	-0.0859*** (-0.7458)	-0.0919 (-0.7962)	-0.0993 (-0.8550)
dtown	-1.6896 (-2.7963)	-1.5834 (-2.5813)	1.6888** (-2.733)
k	-0.0048 (-0.5932)	-0.0217*** (-3.6082)	-0.0036 (-0.5086)

## IV. CONCLUSIONS AND POLICY RECOMMENDATIONS

In order to gain an in-depth understanding of the mechanism of exchange rate fluctuations on economic growth, data collected from the world bank were excluded and screened in this paper, and data of 125 countries from 1997 to 2017 were obtained to build the panel model. Through regression analysis, foreign direct investment has a significant positive effect on economic growth. Exchange rate fluctuations can affect economic growth through foreign direct investment and foreign trade. At present, China's national strength is growing, and it has more and more voice on the international stage. The role of the exchange rate is also becoming more and more important. Therefore, it is very important to study the impact of exchange rate fluctuations on economic growth. According to this study, there are the following policy recommendations:

First, make use of the impact of exchange rate on China's foreign trade. With the optimization of China's economic structure and the progress of science and technology, the products of China's import and export trade are more and more advanced and more and more extensive, which will be increasingly affected by the exchange rate. We should establish relevant foreign trade policies, optimize the foreign trade system, introduce foreign high-quality technology and products on the basis of protecting domestic products, and improve the quality of domestic products through learning technology and experience. At the same time, accelerate the internationalization of the RMB, reduce dependence on the US dollar, and avoid trade and investment risks caused by exchange rate fluctuations.

Second, grasp the impact of exchange rate on the foreign direct investment in China. Foreign investment can promote economic growth, but the exchange rate has a negative impact on foreign investment. So we need to take the initiative to create the environment for investment. The introduction of the foreign direct investment should be based on the development of the country's economy and industrial upgrading. For example, continue to implement preferential policies in introducing foreign capital, build and perfect a series of related systems and mechanisms from trade liberalization to the capital liberalization, provide maximum freedom of choice space for international investors, promote the reform of "negative list" management model, realize the boundary between the government and market, drastically cut administrative approvals, etc. Thus, the negative impact of exchange rate on the foreign direct investment can be mitigated and China's economic development can be promoted.

Third, improve the level of scientific and technological innovation and improve the trade structure. From empirical analysis we can know that, although exchange rate appreciation will increase the price of export commodities, it will become relatively cheaper for imported primary products and intermediate products. Rising exchange rate is good for reducing the cost of production and beneficial to the growth of our economy. China should learn from developed countries, improve trade structure, use exchange rate advantages, and accelerate industrial structure optimization. So our country should strengthen R&D investment in strategic emerging industries, promote independent innovation ability, increase investment in human capital. By improving China's division of labor in the global industrial chain, we will develop to the middle and high end of the industrial chain, increase the added value of products, promote the improvement of China's trade structure, and ensure the stability of China's economic growth under the pressure of exchange rate appreciation when facing the complex economic situation at home and abroad.

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