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The Impact of Renminbi Exchange Rate and Exchange Rate Volatility on China's Outward Foreign Direct Investment

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Abstract: China's Outward Foreign Direct Investment (OFDI) has been steadily increasing in recent years, and the Renminbi exchange rate and its volatility have played a crucial role in shaping this trend. This study aims to explore the impact of the Renminbi exchange rate and its fluctuations on China's OFDI. By analyzing OFDI data to 21 countries and regions globally from 2004 to 2019, we conclude that an appreciation of the Renminbi can facilitate China's OFDI, while depreciation may potentially hinder its growth. However, our research also reveals that the impact of Renminbi exchange rate volatility on OFDI is limited. Additionally, factors such as the host country's GDP size and level of openness also influence China's OFDI to a certain extent. Finally, based on our empirical findings, we provide policy recommendations to help China better manage its outward foreign direct investment.

Keywords: Outward Foreign Direct Investment, Real Effective Exchange Rate of Renminbi, Exchange Rate Volatility, Empirical Analysis.

1. Introduction

The exchange rate is the conversion rate between one country's currency and another's, and it serves as a crucial economic indicator in international trade. In the context of a globalized economy, fluctuations in exchange rates have a significant impact on the movement of capital worldwide, as well as on the direction and scale of a country's outward foreign direct investment (OFDI). Since the initiation of economic reforms and opening up in 1978, China has undergone several adjustments to its Renminbi (RMB) exchange rate system.In 1994, the Renminbi was unified, and in 1996, current deposits in Renminbi became freely convertible. Following the Asian financial crisis in 1998, Japan introduced a "peg" to the U.S. dollar for its exchange rate. On July 21, 2005, China reformed its exchange rate formation mechanism. Post-reform, a managed floating exchange rate system was introduced, which adjusted the exchange rate based on market demand and supply, with reference to a basket of currencies.

Economic globalization is a significant characteristic of the contemporary world. Since the 1990s, foreign direct investment (FDI) has replaced international trade as a primary driver of this phenomenon. Emerging economies, notably China, have risen as an investment powerhouse, attracting global attention. In recent years, China's cross-border investment has seen continuous growth. Total FDI increased from \$2.855 billion in 2003 to \$13.691 billion in 2019, with Chinese companies establishing 27,500 foreign firms in 188 countries and regions. In global rankings, China's FDI scale ranks second worldwide.

When analyzing FDI, numerous variables such as market size, resources, business connections, and institutional environments must be considered. Exchange rates, which compare prices of different currencies, directly reflect relative prices of domestic and foreign factors and goods. They typically play a crucial role in cross-border investment decisions. China's long-term balance of payments imbalance has placed significant pressure on the Renminbi's exchange rate. In the 2005 reform of the Renminbi exchange rate system, the central bank adopted a floating exchange rate system with reference to a basket of currencies, abandoning the previous peg to the U.S. dollar. Meanwhile, major currencies (such as the U.S. dollar, euro, and pound) depreciated significantly against the Renminbi, leading to a period of Renminbi appreciation.

The volatility in the Renminbi exchange rate introduces uncertainty and may affect multinational corporations' investment decisions to some extent, contributing to the unpredictability of China's OFDI. Therefore, it is essential to analyze China's outward foreign direct investment in light of Renminbi exchange rate fluctuations. The effects of exchange rate changes on China's OFDI require further observation and discussion by researchers. While there is abundant literature on the Renminbi exchange rate and attracting foreign investment, there is a lack of research analyzing the intermediary effects of Renminbi exchange rate on China's OFDI and exchange rate fluctuations. Given these considerations, this paper, based on China's cross-border direct investment data to 21 countries or regions from 2004 to 2019, employs a mixed regression approach using ordinary least squares (OLS) regression.

The second category of research suggests that a country's currency depreciation promotes outward foreign direct investment (OFDI). For instance, Benassi et al. pointed out that the impact of exchange rates on OFDI is related to the market orientation of foreign direct investment, which can increase FDI inflows. Campa (1993) argued that a country's currency appreciation implies a decrease in the expected future profits that domestic firms would derive from foreign investments. Thus, currency appreciation does not necessarily lead to the outflow of OFDI. Schmidt and Broll (2008) analyzed OFDI data from the United States to six countries from 1984 to 2004, where the appreciation of the host country's currency relative to the U.S. dollar resulted in a significant stimulation of outflows of FDI from the United States.Wang Zifeng (2009) suggested that if state-owned enterprises are in a leading technological position, currency depreciation can increase outward foreign investment. In cases where they are technologically disadvantaged, foreign investment may decrease. Zhang Weifu (2008) argued that the depreciation of the Renminbi against the U.S. dollar would boost the overall level of China's OFDI.

2. Literature Review

The impact of exchange rate levels on foreign direct investment can be broadly categorized into two types. One type, as proposed by scholars like Froot, and Stein (1991), suggests that depreciation of the host country's currency compared to the home country is favorable for attracting inward foreign direct investment, while the opposite holds true for currency appreciation. In situations with incomplete capital markets, a depreciation of the national currency reduces relative production costs, increases the returns for foreign investors, and encourages inward foreign direct investment. Additionally, currency depreciation enhances the relative wealth of foreign investors, stimulating their interest in acquiring businesses in the host country. Empirical analysis conducted by Frost and Stein (1991) on thirteen U.S. industries found that the depreciation of the U.S. dollar lowered the relative prices of U.S. assets and correspondingly improved the production and operational capabilities of foreign firms in the U.S., confirming that currency depreciation led to increased foreign direct investment in the United States. Analysis of investments in Japan, Indonesia, Malaysia, the Philippines, and Thailand also confirmed that the depreciation of the host country's currency was favorable for attracting Japanese investment. Hu (2012) suggest that RMB appreciation would promote foreign investment in China. Liu (2014) posit that RMB appreciation has no significant short-term impact on China's FDI but would have a positive effect in the long term.

The second category suggests that a home country's currency depreciation promotes overseas direct investment. Studies following this perspective argue that host country currency appreciation can boost inflows of foreign direct investment (FDI). Campa (1993) suggests that a home country currency appreciation implies a decrease in the expected future profit levels for that country's businesses from foreign investments. Therefore, currency appreciation does not necessarily lead to an outflow of overseas direct investment.Schmidt and Broll (2008) analyzed OFDI data from six countries from 1984 to 2004 in the context of the United States, and they found that host country currency appreciation resulted in a significant stimulation of OFDI from the United States. Liu and Deseatnicov (2016) utilized investment data from China to 119 economies between 2003 and 2013. They conducted research using a linear dynamic panel model and found evidence suggesting that the appreciation of the Chinese yuan is detrimental to China's outbound foreign direct investment.

The impact of exchange rate fluctuations on foreign direct investment is another important issue. Many scholars argue that frequent or drastic fluctuations in the host country's exchange rates can have a negative impact on risk-averse investors, leading them to cease investment immediately. Campa (1993) concluded, using option pricing models, that frequent exchange rate fluctuations introduce significant uncertainty for businesses, and only a higher level of host country currency exchange rates can guide companies to engage in overseas direct investment. However, if trade and investment are considered as alternative means, multinational corporations may increase foreign direct investment to mitigate currency risk in international trade due to exchange rate fluctuations. Cushman (1988) conducted research that confirmed a positive correlation between the size of exchange rate fluctuations and U.S. outbound foreign direct investment (OFDI). His findings suggested that American OFDI increased with greater exchange rate volatility because using OFDI for local production in a foreign market was a more effective strategy for mitigating currency risk compared to exporting to that market. Additionally, for tangible assets with currency risk exposure, larger exchange rate fluctuations were found to stimulate businesses in making OFDI decisions.

Many studies in the literature have empirically demonstrated the relationship between outbound foreign direct investment (OFDI) from developed countries and their domestic currency exchange rates. However, when examining multinational corporations from the United States, Japan, and Europe, researchers have found significant differences in results compared to theoretical analyses. Given China's unique characteristics, institutional policies, and differing circumstances compared to developed countries or other developing nations, many studies in the literature have focused on attracting foreign investment. They establish models to study the impact of OFDI on the fluctuations of the Chinese Renminbi (RMB) exchange rate.For example, Hongfeng Peng conducted a time-series analysis based on monthly data and concluded that before the 2005 exchange rate reform in China, the primary factor influencing FDI inflow was the expectations regarding the RMB exchange rate. However, the effective RMB exchange rate did not significantly affect FDI inflow. His research also found that despite significant fluctuations in the effective RMB exchange rate before and after the 2005 reform, these fluctuations did not significantly impact China's FDI inflows.

3. Theoretical Analysis and Research Hypotheses

3.1. Exchange rate level and fluctuation relationship with OFDI

When it comes to exchange rate levels, one theory posits that a home currency appreciation promotes foreign direct investment (FDI) because a depreciation of one's national currency reduces relative production costs and foreign exchange rates. This leads to increased returns for investors, thereby encouraging foreign direct investment. Conversely, another perspective argues that a home currency depreciation fosters foreign direct investment. This is because an appreciation of one's national currency implies a decrease in the expected future profit levels for that country's businesses investing abroad.

Exchange rate fluctuations introduce added complexities in the business landscape, making it more challenging for companies to gather essential information and assess investment risks accurately. These fluctuations create an environment of uncertainty where the relative value of currencies can fluctuate unpredictably, impacting the potential returns on foreign investments. In response to this increased uncertainty, investment entities often adopt a cautious and observant approach rather than rushing into immediate investment decisions. This cautious stance allows them to carefully evaluate market conditions, monitor exchange rate movements, and assess the potential risks associated with outward foreign direct investment. Consequently, this heightened level of vigilance can lead to a decrease in the volume of outward foreign direct investment as companies prioritize risk management and thorough due diligence before committing to international business ventures.

3.2. Hypotheses

H1: An increase in the Renminbi exchange rate level will lead to an increase in China's outward foreign direct investment (OFDI).

H2: An increase in Renminbi exchange rate volatility will lead to a decrease in China's outward foreign direct investment (OFDI).

4. Model Design and Data Selection

4.1. Sample Selection and Data Sources

This study draws upon data from the Guotaian database, covering China's outward investment from 2004 to 2019. A total of 21 major destination countries or regions for Chinese investment were identified. To comprehensively investigate the impact of Renminbi exchange rates on China's outward foreign direct investment (OFDI) and validate hypothesis H1, the exchange rate level is taken as the primary explanatory variable. Model 1 is constructed as follows:

$$\mathrm{ofdi}_{it} = \beta_0 + \beta_1 \cdot \mathrm{reer}_{it} + \sum \gamma \cdot X_{it} + \varepsilon_{it} \qquad (1)$$

In equation (1),where i and t represent the country (or region) and year, respectively. "ofdi" represents China's actual foreign direct investment in year t to country (or region) i. "reer" represents the Renminbi's indirect exchange rate to country (or region) i in year t. "X" denotes a set of control variables, including the host country's GDP, host country's degree of openness (open), host country's economic freedom (free), and host country's resource endowment (resource).

To examine the moderating effect of exchange rate fluctuations on the relationship between exchange rate levels and outward foreign direct investment (OFDI), and to validate hypothesis H2, Model 2 can be constructed as follows:

$$\mathrm{ofdi}_{it} = \beta_0 + \beta_1 \cdot \mathrm{reer}_{it} + \beta_2 \cdot \mathrm{std}_{it} + \sum \gamma \cdot X_{it} + \varepsilon_{it} \ (2)$$

In equation (2) ,"std" represents the change in the exchange rate level of country (or region) i concerning China in year t.

4.2. Variables and Data

The dependent variable OFDI, is measured based on the actual foreign direct investment volume from China to various countries (regions) (original data sourced from the CSMAR).

The measurement of variables for exchange rate levels and exchange rate volatility is derived from the monthly averages and standard deviations of bilateral exchange rates within each year. Exchange rate levels are calculated using the Renminbi (RMB) exchange rate indirect quotation method. This involves multiplying the exchange rate of the host country against the U.S. dollar for the current year by the exchange rate of the U.S. dollar against the Chinese Renminbi for the same year. The required original data is sourced from official exchange rates published by the World Bank. The specific calculation methods for each indicator are as follows.

The RMB exchange rate level is obtained by taking the monthly average exchange rates of the host country's currency against the Renminbi for each year. Therefore, under the indirect quotation method, an increase in the value of this indicator indicates Renminbi depreciation, while a decrease indicates Renminbi appreciation. The calculation formula is as follows:

$$\mathrm{mean} = \frac{\sum_{i=1}^{12} x_i}{12} \qquad (3)$$

In equation (3), where x represents the monthly data for the Renminbi exchange rate against the host country's currency (and the same applies to subsequent equations), "mean" represents the mean exchange rate for each year.

Renminbi exchange rate volatility is measured using the standard deviation (std) of Renminbi exchange rate changes. A larger value for this indicator indicates greater Renminbi exchange rate volatility, while a smaller value indicates lower volatility. The calculation formula is as follows:

$$\mathrm{std} = \sqrt{\sum_{i=1}^{12} (x_i - \mathrm{mean})^2 / 12} \qquad (4)$$

4.3. Other control variables

Host Country GDP: This variable is derived from annual GDP data obtained from the CSMAR for various countries over the years. It reflects the size of the host country's market.

Relative Labor Cost (Labor): This is calculated as the actual per capita GDP of the host country divided by the actual per capita GDP of China, using data from the CSMAR. This value represents the ratio of labor costs in the host country compared to China. A higher value indicates higher labor costs in the host country, and vice versa.

Openness of the Host Country (Open): This is measured as the ratio of a country's total merchandise and service imports and exports to its GDP. The original data is sourced from the Guotai An database.

Resource Endowment of the Host Country (Resource): This is measured based on the proportion of fuel and mineral exports in the total exports of the host country, using data from the WTO Trade Statistics Database.

Economic Freedom of the Host Country (Free): This index is measured using the annual "Economic Freedom" index jointly published by organizations such as the Fraser Institute and The Heritage Foundation. These organizations assign a maximum score of 100 for economic freedom, and countries with higher economic freedom receive higher scores, whereas countries with lower economic freedom receive lower scores.

Since the turn of the century, China's foreign direct investment (FDI) has started to grow rapidly, attracting attention from the international community and many scholars within China. Starting from 2003, the Chinese government has annually published the "Foreign Direct Investment Statistical Bulletin," and many scholars have relied on this bulletin for data. This paper selects data from the years 2004 to 2019 and takes the top 21 countries or regions that received the most Chinese direct investment as samples for empirical analysis.

5. Empirical Results and Analysis

5.1. Descriptive analytics

Table 1 presents descriptive statistics for the main variables. By examining the means, minimums, maximums, and standard deviations of these main variables, we can gain insights into the overall distribution of the variables. The average value of OFDI (Outward Foreign Direct Investment) is 32.6 billion, indicating a significant scale of China's outward direct investment. The maximum value is 1,142 billion, while the minimum value is negative, suggesting substantial variation in amounts across different years and regions.The other indicators also show noticeable differences in GDP levels, resource endowment, economic freedom, and openness to foreign trade among countries. This suggests that the selected data is comprehensive and reliable.

Table 1. Descriptive statistical results for major variables

Variables	N	mean	sd	min	max
ofdi	336	0.326	1.339	-0.0815	11.42
reer	336	2.864	3.691	0.000287	15.27
std	336	0.0929	0.168	7.86e-07	1.441
GDP	336	175.9	349.4	0.387	2,137
resource	336	15.92	24.07	0.103	98.24
free	336	67.87	12.19	44.70	90.20
open	336	1.033	1.018	0.209	4.669

5.2. Regression analysis

Table 2 presents the results of the mixed OLS regression for Model 1. The preliminary regression results for Model 1 show that the level of the Chinese Renminbi exchange rate has a significant negative effect on China's outward foreign direct investment at the 1% level. This suggests that when the Renminbi appreciates, China's outward foreign direct investment significantly increases, which confirms Hypothesis 1.

Regarding the control variables, the GDP level of the host country is significantly positive at the 5% level, indicating that China is more willing to invest in countries or regions with a larger economic scale. However, the host country's resource endowment does not significantly affect China's outward foreign direct investment. The host country's economic freedom and openness to foreign trade are both significantly positive at the 1% level, indicating that China is more inclined to invest in countries (regions) with higher economic freedom and greater openness to foreign trade.

Table 2. Model 1 regression results

VARIABLES	ofdi
reer	-0.0759***
	(-3.73)
GDP	0.0005**
	(2.40)
resource	0.0013
	(0.50)
free	0.0280***
	(3.99)
open	0.6161***
	(8.44)
Constant	-2.0912***
	(-4.98)
Observations	336
R-squared	0.364

Table 3 presents the results of the mixed OLS regression for Model 2, which includes the Renminbi exchange rate volatility variable. The regression results indicate that Renminbi exchange rate volatility does not have a significant impact on China's outward foreign direct investment. The results for the other variables are not significantly different from those in Model 1. These regression results suggest that Hypothesis 2 is not supported.

Table 3. Model 2 regression results

Variables	ofdi
reer	-0.0967***
	(-3.50)
std	0.5919
	(1.11)
GDP	0.0005***
	续表
	(2.61)
resource	0.0013
	(0.49)
free	0.0275***
	(3.92)
open	0.6293***
	(8.51)
Constant	-2.0803***
	(-4.95)
Observations	336
R-squared	0.366

In summary, generally speaking, a higher level of openness and economic freedom in the host country tends to be more favorable for promoting China's foreign direct investment in that country. However, due to certain developing countries where China invests heavily, the coefficients in empirical results may not be statistically significant when measured by trade openness and institutional quality scores based on economic freedom. Obtaining more refined industry-specific data and understanding the investment motivations of investors would allow for a more accurate estimation of the impact of host country's openness and institutional quality on China's foreign direct investment.

5.3. Robustness test

The regression results for the robustness test are presented in Table 4. In this robustness test, the study has included the relative labor cost of the host country as an additional control variable, making the control variables more comprehensive and the analysis more accurate. The empirical results indicate that the regression coefficient of the Renminbi exchange rate level on China's outward foreign direct investment is -0.052 and is statistically significant at the 5% confidence level. This suggests that an increase in stock ownership concentration significantly promotes non-efficient investment behavior by firms, supporting the hypothesis presented earlier. It demonstrates that the conclusions of this study are robust and applicable.

In this robustness test, the results obtained from the regression model are consistent with those presented earlier, indicating that the study's findings remain robust when potential sources of random interference are accounted for.

Table 4. Robustness Test

VARIABLES	ofdi
reer	-0.0520**
	(-2.23)
GDP	0.0005**
	(2.59)
resource	0.0015
	(0.58)
labor	-0.0304**
	(-2.08)
free	0.0333***
	(4.48)
open	0.6125***
	(8.43)
Constant	-2.3595***
	(-5.39)
Observations	336
R-squared	0.372

6. Research Conclusions and Recommendations

Over the past three decades, China has undergone rapid development, and its outward investment has grown substantially along with its economic expansion. Particularly in the new century, China has accelerated its pace of outward investment, striving to catch up with developed nations. Concurrently, the Chinese Renminbi exchange rate has been continuously appreciating year by year, with significant progress in market-oriented exchange rate mechanisms, indicating an increasingly refined exchange rate formation system.

This study is based on data from China's outward foreign direct investment to 21 countries or regions between 2004 and 2019, employing a mixed OLS method for empirical analysis. Renminbi appreciation enhances the value of assets already owned by domestic enterprises and reduces the costs of production abroad, thereby attracting direct foreign investment from various Chinese enterprises.Furthermore, factors such as the market size of the host country, Renminbi exchange rate, host country's openness, economic freedom, and relative labor costs all have significant impacts on China's outward foreign direct investment. However, the host country's resource endowment does not exert a significant influence on China's foreign direct investment.

The impact of the Renminbi exchange rate on China's outward foreign direct investment (OFDI) can be realized through the following mechanisms:

Competition Effect:Exchange rate fluctuations directly affect the actual prices of the same product when purchased in different countries with different currencies, thereby influencing changes in demand both domestically and internationally and affecting the competitiveness of multinational enterprises. When the home currency of the OFDI country appreciates, it raises the export prices of their products, weakening their competitiveness in the international market. This makes exporting products more challenging. To mitigate the impact of reduced competitiveness due to exchange rate changes, companies can engage in OFDI by establishing production facilities in the host country to replace exports. This aligns with the situation in China. Since the currency reform in 2005, the significant appreciation of the Renminbi has contributed to the rapid development of OFDI.

Relative Production Cost Effect:Exchange rate fluctuations lead to relative price changes in products and assets purchased by different countries, affecting international direct investment activities. When the currency of the investing country appreciates compared to the currency of the host country, the investing country's currency has greater purchasing power in the host country. It becomes more cost-effective to purchase products and assets for production in the host country using the currency of the investing country, reducing production costs and increasing the profitability of multinational enterprises. Therefore, a currency appreciation in the investing country promotes OFDI from the investing country to the host country.These mechanisms illustrate how exchange rate dynamics can influence China's OFDI, taking into account factors like competition and relative production costs.

Relative Wealth Effect:Assuming imperfect markets, exchange rate fluctuations can impact the level of direct investment by multinational corporations and their relative wealth. If the currency of the investing country appreciates, it means that an equivalent amount of foreign capital can purchase more goods in the host country. This can encourage outward foreign direct investment (OFDI) by the investing country because it becomes more advantageous to invest abroad. In contrast, if the currency of the investing country depreciates, the relative prices of domestic assets decrease. This makes it more attractive for foreign capital to invest in the country, leading to an increase in inward foreign direct investment.In simpler terms, when the investing country's currency strengthens, its investors have greater purchasing power abroad, encouraging them to invest overseas. Conversely, when the currency weakens, foreign investors find domestic assets more attractive, leading to increased foreign investment inflows.This effect highlights how exchange rate movements can influence investment decisions and capital flows between countries, especially when market imperfections are present.

Exchange rate reforms are crucial for aligning China's "going global" strategy and related exchange rate arrangements. While the long-term appreciation of the Renminbi may pose some challenges to China's current trade and import situation, it offers benefits by promoting direct investment by enterprises and China's integration into the global economy. This higher level of integration enhances China's ability to coordinate the use of various domestic and foreign resources.The development of foreign exchange systems under a floating exchange rate regime suggests that flexibility in commercial marketing and exchange rate formation is gradually increasing. There is also a growing trend towards internationalization of the Renminbi. Looking ahead, it is important to consider formulating and modifying Renminbi exchange rate policies to align with external strategies such as "globalism" in a coordinated manner. Care should be taken to control the speed and range of exchange rate changes to avoid undue impact on companies engaged in foreign direct investment and to prevent disruption.The gradual appreciation of the Renminbi is a historical phase that has already occurred in China's industrialization process and is likely to continue in the future. China should seize this opportunity to accelerate its transition to globalization. Based on the conclusions mentioned, this paper proposes the following recommendations:

Deepen Foreign Exchange System Reform: Accelerate the "going global" strategy and advance the process of exchange rate marketization. While the current account is fully convertible, further relaxation of restrictions on the use of foreign exchange and investments is needed. China should ease restrictions on both enterprises and individuals, enabling capital to flow freely for various investment activities between countries. Strengthening the flow of domestic capital in the international market will allow China to gain greater control over global financial markets while also reducing risks. A balanced supply and demand in the foreign exchange market can help maintain the Renminbi exchange rate at a reasonable and balanced level.

Monitor Exchange Rate Changes: In the commercialization of exchange rate changes, Chinese monetary authorities should pay attention to the frequency and breadth of these changes. Excessive exchange rate volatility and a loss of investor enthusiasm are not conducive to financial security, stability, or foreign direct investment. Therefore, at this stage, China can maintain exchange rate fluctuations within a 2% range. There is no need to increase the flexibility of exchange rate fluctuations before fully opening the capital account to prevent instability and negative impacts on foreign direct investment.

Develop Derivative Markets: To mitigate market risks, it is necessary to establish an exchange rate derivative market based on market supply and demand. These financial products not only help reduce speculative impacts on stock and housing markets but also allow businesses to manage risk through portfolio investments, preventing excessive short-term speculative capital inflows. This will further improve China's external investment market environment and enhance its financial market infrastructure, contributing to the development of China's financial markets.

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