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Impact of Renminbi Exchange Rate Fluctuations on China's Import and Export Trade: An Analysis Based on Data from Five ASEAN Countries

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Abstract

Purpose: In the era of global economic integration, China's doors of openness have widened, leading to increasingly frequent economic and trade exchanges between countries. Exchange rates, as a crucial economic lever for regulating foreign markets, play a vital role in the balanced development of a nation's international trade. Therefore, the relationship between exchange rate fluctuations and foreign trade has garnered widespread attention. **Research design, data and methodology:** This study utilizes import and export trade data between China and five ASEAN countries from 1998 to 2019. It employs regression analysis to examine the specific impact of the real effective exchange rate of the Renminbi on China's import and export trade with these ASEAN nations. **Results:** The empirical analysis yields the following conclusions: Firstly, the real effective exchange rate of the Renminbi exhibits a long-term stable relationship with China's import and export trade with the five ASEAN countries. Renminbi appreciation contributes to an increase in export trade volume but is detrimental to import trade. While this conclusion may deviate from classical trade theories, it aligns with the practical realities of China's foreign trade. Secondly, the coefficients before Gross Domestic Product (GDP) all display positive values, indicating that the growth of total economic demand has a stimulating effect on China's import and export trade.

Keywords : Real Effective Exchange Rate of Renminbi, Import and Export Trade, ASEAN

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Reform and opening up in China have undergone over forty years of development, during which the country's economy has experienced rapid growth, and its relationship with the world has become increasingly close. Since 1978, China's total import and export trade volume has shown a significant upward trend, reaching a historic high of over 32

trillion yuan in 2020, marking a growth of more than 900 times in over four decades. Despite the challenges posed by the COVID-19 pandemic in 2020, which had severe global economic repercussions, China's foreign trade continued to exhibit positive development. In 2020, China's total import and export volume exceeded 32 trillion yuan, with exports reaching nearly 18 trillion yuan, both achieving historical highs in China's history. Furthermore, China's GDP

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surpassed 100 trillion yuan for the first time, reaching 101.6 trillion yuan, with foreign trade accounting for 30% of GDP.

Among major global economies, only China's trade in goods showed positive growth, and foreign trade played a significant role in driving China's economy. The development of China's import and export trade is closely related to the exchange rate of the Chinese yuan. Since the inception of reform and opening up, China has continuously reformed its exchange rate system, including the "94" exchange rate reform, the "7·21" exchange rate reform, and the "8·11" exchange rate reform. The "94" exchange rate reform focused on implementing a unified exchange rate system, merging official and market exchange rates, and transitioning to a floating exchange rate system targeting only the US dollar. In 2005, the "7·21" exchange rate reform shifted the reference target for the Chinese yuan exchange rate to a basket of currencies, breaking its peg to the US dollar. The "8·11" exchange rate reform in 2015 primarily aimed to reform the quotation mechanism for the yuan's central parity rate.

Since 1994, the real effective exchange rate of the Chinese yuan has consistently risen, reaching its peak around the time of the "8·11" exchange rate reform. The ten-year period from July 2005 to August 2015 witnessed the most rapid appreciation of the yuan, with the real effective exchange rate increasing from 84.99 to 130.09, a remarkable increase of 53.07%.

In today's ever-changing international landscape, both domestic and international economic environments have become increasingly complex. To adapt to this changing situation, the concept of the "dual circulation" model has emerged, focusing on expanding domestic demand and further promoting domestic and international circulation. International markets now hold equal importance with domestic markets, and utilizing international markets will contribute to the sustained and stable development of China's economy. China's opening-up efforts have not ceased, and in 2020, China officially signed the Regional Comprehensive Economic Partnership (RCEP) initiated by ASEAN. In this free trade area, over 90% of tariff lines will gradually be reduced to zero, greatly promoting trade among member countries. The signing of RCEP is a crucial platform for China's enhanced opening-up in the new era, providing significant impetus to the formation of China's "dual circulation" development pattern.

The signing of RCEP presents enormous opportunities for China. As the world's largest free trade area in terms of economic size and scale, RCEP opens up vast markets for Chinese enterprises. Moreover, the alignment between RCEP and China's Belt and Road Initiative (BRI) is expected to enhance the influence of the BRI and contribute to the economic integration of the East Asian region. In 2020, the total import and export trade volume between China and

ASEAN, the leading signatory of RCEP, reached 4.74 trillion-yuan, accounting for 14.7% of China's total foreign trade volume and 47% of trade with RCEP member countries. China's trade with ASEAN has surpassed that with the European Union, making it a significant contributor to China's foreign trade and a crucial factor in maintaining a trade surplus, promoting the strengthening of the yuan's exchange rate, and advancing the internationalization of the yuan.

Furthermore, the openness of the Chinese yuan exchange rate market has increased. As an indispensable factor in import and export trade, the exchange rate has attracted more attention due to the growing uncertainty in the external environment. In recent years, the fluctuation of the Chinese yuan exchange rate has increased, impacting China's foreign trade, especially during the trade tensions between China and the United States (Yang & Lau, 2023).. China has accelerated the internationalization of the yuan by opening its domestic financial market and reducing its reliance on the US dollar in trade invoices and international payments. However, further internationalization of the yuan, as proposed in Shanghai, may face more challenges (McKinnon and Schnabl (2014).

China has become a major player in the world economy, and the role of its currency in international trade seems natural. The fluctuation of the Chinese yuan exchange rate plays a significant role in its import and export trade (Dobson & Masson (2009)). Most scholars have analyzed the relationship between the Chinese yuan exchange rate and foreign trade from an industry perspective, with fewer focusing on the national perspective.

Additionally, research has predominantly centered on trade between China and developed countries such as the United States, Europe, and Japan, with limited studies on developing countries and regions. This paper innovatively approaches the topic from a regional economic and trade perspective, selecting five ASEAN countries as the research objects. It utilizes time-series data from 1998 to 2019 to measure the impact of Chinese yuan exchange rate fluctuations on China-ASEAN trade from both import and export aspects, while also incorporating total economic demand as an independent variable to provide a comprehensive analysis. The data used in this article is the most recent available, and the research conclusions are drawn based on the actual situation of China and ASEAN, providing valuable insights for the future development of their trade relationship.

2. Theoretical Background and Literature Review

2.1. Exchange Rate Pass-through

Exchange rates represent the value of one country's currency in terms of another country's currency and play a crucial role in regulating international trade. Exchange rate fluctuations can alter the prices of traded goods, thereby affecting a country's overall price level, a phenomenon known as exchange rate pass-through. From the perspective of an importing country, when the nominal exchange rate changes by 1%, the percentage change in the prices of imported goods denominated in the domestic currency is referred to as the exchange rate pass-through rate. It is used to measure the elasticity of a country's exchange rate with respect to its domestic commodity prices. In a perfectly competitive market, the exchange rate pass-through rate is 100%, meaning that exchange rate changes are fully reflected in the prices of imports and exports. However, in reality, markets are often characterized by imperfect competition, leading to incomplete exchange rate pass-through, where exchange rate changes do not fully translate into price changes in traded goods. This reduces the sensitivity of foreign trade to exchange rate fluctuations and weakens the exchange rate's role in regulating a country's balance of payments.

With the acceleration of market globalization, more and more price setters have emerged in the imperfectly competitive international market, leading to increased exploration of the causes of incomplete exchange rate pass-through. Dornbusch (1987) took a microeconomic perspective and argued that exporters spontaneously adjust the marginal profit of their export goods in response to exchange rate movements, a behavior known as pricing to market. This can result in different pricing of the same commodity in different regions, causing exchange rate and price changes to be asynchronous. Pricing to market behavior is contingent on market segmentation, where factors such as transportation costs limit the tradability of goods, leading consumers to purchase goods in their home country and making it difficult to exploit price differentials between countries for arbitrage. Consequently, the law of one price does not hold, and differential pricing can occur. Additionally, Dornbusch (1987) used the Mundell-Fleming model for analysis and concluded that the extent of price adjustment by firms in response to exchange rate changes depends on the substitutability of imported goods for domestic goods and the market structure. Labys and Yang (2005) further studied this model and found a negative correlation between exchange rate pass-through and substitutability elasticity and the elasticity of output with respect to marginal costs. In an open economy, Taylor (2000) approached the topic from a macroeconomic perspective, arguing that firms tend to maintain a relatively stable cost structure when facing low inflation. Consequently, the changes in product prices are relatively small, leading to a lower exchange rate pass-through rate. The choice of

settlement currency and the stickiness of commodity prices also influence exchange rate pass-through.

Rose and Yellen (1989) used quarterly trade data from Group of Seven (G7) member countries, including the United States, the United Kingdom, and France, from the 1960s onwards. They employed regression analysis to conclude that real exchange rates significantly affect bilateral trade between nations in both directions. Onafowora (2003) focused on three ASEAN countries and utilized a Vector Error Correction Model (VECM) to explore the impact of real exchange rate fluctuations on bilateral trade balances. The results indicated a stable cointegration relationship among real domestic and foreign income, real exchange rates, and real trade balances over the long term, with the M-L condition holding. Eckaus (2004) analyzed the impact of exchange rate fluctuations on trade between China and the United States using data from 1985 to 2002. The study found that exchange rate factors had a relatively limited effect on Sino-U.S. trade. Serenis and Tsounis (2014) improved the method for measuring exchange rate volatility by using the standard deviation of the logarithmic moving average of exchange rates. They concluded that exchange rate volatility had a significantly adverse impact on exports from three African countries.

Smallwood (2019) employed the DCC-GARCH model to measure volatility and analyzed the effect of RMB exchange rate uncertainty on bilateral export growth between China and its top ten export markets. The study found that RMB exchange rate uncertainty did not affect trade between China and the United States. However, it also revealed a connection between China's inflation and increased RMB uncertainty during various exogenous events, such as the Asian currency crisis. Baek and Nam (2021) used the NARDL method to demonstrate that fluctuations in the South Korean Won (KRW) against the Chinese Yuan (CNY) had asymmetric effects on certain export and import sectors of South Korea in the long and short term (though not all types). Iqbal et al. (2020) collected daily data from January 21, 2020, to March 31, 2020, and found that temperature increase had limited importance in controlling or slowing new COVID-19 infections. However, they observed phase asynchrony in the coherence between the RMB exchange rate and COVID-19 at specific time-frequency points, indicating a negative but limited impact of the Wuhan COVID-19 outbreak on China's export economy. Mattoo et al. (2017) estimated the impact of China's exchange rate fluctuations on the exports of developing countries to third-party markets. The degree of competition between China and its competitors in developing countries played a crucial role in identifying the strategy in specific product and destination markets.

Whalley and Chen (2013) discussed China's relatively new dual structure of onshore and offshore Renminbi (RMB)

markets. A notable feature of this structure is that both onshore and offshore exchange rates are market-determined, while the onshore exchange rate is anchored to the official spot rate, and the capital account remains non-convertible. Ahmad et al. (2019) explored the relationship between China's exchange rate, foreign direct investment (FDI) inflows, and economic development. The study found that the Chinese economy benefits from a lower exchange rate and identified a direct and long-term relationship between FDI inflows and economic development at the aggregate level. Granger causality tests confirmed both long-term and short-term associations among these variables. GMM estimation with virtual variables for financial crises and fluctuations in RMB exchange rate policy further substantiated the growth-promoting effects of exchange rate and FDI inflows.

Hooy et al. (2015) focused on the Association of Southeast Asian Nations (ASEAN) and found a significant positive impact of the real RMB exchange rate on ASEAN exports to China. This effect was particularly evident in the export of high-tech and medium-tech manufactured goods, as well as component exports. Cheung et al. (2016) studied the trade flows between China and the United States from 1994 to 2012. They observed that the response of China's export value to the real Renminbi (RMB) appreciation was negative, while imports responded positively. Furthermore, the combined price effect on exports and imports implied that an increase in the real value of the RMB would reduce China's trade surplus. Thorbecke (2015) provided value-added exchange rate data for China's processing exports from 1993 to 2013 and reported their significant impact on exports. Despite a 36% RMB appreciation from early 2005 to the end of 2013, the depreciation of supply chain countries' currencies mitigated the impact of RMB appreciation on the competitiveness of processing exports. Eichengreen and Tong (2015) studied the effects of RMB revaluation on corporate valuations, particularly focusing on the sudden currency policy change announced by China. They examined the impact on 9,753 manufacturing firms in 44 countries. The results showed that RMB appreciation did not significantly affect the average valuation of industry firms exporting to China. However, this "no result" masks the positive impact on firms exporting final products to China, while the impact on firms providing inputs for China's processing exports can be negligible.

Thorbecke (2011) argued that the empirical evidence regarding the impact of RMB appreciation on China's exports, especially for the largest export category - processing exports, is mixed. This is because a significant portion of the value-added in these goods comes from components produced in Japan, South Korea, and other East Asian supply chain countries. Therefore, controlling for the exchange rate fluctuations of these countries is crucial.

Marquez and Schindler (2007) found that a 10% real appreciation of the RMB would lead to a decrease of nearly one percentage point in China's overall export share. However, the estimated response of imports was minimal and lacked precision. Whalley and Wang (2011) discovered that the impact of RMB appreciation on the trade surplus was proportionally greater than its effect on trade volume. Moreover, the changes in trade volume could be substantial. Different processing methods in China's processing trade had a minor impact on trade volume under RMB appreciation conditions, but a significant impact on the trade surplus. The results depended on elasticity, and the greater the elasticity of substitution preference, the greater the impact on trade volume and the trade surplus.

2.2. Research within China

With the increasing openness of the Chinese economy and the ongoing exchange rate reforms, the relationship between the Renminbi (RMB) exchange rate and China's foreign trade has become a focus of domestic scholars.

Xing (2006) argued that China's exchange rate policy played a crucial role in the prosperity of Foreign Direct Investment (FDI). Both RMB depreciation and the policy of pegging the RMB to the US dollar enhanced China's competitiveness in attracting foreign direct investment. Xu and Lien (2020) studied the impact of the US-China trade war on the dynamic dependence of the RMB and its major trading partners' currencies. They used a combination of the Generalized Autoregressive Score-Driven (GAS) model and copula methods for analysis. They found that the appreciation of the US dollar against target currencies and the global economic downturn risks caused by the trade war might be factors driving changes in exchange rates and dependence between CNY and its major trading partner currencies. Ma and Wang (2019) employed copula models to analyze and compare dependence structures, indicating that the rise in commodity prices was consistent with the appreciation of the Australian dollar and the depreciation of the Chinese RMB. They also observed a weak correlation between steam coal prices and the Chinese RMB, as well as a significant relationship between natural gas prices and the Chinese RMB.

Li et al. (2015) found that the response of RMB prices to exchange rate changes was minimal, suggesting a relatively high pass-through of exchange rates to foreign currency-denominated prices. However, the response of transaction volumes was moderate and significant. Furthermore, higher productivity exporters priced their products higher, and although pass-through rates remained high, RMB appreciation reduced the likelihood of entering and staying in export markets. Jin and Zang (2013) developed a statistical model based on monthly data for

China's Foreign Direct Investment (FDI) and the Real Effective Exchange Rate (REER) index of the RMB from January 1997 to September 2012. Their empirical results indicated that, after the exchange rate system reform in 2005, RMB appreciation promoted FDI, which was a result of the changing types of FDI inflows into China in recent years. In the long term, an appropriate RMB appreciation and a more flexible exchange rate system would have a positive impact on China's monetary and micro-control policies. Zhang and Ouyang (2018) investigated the responses of enterprises to RMB exchange rate fluctuations, including export activities and profitability. They found that while RMB appreciation reduced enterprise exports, it enhanced profitability. The reduction in import costs and the upgrading of export structures were the reasons for improved enterprise profitability, with no evidence supporting the productivity channel. Chen et al. (2018) explored the impact of currency misalignment on China's exports and the spillover effects of these misalignments on the exports of nine major Asian economies. They found that over time, the RMB continued to be mildly undervalued and overvalued. Most Asian economies were affected by RMB exchange rate misalignments. Tang (2015) used a cointegrated Vector Autoregression (CVAR) model to study the relationship between China's Real Exchange Rate (RER) and economic growth. The findings suggested that the Chinese economy did not benefit from the depreciation of the RMB. In the long run, there was no direct link between RER and economic growth. Interestingly, the empirical evidence indicated that the Chinese economy seemed to be stimulated by export expansion and foreign capital inflows, indicating that the long-term equilibrium RER was jointly determined by foreign trade, foreign exchange reserves, and foreign direct investment.

Wang and Zhu (2016) found that the impact of the widely used US dollar/Renminbi exchange rate on China's exports is more significant. Specifically, a 1% appreciation of the Renminbi against the US dollar will lead to a 1.532% decrease in China's exports, while a 1% appreciation of the Renminbi's nominal effective exchange rate only results in a 0.42% decrease. More importantly, for every 1% increase in the volatility of the US dollar/Renminbi exchange rate, China's exports will decrease by 0.579%. Zhang and Guo(2021), based on daily data from China from January 2007 to September 2021, examined the factors affecting the sustainability of returns from Renminbi arbitrage trading, finding that the interest rate differential returns of the Renminbi after exchange rate reform are more traceable. Shi (2023) believes that the fluctuation of the Renminbi exchange rate has a significant impact on China's foreign trade, and that exchange rate fluctuation is an important factor affecting international trade. How to deal with the impact of Renminbi exchange rate fluctuations on China's

import and export trade is a very important issue. Yang et al. (2023) used the GARCH-MIDAS model to examine how the degree of openness and economic fundamentals—both observable and unobservable—affect the long-term volatility of the offshore exchange rate. They found that trade openness reduces long-term volatility, while financial openness has no effect. Jiang and Liu (2023) through a nonlinear autoregressive distributed lag (NARDL) model, found that the exchange rate has a nonlinear and asymmetric impact on trade balance, especially the impact of appreciation on the China-US trade balance is more significant than depreciation.

Liu and Lee (2022) used a rolling window method to study the nonlinear relationship between interest rates and exchange rates between China and the United States. The results show that the impact of the United States' interest rate adjustments on the China-US exchange rate volatility is stronger than that of China's interest rate adjustments. In addition, the changes in the China-US exchange rate have a slightly stronger impact on US interest rates than on Chinese interest rates. Zhou (2022) discussed the advantages and disadvantages of the internationalization of the Renminbi on China's import and export trade, finding that the internationalization of the Renminbi can actively promote the adjustment of national economic achievements and trade structure. Furthermore, the internationalization of the Renminbi can also provide positive leeway for monetary policy. Chao (2021) believes that the changes in China's import and export trade actually reflect the appreciation and depreciation of the Renminbi, which is closely related to the total volume of China's import and export trade and the formulation of corresponding foreign exchange measures. Generally, an increase in the Renminbi exchange rate means an appreciation of the Renminbi, which is favorable for imports, while a decrease in the Renminbi exchange rate means a depreciation of the Renminbi and a decrease in the price of export goods, thus having a greater price advantage, which is favorable for exports. Chinese companies should correctly grasp the rise and fall of the Renminbi exchange rate when developing overseas and reasonably carry out import and export trade. Xiao (2021) used the cointegration method to analyze the impact of Renminbi exchange rate changes on the import and export of China's textile and garment industry. The results show a significant positive correlation between the real effective exchange rate and import and export, and the impact of the real effective exchange rate on exports is greater. Additionally, there is also a mutually reinforcing relationship between imports and exports.

Dong et al. (2020) constructed a multi-region dynamic computable general equilibrium model to explore the impact of international oil price shocks and Renminbi exchange rate fluctuations on China's macroeconomy. The results indicate

that both the decrease in international oil prices and the depreciation of the Renminbi are beneficial to economic growth, although the impact of the Renminbi's depreciation is more pronounced. The rise in international oil prices will further widen the output gap between wealthy and poor regions, while the decrease in oil prices and the depreciation of the Renminbi will narrow the regional development differences. Chen et al. (2020) used quantile regression analysis and found that the impact of Economic Policy Uncertainty (EPU) on the volatility of China's exchange rate exhibits asymmetry and heterogeneity between different markets, with China's EPU having a positive and significant impact across all quantiles of exchange rate volatility. The impact of EPU on exchange rate volatility has mixed effects, with significant differences between economies: the EPU of the United States, Europe, and Japan have significant impacts, whereas the EPU of Hong Kong is not significantly correlated with exchange rate volatility. Wei et al. (2020) argue that the spillover of the Renminbi exchange rate is influenced by internal financial reforms and external economic shocks, however, the outbreak of COVID-19 disrupted this system and the influence of the Renminbi. Chiu and Ren (2019) applied a two-step difference GMM estimator to explore the linear and nonlinear relationships between trade balance, savings rates, and real exchange rates among China and its 102 trading partners during 1995-2014. The results show that Renminbi depreciation has varying impacts on China's bilateral trade balance depending on whether the trading partners are high-income or low-income; and the savings rate has a nonlinear effect on China's bilateral trade balance.

Xu et al. (2016) utilized micro-level data from Chinese firms and highly disaggregated customs data from 2000 to 2007 to study the impact of Renminbi exchange rate fluctuations on the export behaviors of China's multiproduct firms. The study found that real appreciation of the Renminbi has a negative impact on the export prices and quantities of China's multiproduct firms, with significant differences among firms with different productivity levels and across the product ladder within multiproduct firms. Furthermore, the real appreciation of the Renminbi narrowed the export scope of multiproduct firms and prompted firms to shift their export sales towards their best-performing products. Xing (2012) analyzed the role of processing trade in China's bilateral trade balance and the impact of Renminbi appreciation on China's processing trade. The analysis showed that real appreciation of the Renminbi would negatively affect processing imports and exports, with a 10% real appreciation of the Renminbi not only reducing China's processing exports by 9.1% but also reducing processing imports by 5.0%. Miao et al. (2013) investigated the sensitivity of stock returns of Chinese firms classified by industry to Renminbi exchange rate

fluctuations. In 16 Chinese industries, 7 recorded strong evidence of significant exposure. Evidence of scale-asymmetric effects was also found. Furthermore, they explored the characteristics of such exposure and found evidence of significant exposure among non-exporters in some industries.

From the above summaries, it is clear that scholars have not reached a consensus. Some scholars' research results indicate that exchange rate fluctuations have a significant impact on import and export trade, while other scholars believe the impact is not significant, and the specific impacts of exchange rate fluctuations on imports and exports also vary.

3. Empirical Analysis

3.1. Data Sources

The sample period for the data used in this article spans from 1998 to 2019. The real effective exchange rate data are sourced from the Bank for International Settlements (BIS), and the data on China's imports and exports to the five ASEAN countries, as well as China's Gross Domestic Product (GDP) data, are all obtained from the National Bureau of Statistics of China. The GDP data of the five ASEAN countries are sourced from the International Monetary Fund (IMF DATA) database. The import and export values and GDP data of the five ASEAN countries have been weighted, where the weights are the proportion of each country's annual imports, exports, and GDP to the total of the five ASEAN countries.

3.2. Model Specification

Based on the transmission mechanism of exchange rates on international trade and related theories, to study the impact of the Renminbi exchange rate on China-ASEAN five countries' import and export trade, the following export and import regression models are established:

$$\ln EX = \alpha_0 + \alpha_1 \ln Y_F + \alpha_2 \ln REER + \varepsilon_i \quad (1)$$

$$\ln IM = \beta_0 + \beta_1 \ln Y_C + \beta_2 \ln REER + \mu_i \quad (2)$$

In this context, EX represents the export amount from China to the five ASEAN countries, IM represents the import amount from the five ASEAN countries to China, Y_F represents the total economic demand of the five ASEAN countries, measured by the weighted GDP of these countries, Y_C represents the domestic economic demand of our country, measured by China's GDP, REER represents

the real effective exchange rate of the Renminbi, ε_i and μ_i are random disturbance terms. To facilitate subsequent regression analysis, the data on both sides of the equation are taken logarithmically to make the model more stable.

3.3. ADF Unit Root Test and Cointegration Test

Since the data selected for this study are time series data, there may be instances of non-stationarity. If non-stationary data are used for regression analysis, it often leads to the phenomenon of "spurious regression." Therefore, it is essential to first perform the ADF (Augmented Dickey-Fuller) unit root test on the variables to determine their stationarity.

Table 2: Results of Unit Root Test after First-Order Difference

Variable	ADF value	5%critical value	10%critical value	P-value	Stationarity
Δ LNEX	-4.322	-3.733	-3.312	0.021	Stationary
Δ LNIM	-4.421	-3.658	-3.268	0.017	Stationary
Δ LNREER	-3.212	-3.021	-2.652	0.034	Stationary
Δ LNGDP_F	-3.367	-3.021	-2.652	0.024	Stationary
Δ LNGDP_D	-3.313	-3.657	-3.268	0.031	Stationary

After the first differencing (in Table 2), the ADF statistic values for all variables are less than the critical value at the 10% level, thus rejecting the null hypothesis and indicating that all data are stationary. From this, it can be concluded that the import and export trade volumes between China and the five ASEAN countries, the real effective exchange rate of the Renminbi, and the GDPs of China and the five ASEAN countries are all integrated of order one. On this basis, the study continues by testing for the presence of a cointegration relationship through the ADF test on the residuals of the regression model.

Table 3: ADF Unit Root Test Results of Residual in Import and Export Models

Variable	ADF value	5%critical value	10%critical value	P-value	Stationarity
RESID01	-3.497	-3.021	-2.651	0.019	Stationary
RESID02	-4.243	-3.041	-2.661	0.004	Stationary

In Table 3, RESID01 represents the residuals from the export regression model, and RESID02 represents the residuals from the import regression model. The test results show that both have passed the ADF test, indicating that the variables in both regression models have a cointegration relationship.

Table 1: ADF Test Results

Variable	ADF value	5%critical value	10%critical value	P-value	Stationarity
LNEX	-0.632	-3.645	-3.261	0.966	Non-stationary
LNIM	-1.112	-3.645	-3.261	0.917	Non-stationary
LNREER	-1.985	-3.658	-3.269	0.619	Non-stationary
LNGDP_F	-0.634	-3.645	-3.261	0.963	Non-stationary
LNGDP_D	-2.542	-3.691	-3.287	0.333	Non-stationary

Table 1 shows the results of the level stationarity tests for each variable. It can be seen that the ADF values for all variables are greater than the critical values at the 10% significance level, indicating the presence of unit roots, which suggests that the data are nonstationary. Next, the ADF test is conducted on the first-difference of the variables.

3.4. Regression Analysis

After establishing that there is a long-term stable relationship between the real effective exchange rate of the Renminbi and the import and export trade volumes between China and the five ASEAN countries, further regression analysis is conducted on the import and export models.

Table 4: Regression Results of the Export Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.651	1.812	-0.353	0.724
LNREER	1.135	0.434	2.613	0.019
LNGDP_F	1.216	0.128	9.462	0.0000
R ²	0.993	Adjusted R ²		0.991
F-statistic	588.322	Prob(F-statistic)		0.000

Table 4 presents the regression results for the export model, where the P-value corresponding to the F-statistic is 0, indicating that the regression equation is significantly valid as a whole. The coefficient of the variable LNGDP_F is positive, and the coefficient of LNREER is negative, suggesting that the real effective exchange rate of the Renminbi is positively correlated with the total economic demand of the five ASEAN countries, and with a P-value of zero, the results are significant. This correlation is negatively related to the export trade volume to the five ASEAN countries, with a P-value less than the 5%

significance level, indicating that the Renminbi exchange rate has a significant impact on export trade.

Table 5: Regression Results of the Import Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.518	1.097	12.316	0.000
LNREER	-2.515	0.421	-6.014	0.000
LNGDP_F	1.183	0.094	12.336	0.000
R ²	0.993	Adjusted R ²		0.991
F-statistic	613.546	Prob.		0.000

Table 5 displays the regression results for the import model, where similarly, the P-value corresponding to the F-statistic is 0, indicating that the equation is significantly valid. The coefficient of the variable LNGDP_D is positive, and the coefficient of LNREER is negative, suggesting that the real effective exchange rate of the Renminbi has a positive relationship with our country's total economic demand and a negative relationship with our country's import trade volume from the five ASEAN countries. Both relationships have a P-value of 0, indicating that the test results are highly significant.

4. Conclusions

After conducting an empirical analysis on the import and export trade between China and the five ASEAN countries, the following conclusions are drawn:

First, there exists a long-term cointegration relationship between the real effective exchange rate of the Renminbi and the import and export trade volumes between China and ASEAN. An appreciation of the Renminbi exchange rate has a significant negative impact on China's exports to ASEAN and a significant positive impact on imports from ASEAN. Although the empirical results are inconsistent with the conclusions of classic trade theory, they align with the actual situation of both China and ASEAN. Since 2005, the Renminbi exchange rate has begun to appreciate, but this has not reduced China's exports to ASEAN countries. Since 2012, China's exports to ASEAN have exceeded imports, and the trade surplus has continued to expand to date. This situation arises partly because, compared to ASEAN, China has more advanced manufacturing technology and its products have clear advantages in quality and price, making Chinese export products more competitive in the ASEAN market. On the other hand, China's close geographical relationship with ASEAN countries and the rapid development of transportation methods such as roads, railways, bridges, and shipping have saved a significant amount of transportation costs. Additionally, after the establishment of the China-

ASEAN Free Trade Area, China has introduced many policies to encourage exports and reduce taxes and fees, which collectively promote the further expansion of China's trade surplus with ASEAN.

Second, the total economic demand of a country reflects its real purchasing power and has a significant impact on import and export trade. The growth of China's total economic demand significantly promotes the increase in China's import trade volume, while the increase in the total economic demand of ASEAN trade partners significantly promotes the growth of China's export trade volume. A country's good economic condition will promote the development of foreign trade and enhance the quality of bilateral cooperation.

There are some Insights and Recommendations. First, improving the foreign exchange market is crucial by lowering the entry requirements for the foreign exchange market transactions and supporting more financial institutions to trade foreign currencies, bonds, etc., providing liquidity to the foreign exchange market. Second, reform the economic system by reducing excessive regulation on businesses and individuals, guiding participants in the foreign exchange market to become genuine market players, accelerating interest rate marketization reforms and financial institution reforms, enhancing the judicial system, strengthening financial supervision, and effectively controlling risks as the capital account and financial services industry become more open. Finally, timing is crucial for Renminbi exchange rate reforms. With the ongoing appreciation trend of the Renminbi and speculative capital flowing into the Chinese market, it is not the optimal time for exchange rate mechanism reform. The implementation of exchange rate reforms should consider the global economic situation, the stability of the Renminbi exchange rate, international relations, and other factors to choose the most favorable timing.

Second, promoting the internationalization of the Renminbi requires optimizing the environment for its cross-border use. ASEAN is an important partner for China, and financial cooperation frameworks can be planned with these countries to establish financial infrastructures, guide banks to join the Renminbi cross-border payment system, and facilitate the use of the Renminbi abroad, benefiting bilateral economic and trade cooperation. Furthermore, under controllable risks, further promote Renminbi-denominated bulk commodity futures and spot contracts to upgrade the Renminbi's pricing and settlement functions in the global commodity market. Develop offshore Renminbi markets, enrich financial product types, improve financial service levels, and increase ways for overseas investors to hold Renminbi assets, making the use of Renminbi more convenient. With the further implementation of the "Belt

and Road" initiative and RCEP, regions in Southeast Asia with developed financial markets might become the next offshore Renminbi markets.

Third, due to the generally undeveloped manufacturing technology in ASEAN countries, there is a significant demand for China's electromechanical products and industrial products. Currently, as the Renminbi exchange rate is in an upward channel, this will bring certain impacts to the export trade of Chinese manufacturing enterprises. In the case of foreign currency depreciation, export enterprises will face greater exchange rate risks, leading to reduced profits. Therefore, businesses primarily engaged in international trade should be aware of hedging exchange rate risks and be familiar with various financial hedging tools to choose the most suitable financial instruments for their situation when facing different exchange rate risks. Currently, Chinese enterprises need to improve their awareness and ability to avoid exchange rate risks. Most small and medium-sized enterprises only passively manage risks when exchange rate fluctuations increase, and exchange rate risks intensify.

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