

# The Impact Factors Study on the Appropriate Scale of China's Foreign Exchange Reserves

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**Abstract:** Foreign exchange reserves play a crucial role for a country in maintaining a balance of payments, enhancing international market competitiveness, and elevating its global standing. This study employs cointegration analysis to delve into the intricate relationship between the Chinese yuan to U.S. dollar exchange rate, external debt balance, total imports, and the scale of China's foreign exchange reserves. The findings reveal that among the factors considered, total imports exert the most significant influence on the scale of China's foreign exchange reserves. In the short term, a negative correlation is observed between foreign exchange reserves and the yuan to U.S. dollar exchange rate. However, in the long term, a positive correlation emerges between foreign exchange reserves and both the yuan to U.S. dollar exchange rate and total imports. Intriguingly, a negative correlation is noted with the external debt balance over the long term. This nuanced analysis sheds light on the dynamic interplay between key economic variables, providing valuable insights for policymakers, economists, and stakeholders. By uncovering the intricate relationships and time-dependent correlations, the study contributes to a deeper understanding of the factors influencing the scale of China's foreign exchange reserves, offering a foundation for informed decision-making in the realm of international finance and trade.

**Keywords:** Foreign exchange reserves; Exchange rates; External debt balance; Total imports.

## 1. Introduction

Foreign exchange reserves, also known as forex reserves or foreign currency reserves, refer to the foreign currency assets that central banks and other governmental institutions of various countries collectively hold to meet international payment needs. Foreign exchange reserves are a crucial component of a country's official reserve assets.

Since the implementation of the foreign exchange management system reform by the People's Bank of China in 1994, China's foreign exchange reserves have consistently increased year after year. Starting from \$51.62 billion in 1994, China's foreign exchange reserves surged to \$3,127.7 billion by 2022, representing a several-fold expansion. In particular, in 2014, China's foreign exchange reserves reached an astonishing \$38,430.18 billion. In recent years, China's annual foreign exchange reserves have generally stabilized within the range of \$30,000 to \$33,000 billion. This significant growth in China's foreign exchange reserves highlights the country's efforts to strengthen its financial position and ability to address international payment obligations. The accumulation of substantial foreign exchange reserves contributes to economic stability and provides a buffer against external financial challenges.

According to the 2018 data from the International Monetary Fund (IMF), China's foreign exchange reserves accounted for nearly one-third of the global total, highlighting China's significant position in the international financial system. The question of the advantages and disadvantages of substantial foreign exchange reserves has been the subject of widespread discussion among experts and scholars in recent years, indicating a growing focus on research regarding the appropriate scale of foreign exchange reserves.

Generally speaking, foreign exchange reserves serve multiple functions, including regulating international balance of payments, stabilizing the domestic currency exchange rate, enhancing financing capabilities, and mitigating financial

risks. However, it is crucial to maintain stability in the scale of foreign exchange reserves within a certain range, as a rapid increase in reserves could potentially lead to issues such as inflation. Therefore, effective management and control of the scale of foreign exchange reserves are of paramount importance. As the global economy continues to evolve and financial markets experience fluctuations, in-depth research on the scale of foreign exchange reserves will contribute to the formulation of more scientifically sound management strategies to address various potential economic challenges. Against this backdrop, strengthening monitoring, analysis, and adjustments of foreign exchange reserves becomes a crucial element in ensuring the robust operation of a country's financial system.

## 2. Literature Review

### 2.1 Univariate Proportion Analysis Method and Ratio Analysis Method

The Univariate Proportion Analysis Method involves establishing a proportional relationship between foreign exchange reserves and an economic variable. Triffin (1960) emphasized the connection between a country's foreign exchange reserves and its international trade, arguing that these reserves should maintain a certain proportion to the total value of imports. This perspective highlights the role of foreign exchange reserves in facilitating trade and managing economic stability on the international stage.

Frenkel (1974) took a different approach by using the ratio of foreign exchange reserves to a country's broad money supply as a criterion for assessing the adequacy of foreign exchange reserves. This ratio serves as a metric to evaluate the sufficiency of reserves relative to the broader monetary context of a nation.

In the realm of ratio analysis, scholars such as Wang Guolin (2001) and Tan Mingming (2006) conducted studies employing various ratios to evaluate the adequacy of China's

foreign exchange reserves. Ratios considered in these studies include the reserve-to-import ratio, reserve-to-GDP ratio, and reserve-to-external debt ratio. Wang Guolin concluded that China's foreign exchange reserves are adequate based on these ratios, while Tan Mingming arrived at the opposite conclusion, suggesting that the reserve size is excessive. These divergent findings highlight the complexity and subjectivity involved in determining the adequacy of foreign exchange reserves using ratio analysis.

Zhang Ming (2018) took a comprehensive approach by calculating the most suitable level of foreign exchange reserves for China based on the Matrix model developed by the International Monetary Fund (IMF). This model incorporated four key variables: short-term external debt balance, securities investment liability balance, broad money balance, and export volume. Different factor coefficients were assigned to these variables under fixed and floating exchange rate regimes. The model aimed to determine the optimal foreign exchange reserve level for China under both exchange rate systems, providing a nuanced perspective on reserve adequacy that considers various economic factors.

In summary, the Univariate Proportion Analysis Method, ratio analysis, and the Matrix model developed by the IMF offer diverse approaches to assessing the adequacy of foreign exchange reserves. These methods take into account different economic variables and ratios, reflecting the multifaceted nature of evaluating and optimizing a country's foreign exchange reserve levels.

## 2.2 Regression Analysis Method

The regression analysis method, particularly through multiple regressions, serves as a powerful tool for exploring relationships between variables in a multivariate context. This analytical approach has been widely employed in studies related to foreign exchange reserves, with notable examples including research by Lane and Burke (2001) and Aizenman and Marion (2002). These studies utilize regression analysis to investigate various factors that influence the dynamics of foreign exchange reserves. The variables considered in such analyses span a range of categories, encompassing import and export volumes, monetary policy measures, economic size, exchange rate variables, and more.

For instance, Zhang Yu (2014) undertook an estimation of the appropriate level of China's foreign exchange reserves using a regression model. In this model, three key variables were considered: the difference between foreign exchange reserves and imports, Gross Domestic Product (GDP), and exchange rates. By employing regression analysis, Zhang Yu aimed to discern the relationships and dependencies among these variables, providing insights into the determinants of China's foreign exchange reserve levels.

In another example, Liu Yixin and Ma Shaokang (2019) took a nuanced approach based on the motivations for holding foreign exchange reserves. They selected three specific variables—import volume, external debt balance, and the RMB to USD exchange rate—and constructed a VAR (Vector Auto Regression) model. This sophisticated modeling technique allowed them to capture the interdependencies and interactions among the selected variables. Additionally, cointegration tests were applied to study both the long-term equilibrium relationship and short-term fluctuation relationship between foreign exchange reserves and the chosen factors.

The research conducted by Liu Yixin and Ma Shaokang

delves into the impact of these three factors on the size of China's foreign exchange reserves. By utilizing advanced econometric methods like VAR models and cointegration tests, the study goes beyond simple correlations and strives to uncover the underlying dynamics and causal relationships shaping the fluctuations in China's foreign exchange reserves. This demonstrates the versatility of regression analysis in addressing complex economic questions and providing a deeper understanding of the factors influencing the management of foreign exchange reserves.

## 2.3 Cost-Benefit Analysis Method

The Cost-Benefit Analysis Method, when viewed through the lens of equilibrium theory, has been a subject of extensive exploration, particularly in the context of developing countries. A seminal contribution to this field was made by Agarwal in 1971, who delved into the fundamental conditions of developing nations and formulated a model tailored to their specific circumstances. The crux of the Cost-Benefit Analysis Method lies in its assertion that a country maintaining a certain level of foreign exchange reserves experiences both advantages and drawbacks.

The benefits, as elucidated by this method, predominantly revolve around the preventive function of foreign exchange reserves. These reserves act as a bulwark, safeguarding the country against potential economic vulnerabilities and external shocks. The preventive role becomes especially crucial in the context of developing nations, where economic stability is often more susceptible to external pressures.

Conversely, the costs incurred by a country in holding foreign exchange reserves are primarily associated with the opportunity cost. This implies that the funds tied up in reserves could potentially have been used for alternative investment opportunities that may yield higher returns. The concept of opportunity cost underscores the trade-off involved in maintaining a substantial reserve position.

A notable advancement in this line of thought comes from Frenkel and Jovanovic (1980), who introduced a novel model challenging the conventional view. Their proposition suggests that foreign exchange reserves serve not only as a tool for adjusting the balance of international payments but, more importantly, as a proactive mechanism to prevent abnormal fluctuations in the said balance. This perspective adds a dynamic dimension to the role of reserves, emphasizing their anticipatory function in averting potential economic imbalances.

According to the Cost-Benefit Analysis Method, the optimal level of foreign exchange reserves is reached when the benefits derived from holding them align with the opportunity cost incurred. Striking this equilibrium is essential for a country to maximize the advantages of its reserve holdings while minimizing the associated costs. This nuanced approach to analyzing foreign exchange reserves provides valuable insights into their multifaceted role in shaping a nation's economic resilience and stability.

## 2.4 Summary

Since the 1960s, scholars have put forward various propositions regarding the optimal size of foreign exchange reserves, including methods such as ratio analysis, regression analysis, cost-benefit analysis, and so on. In China, scholars have primarily conducted empirical research on the determinants of the size of foreign exchange reserves based on existing foreign literature and theories, adapting them to

the specific conditions of China. Although there is currently no universally standardized definition for the optimal size of foreign exchange reserves internationally, and there is no consensus on how to measure it, over the past few decades, scholars have identified many factors influencing the size of foreign exchange reserves, providing guidance for the management of the optimal size.

In summary, existing literature has inspired the selection of macroeconomic factors in this study to serve as explanatory variables. The main focus of this study is to construct a VAR model, conduct cointegration tests, analyze the dynamic relationships between some macroeconomic variables, and discuss the impact of various variables on the optimal size of China's foreign exchange reserves.

### 3. Data Collection and Empirical Analysis

This paper employs cointegration theory, constructs a VAR model, and analyzes the factors influencing the optimal size of foreign exchange reserves. Considering the availability of data and sample size requirements, the sample range selected for this study is the annual macroeconomic data of China from 1985 to 2021. All data are sourced from the official website of the National Bureau of Statistics of China.

#### 3.1 Variable Selection

The paper adopts a comprehensive approach to measure the size of China's foreign exchange reserves (FR) by selecting three key indicators: the Chinese Yuan to US Dollar exchange rate (ER), foreign debt balance (FD), and total imports (IM). These indicators are crucial factors that reflect the dynamics of China's economic landscape, and their relationship with foreign exchange reserves is explored through empirical tests conducted using Eviews.

##### 1.Chinese Yuan to US Dollar Exchange Rate (ER):

The exchange rate between the Chinese Yuan and the US Dollar is a pivotal factor influenced by various economic factors such as national trade, international balance of payments, and interest rates. The paper notes that fluctuations in the exchange rate are expected due to these factors. Specifically, when the Chinese Yuan appreciates, it tends to lead to a decrease in exports, an increase in imports, and the inflow of foreign capital. This, in turn, contributes to the

augmentation of foreign exchange reserves. Conversely, when the Yuan depreciates, the opposite effect is observed, potentially leading to a decrease in foreign exchange reserves.

##### 2.Foreign Debt Balance (FD):

The foreign debt balance is identified as another crucial indicator. An increase in the foreign debt balance implies higher amounts of principal and interest payments due. This, in turn, can lead to a decrease in foreign exchange reserves. The relationship between foreign debt and reserves underscores the importance of managing debt levels to maintain a healthy reserve position.

##### 3.Total Imports (IM):

Total imports represent the volume of goods and services that a country brings in from abroad. The paper suggests that an increase in total imports is associated with a tendency for foreign exchange reserves to increase. This relationship can be attributed to the fact that higher imports often require larger reserves to facilitate international trade and payments.

For the empirical analysis, the paper employs logarithmic transformations for each variable. The resulting variables are denoted as LNFR (logarithm of foreign exchange reserves), LNER (logarithm of the exchange rate), LNFD (logarithm of foreign debt balance), and LNIM (logarithm of total imports). These transformations are applied to facilitate the analysis and interpretation of the results. In Eviews, the corresponding variables are labeled as LNY, LNX1, LNX2, and LNX3 for LNFR, LNER, LNFD, and LNIM, respectively, providing a clear and concise way to observe and analyze the outcomes of the empirical tests. This analytical approach enables a deeper understanding of the relationships between these key indicators and China's foreign exchange reserves.

#### 3.2 Stationarity Test

To avoid the spurious regression phenomenon, this article first employs the Augmented Dickey-Fuller (ADF) unit root test to examine each individual series, including the dependent variable and each explanatory variable. The ADF test is conducted at a significance level of 5% to test the presence of unit roots in the explanatory variables and three dependent variables. By comparing the t-values from the test results with critical values, it can be determined whether a series contains a unit root. If a unit root is found, it indicates that the series is non-stationary and needs to undergo differencing before further testing.

**Table 1.** ADF Test Results

Variable Name	ADF Test Value	5% Critical Value	Conclusion
LNFR	-0.1826	-3.5578	Non-Stationary
$\Delta$ LNFR	-5.5959	-3.5443	Stationary
LNER	-2.2817	-3.5403	Non-Stationary
$\Delta$ LNER	-5.6489	-3.5443	Stationary
LNFD	-0.7614	-2.9511	Non-Stationary
$\Delta$ LNFD	-6.3157	-3.5485	Stationary
LNIM	-0.6797	-3.5403	Non-Stationary
$\Delta$ LNIM	-4.5355	-3.5443	Stationary

Based on the above results, it can be observed that the absolute values of the statistics obtained for all variables in the ADF test are less than the absolute values of the corresponding critical values at a 5% significance level. This indicates that all variables exhibit non-stationary characteristics. However, after applying a first-order differencing to each variable, all variables successfully rejected the non-stationary hypothesis that includes a unit root

at a 5% significance level, thereby passing the stationarity test. This strongly suggests that the introduction of differencing has effectively eliminated the trend components in the time series, leading to an increased tendency toward stationarity for each variable after processing.

#### 3.3 Cointegration Test

The Johansen cointegration test is a powerful method

employed in econometrics to investigate whether multiple time series variables share a common long-term relationship. This statistical technique is particularly valuable in analyzing economic data, allowing researchers to discern whether there is a coevolution of economic variables and whether a cointegration relationship exists among them. The primary objective of the Johansen cointegration test is to uncover long-term equilibrium relationships between different variables. By doing so, it offers a more profound and comprehensive understanding of how these variables mutually influence and depend on each other over time. The test is especially relevant in macroeconomic studies where the focus is on understanding the underlying dynamics of economic systems.

In the context of the study at hand, the Johansen cointegration test is applied to examine the cointegration among four variable sequences: the Chinese Yuan to U.S. Dollar exchange rate (ER), foreign debt balance (FD), total imports (IM), and foreign exchange reserve scale (FR). Each of these variables plays a crucial role in reflecting various

aspects of China's economic landscape. The initial step involves establishing a Vector Autoregression (VAR) model. The VAR model is a statistical technique that models the interdependencies between multiple time series variables. By utilizing this model, the researchers can explore the dynamic relationships among the variables of interest. To ensure the accuracy of the model, various information criteria, such as the Akaike Information Criterion (AIC), are employed. These criteria assist in determining the optimal lag period, which is crucial for capturing the temporal dependencies and trends within the data. The optimal lag period, determined through the AIC or similar criteria, allows for a more nuanced and in-depth investigation into whether a long-term stable relationship trend exists among the selected variables. In essence, the research is seeking to identify whether there is a persistent and meaningful connection among the Chinese Yuan to U.S. Dollar exchange rate, foreign debt balance, total imports, and foreign exchange reserve scale. The following are the results of the Johansen cointegration test.

**Table 2.** Johansen Test Results  
(1) Trace test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.689336	78.12076	47.85613	0.0000
At most 1 *	0.571123	39.54229	29.79707	0.0028
At most 2	0.293129	11.60501	15.49471	0.1769
At most 3	0.004749	0.157084	3.841466	0.6919

(2) Maximum eigenvalue test

Hypothesized No. of CE(s)	Eigenvalue		0.05 Critical Value	Max-Eigen Statistic Prob.**
None *	0.689336	38.57847	27.58434	0.0013
At most 1 *	0.571123	27.93728	21.13162	0.0047
At most 2	0.293129	11.44793	14.26460	0.1331
At most 3	0.004749	0.157084	3.841466	0.6919

The Johansen test results, as presented in Table 2, provide valuable insights into the cointegration relationships among the variables LnFR, LnER, LnFD, and LnIM. The significance of these results is underscored by the application of both the trace test and the maximum eigenvalue test, each contributing to the determination of the number of cointegration equations. The trace test reveals a trace statistic of 39.54229, surpassing the 5% critical value of 29.79707 at a 5% confidence level. This leads to the rejection of the null hypothesis that posits at most 1 cointegration equation. The outcome implies the presence of at least 2 cointegration equations, suggesting a more complex relationship structure among the variables under consideration. Similarly, the maximum eigenvalue test results in a maximum eigenvalue statistic of 27.93728, which exceeds the 5% critical value of 21.13162. This outcome leads to rejecting the null hypothesis of at most 1 cointegration equation, providing additional support for the existence of at least 2 cointegration equations. The consistency between the trace test and the maximum eigenvalue test reinforces the robustness of the findings and strengthens the case for multiple cointegration relationships.

The conclusion drawn from these tests is that there are at least 2 cointegration relationships among LnFR, LnER, LnFD, and LnIM. This signifies stable long-term relationships extending beyond transient, short-term associations.

Understanding these cointegration relationships is crucial for unraveling the intricate web of interactions and interdependencies among the variables. The inclusion of foreign exchange reserves, exchange rates, external debt, and total imports in these relationships suggests a comprehensive analysis that spans key economic indicators. Moreover, recognizing the stability of these long-term relationships is essential for comprehending the enduring impacts on the economic system. Whether it's the influence of exchange rates on foreign exchange reserves, the role of external debt in shaping these relationships, or the contribution of total imports to the overall economic dynamics, the identified cointegration relationships provide a foundation for policymakers and researchers to formulate informed strategies and policies.

In conclusion, the Johansen test results underscore the presence of at least 2 cointegration relationships among LnFR, LnER, LnFD, and LnIM, indicating stable long-term associations.

### 3.4 Selection of optimal lag length

The selection of an optimal lag length is a crucial step in modeling time series data, and this article employs five widely-used criteria to determine the most suitable lag structure for the unconstrained Vector Autoregressive (VAR)

model. The criteria utilized for this purpose are LR (Likelihood Ratio), FPE (Final Prediction Error), AIC (Akaike Information Criterion), SC (Schwarz Criterion), and HQ (Hannan-Quinn Criterion). Each of these criteria offers a different perspective on model selection, and their combined application provides a comprehensive approach to identifying the lag length that best captures the underlying dynamics of the data. The Likelihood Ratio (LR) criterion compares the likelihoods of the model with different lag lengths, assessing how well each model fits the data. The FPE criterion evaluates

the predictive performance of the model by considering the final prediction error. A lower FPE indicates a better fit of the model to the data. AIC, SC, and HQ are information criteria that balance the goodness of fit with the complexity of the model. AIC penalizes models for additional parameters, SC incorporates a larger penalty for complexity, and HQ provides a compromise between goodness of fit and model complexity.

Table 3 presents the results of applying these criteria to the unconstrained VAR model, showcasing the evaluation of various lag lengths.

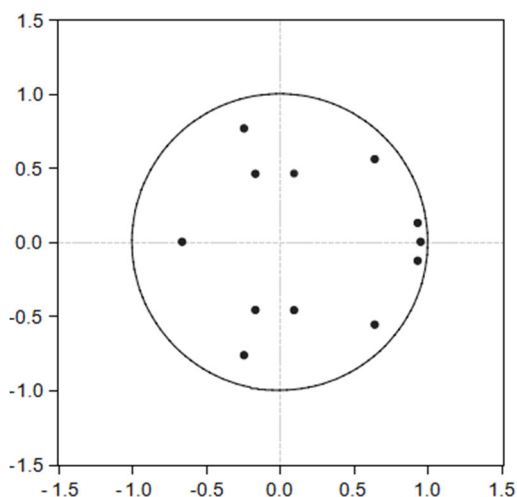
**Table 3. Optimal Lag Length for VAR Model**

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-68.92232	NA	0.000857	4.289548	4.469120	4.350788
1	110.9294	306.8058	5.63e-08	-5.348787	-4.450928*	-5.042591*
2	120.8212	14.54680	8.43e-08	-4.989482	-3.373336	-4.438330
3	148.5393	34.23996*	4.73e-08*	-5.678780*	-3.344346	-4.882671

Through the analysis of Table 3, we observe that both LR test, FPE test, and AIC information criteria all lean towards selecting a lag of 3. Therefore, based on these evaluation criteria, we conclude that the optimal lag order for the VAR model is 3.

### 3.5 AR characteristic root test

**Inverse Roots of AR Characteristic Polynomial**



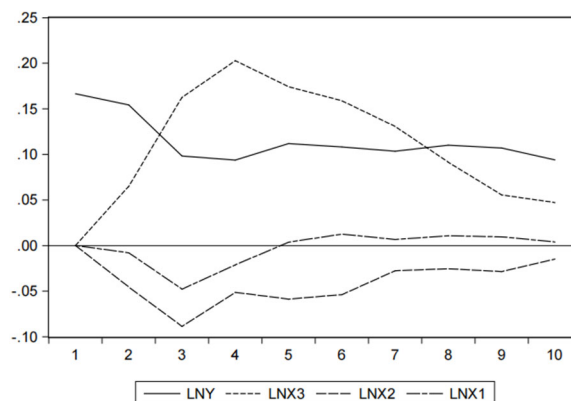
**Figure 1. AR characteristic root test**

The stability assessment of the VAR model, conducted through the reciprocal method of analyzing the AR characteristic polynomial roots, yields a crucial insight. As depicted in Figure 1, the absence of roots outside the unit circle serves as a compelling indication of the stability of the VAR model. This stability finding lays a solid foundation for conducting more in-depth analyses, adding depth and reliability to the research. With the confirmed stability, the study can now delve into advanced analytical techniques. One such avenue is the exploration of impulse response analysis, which allows for the examination of the dynamic reactions of the model variables to shocks over time. This dynamic perspective enhances our understanding of how the system responds to external influences and provides valuable insights for us.

### 3.6 Impulse Response

The impulse response function refers to the impact on the contemporaneous and future values of endogenous variables after applying a shock of one standard deviation to the random error term. This analysis helps us understand how introducing shocks into the economic system influences the interrelationships among various variables. In our study, we focus on examining how changes in foreign exchange reserves (LNFR) induce dynamic responses in the Chinese Yuan to US Dollar exchange rate (LNER), external debt balance (LNFD), and total imports (LNIM). Through the analysis of the impulse response function, we can observe the short-term and long-term effects that shocks have on these economic variables at different time points. This aids in gaining a more comprehensive understanding of the interplay between these variables and their impact on the overall economic situation. Such an approach enables us to delve deeply into the role of foreign exchange reserves in the macroeconomic context and uncover potential policy implications.

**Response of LNY to Cholesky One S.D. Innovations**



**Figure 2. Impulse Response**

As shown in the above Figure 2, after implementing an impact on itself, LNY exhibits a noticeable decline from the 1st to the 3rd period, with a small fluctuation after the 3rd period, ultimately converging.

When LNX1 imposes an impact on LNY, specifically when the exchange rate of the Chinese Yuan to US Dollar (LNER)

experiences a unit positive shock, the foreign exchange reserves LNFR show a negative response. In the 1st to 3rd periods, the negative response strengthens, diminishes after the 3rd period, and disappears by the 5th period. It turns into a positive response after the 5th period, gradually converging.

Following an impact by LNX2 on LNY, i.e., when the external debt balance LNFD undergoes a unit positive shock, the foreign exchange reserves LNFR consistently exhibit a negative response. The negative impact intensifies from the 1st to the 3rd period, gradually weakens with an increase in periods, and ultimately converges.

Upon an impact from LNX3 on LNY, meaning when the total import amount LNIM undergoes a unit positive shock, the foreign exchange reserves LNFR consistently show a positive influence. The positive impact increases rapidly in the 1st to 4th periods, then diminishes at a relatively faster rate, ultimately converging.

From the above analysis, it can be inferred that the fluctuations in the Chinese Yuan to US Dollar exchange rate and total import amount have a negative effect on foreign exchange reserves in the short term but a positive effect in the long term. Regardless of the duration, the fluctuations in external debt balance consistently have a negative impact on foreign exchange reserves, while the total import amount consistently has a positive impact.

### 3.7 Variance decomposition

By using the variance decomposition method, one can comprehend the impact of various factors on foreign exchange reserves and further evaluate the significance of different structural shocks.

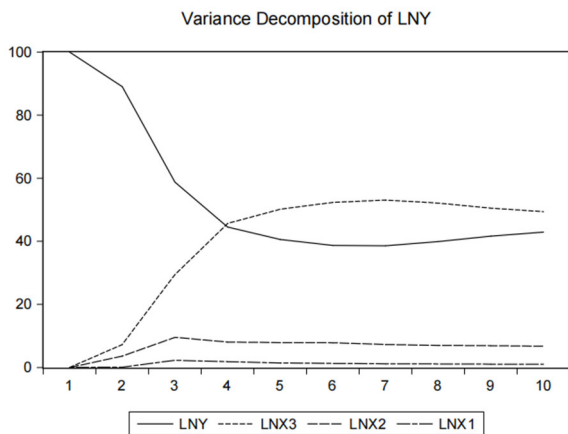


Figure 3. Variance decomposition

According to the presentation in the above Figure 3, if we do not consider the contribution rate of foreign exchange reserves itself, it can be observed that the changes in LNY, especially those caused by LNX2 and LNX3, are quite significant. Specifically, the balances of foreign debt (LNFD) and total imports (LNIM) make important contributions to the variations in the scale of foreign exchange reserves (LNFR). Over the long term, the contribution of total imports to the changes in the scale of foreign exchange reserves is more pronounced compared to the short term, reaching around 50% in the long run. In contrast, the contribution level of foreign debt balances to the changes in the scale of foreign exchange reserves is maintained at around 10%. However, the contribution of the Chinese Yuan to US Dollar exchange rate to the changes in the scale of foreign exchange reserves has consistently remained at a relatively low level, with a less

significant impact. These findings contribute to a more comprehensive understanding of the extent to which various factors influence changes in the scale of foreign exchange reserves, providing important insights for the formulation of relevant policies and strategies.

## 4. Result Analysis and Evaluation

Through a detailed analysis of the factors influencing the size of foreign exchange reserves, namely the exchange rate of the Chinese Yuan to the U.S. Dollar, external debt balance, and total imports, we can gain an in-depth understanding of the roles these factors play in the dynamics of foreign exchange reserves. Among these factors, total imports are identified as having the most significant impact on the size of foreign exchange reserves. Results from impulse response analysis reveal a short-term negative correlation between foreign exchange reserves and the exchange rate of the Chinese Yuan to the U.S. Dollar, indicating that foreign exchange reserves respond correspondingly to instantaneous effects of exchange rate fluctuations. In the long term, foreign exchange reserves exhibit a positive correlation with both the exchange rate of the Chinese Yuan to the U.S. Dollar and total imports, possibly reflecting the common trends in international trade and exchange rates over an extended period. Conversely, foreign exchange reserves demonstrate a negative correlation with external debt balance, suggesting that an increase in external debt exerts a certain negative pressure on the size of foreign exchange reserves.

From the perspective of variance decomposition, the impact of the Chinese Yuan to U.S. Dollar exchange rate and external debt balance on changes in foreign exchange reserves is relatively small, accounting for approximately 10% of the overall impact when combined. In contrast, total imports play a crucial role in this decomposition, contributing significantly to fluctuations in foreign exchange reserves, especially over the long term, where the contribution can reach around 50%. This further emphasizes the importance of international trade in shaping the size of foreign exchange reserves, particularly with a notable impact on long-term reserve levels.

In summary, the analysis indicates that these three factors collectively influence variations in the size of foreign exchange reserves to a certain extent, with total imports playing the most significant role. This in-depth exploration contributes to a more comprehensive understanding of the mechanisms behind foreign exchange reserves, offering more accurate guidance for policy formulation. These research findings not only provide valuable insights into the foreign exchange market and international trade but also serve as beneficial references for decision-makers in formulating future policies and addressing external economic changes.

## 5. References Policy Suggestion

There are various factors influencing the optimal scale of foreign exchange reserves. This paper enumerates three of these factors, thereby deriving a general approach to analyze the impact of each factor on foreign exchange reserves. Based on the three variables selected in this paper, the following recommendations are proposed:

### 5.1 Stabilize Exchange Rate

Regarding the importance of exchange rate stability, despite the analysis above indicating a relatively minor impact of the RMB to USD exchange rate on the fluctuation

of foreign exchange reserves, stable exchange rates have a multifaceted impact on the scale of foreign exchange reserves. In recent years, China has faced challenges to economic development from various factors such as U.S.-China trade tensions, the COVID-19 pandemic, Russia-Ukraine conflict, anti-globalization trends, and international populism. In this complex international context, the fluctuations in the RMB to USD exchange rate have been increasing continuously, influenced by changes in the external environment. Therefore, to maintain the stability of the scale of foreign exchange reserves, the central bank should take measures to keep the RMB to USD exchange rate relatively stable and restrain excessive fluctuations in the exchange rate.

Considering the uncertainty of the current economic situation, the central bank, in formulating policies, should closely monitor changes in the international economic environment and take appropriate monetary policy measures. For instance, monitoring and analyzing factors that may lead to fluctuations in the RMB to USD exchange rate and adjusting policies promptly to ensure the optimal scale of foreign exchange reserves.

Furthermore, to better adapt to global economic fluctuations, the central bank may also consider diversifying the composition of foreign exchange reserves, reducing dependence on specific currencies to mitigate risks arising from fluctuations in specific currencies. By establishing a more flexible foreign exchange reserve management mechanism, the central bank can better maintain the long-term stability and robustness of foreign exchange reserves.

## 5.2 Prudently Manage External Debt

The negative correlation between the external debt balance and China's foreign exchange reserves requires the government's high attention. In order to enhance the efficiency of external debt utilization, the government may consider implementing a series of measures:

Firstly, it is recommended to establish a unified external debt management institution to ensure effective supervision and control of external debt. By centrally managing external debt, the government can more accurately grasp the situation of external debt, timely formulate corresponding policies to respond to fluctuations in external debt, and maintain a reasonable scale of external debt.

Secondly, it is suggested to formulate a scientific method for managing the size of external debt. The government can draw on international experience to establish a scientific external debt management model, taking into account factors such as the country's economic conditions, changes in the international financial markets, and set reasonable external debt size targets. This can better balance the scale of external debt, ensuring both the repayment capacity of external debt and avoiding rapid expansion of external debt, thereby reducing external debt risks.

Additionally, the government can optimize the structure of external debt, improve the efficiency of external debt utilization, and reduce the financial costs of external debt. This can better achieve the goal of balancing foreign exchange reserves. In the process of managing external debt, it is essential to carefully balance the flexibility of external debt utilization and the stability of external debt size to ensure the rational management of external debt.

In conclusion, prudently managing external debt is a crucial aspect of maintaining an appropriate scale of foreign exchange reserves. The government should take effective

measures to ensure the scientific and flexible management of external debt, adapting to the constantly changing international financial environment.

## 5.3 Optimize Trade Structure

The government can take a series of measures to optimize the trade structure, aiming to achieve a more balanced trade situation. Here are some suggestions:

Firstly, the government can diversify trade partners and explore new cooperation opportunities. Overreliance on a few trading partners may expose China's foreign trade to instability. Therefore, establishing trade relationships with more countries and regions can reduce trade risks and promote the stable development of trade.

Secondly, encouraging innovation in technology and industry to increase the added value of exported products is important. By strengthening technological innovation and improving product quality, China's exported products can better meet international market demands, enhance international market share, and achieve stable export growth.

Additionally, the government can provide policy support for the import process, such as reducing import tariffs, simplifying import procedures, and encouraging enterprises to introduce advanced technology and equipment. This helps raise the level of domestic industries and stimulates an increase in imports, thereby maintaining a relatively balanced trade structure.

Moreover, active participation in the formulation and reform of international trade rules, advocating for more trade facilitation policies, and enhancing China's voice in global trade contribute to creating a more favorable trade environment.

In general, the management of foreign exchange reserves should be standardized and normalized, adjusting various factors influencing foreign exchange reserves based on different circumstances. When foreign exchange reserves are excessive or insufficient, modifying the relevant factors affecting foreign exchange reserves can lead to a decrease or increase in reserves. This facilitates dynamic management of foreign exchange reserves, maintaining an appropriate scale of reserves.

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