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Empirical analysis of China's fiscal deficit, trade surplus and private sector savings based on historical data

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Abstract: This article conducts empirical analysis on China's fiscal deficit, current account surplus, and private sector savings data after the reform and opening-up policy. It finds a clear positive correlation between private sector savings and fiscal deficit, and a significant negative correlation between current account surplus and government fiscal deficit. As a result, it concludes that in the short term, the government can improve the fiscal deficit through international trade policies; however, in the long term, addressing private sector savings remains essential for improvement.

1. Introduction

Since the reform and opening-up, China's economy has experienced years of sustained high-speed growth, and its economic aggregate has jumped to the second largest in the world, with per capita income also entering the ranks of high-income economies worldwide. However, as China's macroeconomic operation continues, it also faces many problems. In recent years, the fiscal deficit of the Chinese government has not only failed to ease but has further deteriorated due to reasons such as the pandemic. As a key player in the macroeconomy, while considering its own sustainable development, the government should strive to improve its fiscal situation as much as possible without harming the existing economic operation. Additionally, due to the impact of the COVID-19 pandemic, government departments have invested a large amount of funds in public health facilities such as hospitals and vaccines, further exacerbating the burden on government finances.

At the current stage, China's macroeconomic performance is weak, requiring a policy arrangement of "double easing" through loose fiscal policy complemented by accommodating monetary policy. Considering that monetary policy has limited effectiveness in promoting macroeconomic operation, the government will relax fiscal policy, which has a more pronounced impact on economic growth. Since the reform and opening-up policy, the government's nominal fiscal deficit has continuously increased, showing an overall exponential upward trend, with only a few years achieving a surplus.

At the same time, we see that at the micro level, there is ample evidence indicating that the intertemporal savings of the private sector have significant implications for macroeconomic issues such as trade and government fiscal matters. When the private sector's savings are insufficient to offset the government's negative savings, a savings-investment gap will inevitably arise. According to China's actual data, although China's fiscal deficit level is lower than its savings, consideration must also be given to private sector investment. Meanwhile, when there is a trade deficit, a triple

deficit will emerge. However, concerning China's reality, we can observe that while China has maintained a trade surplus for a long time, it has also ensured a relatively low level of fiscal deficit. This could potentially lead to an imbalance in investment savings.

2. Literature Review

2.1 Fiscal deficit and trade imbalance

The relationship between government fiscal deficits and trade also exists. Xu Xiongqi (2006) pointed out that fiscal deficits and GDP have different Granger causal effects on trade. An increase in fiscal deficits leads to an increase in trade surplus, while an increase in GDP leads to a decrease in trade surplus [9]. Liu Wei (2007) found through research that fiscal deficits are one of the main influencing factors of trade balance. An increase in fiscal deficits worsens the trade balance in the short term but improves it in the long term [5]. Meanwhile, Li Shikai (2008) discovered that due to the tax reduction policies implemented by the Bush administration, the US government's fiscal deficit has become the primary explanatory variable for trade deficits [2]. Lu Yuduo and Li Fangzhou (2016) found that US fiscal policy affects international trade through interest rate mechanisms [6]. Ito (2009) empirically verified that in the 1980s, the US fiscal deficit was the main cause of the current account deficit [11]. Mohammadi (2004) examined panel data from 67 countries from 1975 to 1995 and showed a significant positive correlation between fiscal deficits and trade deficits [12].

2.2 Fiscal deficit and investment savings imbalance

In general, considering that the interconnection between these two economic variables is not so tight, there are relatively few studies on the relationship between fiscal deficits and investment-saving imbalances. This article only uncovers several representative studies. Lu Yuduo and Li Fangzhou (2016), when analyzing China's fiscal deficit, found that it impacts international trade through the savings-investment gap [6]. Yu Huiqian (2012) found in her study on the "triple deficit" economic phenomenon in the Greek government that there is no typical Granger causality between trade deficits and fiscal deficits, but changes in the savings levels of the private sector can affect the current account situation [7]. Xu Xiongqi (2010) found that the relationship between fiscal deficits and savings is not simply a positive or negative correlation. Specifically, as fiscal deficits increase, real interest rates rise, and the CPI level increases, national savings decrease. With an increase in fiscal deficits, real GDP increases, the proportion of employed people in the total population rises, and national savings increase [10].

2.3 Investment savings imbalance and trade imbalance

The relationship between investment and savings, as well as trade imbalances, is an ancient topic in economics. According to the aforementioned macroeconomic national income identity, we can see that a country's domestic savings-investment gap determines whether the country's current account is in deficit or surplus. Many economists have also empirically demonstrated this point. Obstfeld and Rogoff (2005) suggest that the apparent cause of China's trade surplus is insufficient domestic demand, while the fundamental reason is that investment has consistently been less than savings, leading to exports. Similarly, domestic scholars have pointed out the same issue [13]. Xu Shaoqiang and Jiao Wu (2007) analyzed data from 1985 to 2006 and found that the long-standing phenomenon of investment being less than savings in China is one of the fundamental reasons for the current account surplus [8]. Lin Guijun (2008) indicated that savings exceeding investment is a

key factor leading to China's current account surplus [4]. Not only concerning China, but Li Shikai (2008) drew similar conclusions regarding the external economic imbalance of the United States, finding that the U.S. trade deficit is an inevitable result of the imbalance in domestic savings-investment gap [2]. Li Jin (2010) utilized a "dual choice" model and found that the "investment-savings gap" is indeed supported by Chinese data [1]. Ito (2009), based on the perspective of the relationship between investment and savings, found that a large part of the U.S. current account deficit stems from fiscal deficits, China's current account surplus arises from excessive savings, while Japan's long-term surplus is due to insufficient investment [11].

2.4 Summary

Based on the above literature, we understand that although there have been many domestic and international studies on fiscal deficits, investment-saving imbalances, and trade deficits, most of them are based on two of these variables, with fewer articles simultaneously considering all three economic variables and providing detailed theoretical and mechanistic analyses. Secondly, while considering the deviation from equilibrium of these three economic variables, viable solutions for correction have not been proposed, especially for persistent high trade deficits and government deficits with a continuous upward trend.

This article, based on data from China's reform and opening-up period, examines the interconnection between fiscal deficits, investment-saving imbalances, and trade deficits, aiming to identify their relationships. Furthermore, it provides targeted recommendations for reversing the fiscal deficit issue based on empirical analysis results.

3. Empirical Study on China's Fiscal Deficit and Trade Imbalance

3.1 Theoretical derivation

We assume that the consumption level of the private sector is denoted as C, the savings level of the private sector is denoted as S, the total investment level is denoted as I, government purchases are denoted as G, total exports are denoted as X, total imports are denoted as M, and the overall economic output is denoted as Y.

$$Y = C + S \tag{1}$$

$$Y = C + I + G + X - M \tag{2}$$

According to the above two equations, simplification yields:

$$I - S = M - X - G \tag{3}$$

When savings are insufficient, it results in $I - S > 0$, indicating a savings gap.In this situation, there is an absolute savings gap at the overall level. However, given China's substantial annual trade surplus, it is evident that there won't be an absolute savings gap at the overall level as described above. Instead, what is more likely to occur is a savings gap within the private sector, leading to the outcome observed by the government sector.Based on the assumption that government investment levels and investment scale are relatively stable and predictable, we consider the capital formation total obtained from GDP calculation based on the expenditure method as an incomplete estimate of actual investment levels. This includes both private and government investment. Considering that government investment is primarily directed towards public infrastructure and other investments beneficial for macroeconomic operations, it cannot be significantly reduced in the short or even long term.Therefore, this paper focuses only on the savings and investment gap within the private sector. With the assumption regarding government investment, it can be observed that fluctuations

and growth in private sector investment are the main factors affecting total investment or capital formation growth.

When a country maintains a high trade surplus while also keeping a low fiscal deficit, it implies that a portion of its savings results in I<S, meaning that some savings flow abroad through international trade, either in the form of high levels of exports or through capital outflows. Whether in the form of exports or capital outflows, the ultimate outcome is a surplus in the current account of the balance of payments. Conversely, if the situation is reversed, it results in a deficit in the current account.

At the same time, considering that the government can obtain tariff revenue from international trade and can provide certain means to adjust the domestic market, thereby saving the direct costs of regulating the domestic market, there is a certain connection between trade and government fiscal revenue and expenditure. Secondly, considering that the economic activities of the private sector have a significant impact on a country's economy, the consumption, savings, and investment activities of the private sector have a great influence on government fiscal revenue and expenditure as well as policy formulation [3]. In summary, from a theoretical perspective, we have explained that the imbalance between private sector investment and savings and trade surpluses both have a significant impact on government fiscal deficits.

3.2 Empirical testing

This section provides the following empirical analysis of China's longstanding fiscal deficit and trade imbalance issues.

3.2.1 Variable selection and data issues

Overall, China's economy has performed well, but there are also some underlying economic risks. In the early stages of reform and opening up, China faced simultaneous issues of fiscal deficits and trade imbalances (trade deficits). However, with the progress of reform and opening up, China's trade pattern seems to have undergone significant changes, and the problem of inadequate private savings has also improved. Nevertheless, the issue of fiscal deficits has not been alleviated. This paper draws on the work of Yu Huiqian (2012) to study the relationship between China's fiscal deficit, trade surplus, and private sector savings [7]. The empirical analysis in this paper selects three columns of data: the Chinese government's fiscal deficit (FD), the trade surplus (TD), and total private sector savings (TS). To avoid autocorrelation and multicollinearity issues, this paper does not use total private sector consumption (TC).

To ensure the consistency and reliability of data sources and statistical criteria, the data in this article are sourced from the statistics provided by the National Bureau of Statistics of China. According to the aforementioned requirements, we have selected fiscal expenditure (FE), fiscal revenue (FR), balance of current account (credit - debit) (TD), per capita disposable income of residents (PCI), per capita consumer expenditure of residents (PCE), and total population at the end of the year (L) from the years 1982 to 2021. Additionally, based on the principles of macroeconomics, we can derive the following:

$$FD_t = FE_t - FR_t \tag{4}$$

$$TD_t = CAB_t \tag{5}$$

$$TS_t = (PCI_t - PCE_t)L_t \tag{6}$$

$$TC_t = PCE_t \tag{7}$$

3.2.2 ADF Test

In order to avoid spurious regression, it is necessary to test the stationarity of the data. There are various methods for testing stationarity, and in this article, we have chosen the Augmented Dickey-Fuller test (ADF). We obtained the results mentioned above by taking logarithms, where $Y = \ln FD_t$, $X1 = \ln TD_t$, $X2 = \ln TS_t$, $X = X2(-1)$. During the process of logarithmic transformation, we removed data points that were negative in statistics, such as fiscal surplus and trade deficit.

After taking the first-order differences of the four variables mentioned above, we obtain the results shown in Table 1 below. In the table, DM represents the first-order difference of variable M.

Table 1: ADF Test Results

Variable Name	ADF Test Value
Y	0.5996
X1	0.7818
X2	0.7515
DY	0.0000
DX1	0.0001
DX2	0.0090

According to the results in Table 1, it can be observed that, at a significance level of 5%, none of the five variables mentioned above passed the test. Therefore, these variables are non-stationary, indicating the presence of certain periodicity. However, the ADF values of the first difference form of these five sequences basically satisfy the 5% critical value condition, rejecting the null hypothesis of the existence of a unit root. Therefore, these sequences can be considered as first-order integrated I(1) sequences.

3.2.3 Cointegration test and cointegration equation

Based on the ADF unit root test mentioned above, we find that Y, X1, and X2 all satisfy the condition of being integrated of order 1 (I(1)), meeting the requirement for cointegration testing. The fundamental concept of cointegration is that if two or more time series variables are non-stationary, but their first-order differences are stationary, then these non-stationary time series variables have a long-term relationship. Building on this premise, we construct a VAR model:

$$Y_t = \sum_{i=1}^{p} A_i Y_{t-i} + BX_i + \alpha_t \tag{8}$$

In this context, represents a three-dimensional vector composed of Y, X1, and X2, where p represents the vector of the matrix to be estimated with the maximum posterior, and represents the random error term. At the same time, we consider the forward specification of government fiscal expenditure, and it is highly likely that savings from the previous period have a significant impact on the formulation of government fiscal policy in the next period. However, for savings in the current period, we indirectly derive them using the balance method, which introduces a certain bias compared to the actual savings of the private sector. Therefore, we introduce savings from the previous period of the private sector and do not introduce savings for the current period.

Through simplification of the above estimation, we obtain:

$$\Delta Y_t = \left(\sum_{i=1}^{p} A_i - I\right) Y_{t-1} - \sum_{i=1}^{p-1} \left(\sum_{i=i+1}^{p} A_i\right) \Delta Y_{t-i} + BX_i + \alpha_t \tag{9}$$

Therefore, we first determine the appropriate lag order using criteria such as AIC, and then conduct the Johansen test. Finally, we examine the residuals of the VAR model to obtain the results presented in Tables 2 and 3.

Table 2: Selection of Optimal Lag Order

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-56.77429	NA	0.059569	5.692790	5.842007	5.725174
1	16.98375	119.4178*	0.000127*	-0.474643*	0.122227*	-0.345107*
2	22.85401	7.827006	0.000182	-0.176572	0.867950	0.050116
3	30.07511	7.564960	0.000256	-0.007153	1.485022	0.316687

Considering the limitations in data acquisition and the removal of data for years with fiscal surplus and current account deficit, the actual selection of the optimal lag order was constrained to lag 1. Therefore, in this study, a lag order of three was chosen as the optimal lag order.

Table 3: Johansen Test Results

(1) Trace test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.553482	36.03665	29.79707	0.0084
At most 1	0.307370	13.46095	15.49471	0.0990
At most 2	0.107286	3.177687	3.841465	0.0746

(2) Maximum eigenvalue test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.553482	22.57570	21.13162	0.0311
At most 1	0.307370	10.28326	14.26460	0.1940
At most 2	0.107286	3.177687	3.841465	0.0746

According to the Johansen test results in Table 3, it can be observed that there exists a cointegrating equation among the aforementioned variables. Furthermore, based on the reciprocal values of all eigenvalues of the VAR model lying within the unit circle, we can assert that the VAR model is stationary. Additionally, both trace test and maximum eigenvalue test indicate the presence of a long-term and stable relationship among government fiscal deficit, private sector savings, and current account surplus.

Based on the results of the Augmented Dickey-Fuller (ADF) unit root test, we conducted a least squares regression and obtained the regression results shown in Table 4.

Table 4: OLS Regression Results and Cointegration Regression Results

(1) OLS regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.515028	0.628245	-4.003264	0.0004
X1	-0.166486	0.072962	-2.281828	0.0298
X	1.346451	0.078702	17.10830	0.0000

R-squared	0.964332	Mean dependent var	7.788182
Adjusted R-squared	0.961954	S.D. dependent var	2.049455
S.E. of regression	0.399755	Akaike info criterion	1.090581
Sum squared resid	4.794133	Schwarz criterion	1.226627
Log likelihood	-14.99458	Hannan-Quinn criter	1.136356
F-statistic	405.5408	Durbin-Watson stat	1.116207
Prob(F-statistic)	0.000000		

(2) Cointegration regression results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-0.277719	0.090724	-3.061156	0.0051
X	1.436892	0.097072	14.80233	0.0000
C	-1.613294	0.846194	-1.906529	0.0677

R-squared	0.956272	Mean dependent var	8.199240
Adjusted R-squared	0.952908	S.D. dependent var	1.792840
S.E. of regression	0.389059	Sum squared resid	3.935545
Long-run variance	0.185931		

According to the regression results in Table 4, in the long term, there is a significant negative correlation between the current account surplus and government fiscal deficit, and a significant positive correlation between private sector total savings and government fiscal deficit. It is worth noting that although there is a significant positive correlation between the current account surplus and government fiscal deficit, its impact on the government fiscal deficit is relatively small compared to private sector savings. At the same time, we find that the direction of the impact of private sector consumption and current account surplus on government fiscal deficit is opposite, but the magnitude of the impact is basically the same. Essentially, the most significant impact is from the current account surplus; when the current account surplus increases by 1%, on average, the government fiscal deficit decreases by 0.27%.

We conducted residual diagnostics for our model, and the variance inflation factors (VIFs) for variables X and X1 were both 3.497176, indicating that there is no issue of multicollinearity. Additionally, the p-value from the auxiliary regression of residuals on the first-order lagged residuals is 0.1095, suggesting the absence of autocorrelation.

3.2.4 Granger causality test

The process of establishing an econometric model essentially involves using regression analysis tools to study how changes in one economic variable affect other economic variables. However, this does not necessarily imply that two variables must have a causal relationship. Regression analysis itself does not distinguish causal direction or test for the existence of causal relationships. Therefore, in this section, we use the Granger causality test to some extent to address this limitation. The Granger causality test assesses whether, with the inclusion of past information on both X and Y, the prediction of variable Y is improved compared to using only past information on Y alone. In other words, if variable X helps explain future changes in variable Y, then X is considered a Granger cause of Y's changes.

According to the ADF unit root test results in Table 1, we found that the three variables mentioned (government fiscal deficit, current account surplus, private sector savings) are integrated of order one, indicating they are stationary. Therefore, we can directly proceed with the Granger causality test. By selecting the lag order based on the most appropriate lag selection criteria, we choose a lag order of 1 for the Granger test. The results are presented in Table 5.

Based on the results in Table 5, we found that at a significance level of 1%, the first-order lag of private sector savings is a Granger cause of government fiscal deficit. At a significance level of 5%, there is bidirectional Granger causality between the current account surplus and government fiscal deficit. Additionally, the first-order lag of private sector savings is a Granger cause of the current account surplus. These findings align with our previous conclusions, indicating that the changes in X1 and X can be considered causes of changes in Y.

Table 5: Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
X1 does not Granger Cause Y	29	5.73112	0.0242
Y does not Granger Cause X1		4.96859	0.0347
X does not Granger Cause Y	35	24.3331	2.E-05
Y does not Granger Cause X		0.10055	0.7532
X does not Granger Cause X1	30	5.24282	0.0301
X1 does not Granger Cause X		0.14024	0.7110

Through the above analysis, we have learned that the three variables examined in this paper are part of a dynamic and complex causal chain. Overall, they are interconnected either directly or indirectly, with changes in one variable affecting the others.

3.2.5 Vector Error Correction Model (VECM)

"Vector Error Correction Model (VECM)" was proposed by Engle and Granger. It is a VAR model with cointegration constraints, commonly used for modeling non-stationary time series with cointegration relationships. Equilibrium represents the abnormal state, while non-equilibrium represents the normal state. Therefore, if there is a short-term deviation from the equilibrium state, how to restore it to the equilibrium state? This is the problem that the Error Correction Model aims to address.

VAR model is suitable for stationary time series, describing n variables (endogenous variables) within the same sample period as linear functions of their past values. Based on the above derivation of the VAR model, we present the VAR form again:

$$\Delta y = \alpha\beta' y_{t-1} - \sum_{i=1}^{p-1}\left(\sum_{i=i+1}^{p} A_i\right)\Delta Y_{t-i} + BX_i + \alpha_t,\ \ p = 1,2\cdots T \tag{10}$$

Therefore, based on this foundation, the form of the VEC model is obtained as follows:

$$\Delta y = \alpha emc_{t-1} - \sum_{i=1}^{p-1}\left(\sum_{i=i+1}^{p} A_i\right)\Delta Y_{t-i} + BX_i + \alpha_t,\ \ p = 1,2\cdots T \tag{11}$$

Table 6: Vector Error Correction Model Analysis and Residual Test Results for the VEC Equation

	D(Y)	D(X1)	D(X)
CointEq1	-0.720257	-0.542594	-0.045095
	(0.16699)	(0.41438)	(0.04534)
	[-4.31322]	[-1.30940]	[-0.99462]
C	0.195530	0.062994	0.147891
	(0.06237)	(0.15477)	(0.01693)
	[3.13503]	[0.40702]	[8.73342]
R-squared	0.417091	0.061864	0.036654
Adj. R-squared	0.394671	0.025782	-0.000398
Sum sq. resids	2.831861	17.43831	0.208760
S.E. equation	0.330027	0.818965	0.089606
F-statistic	18.60387	1.714537	0.989268
Log likelihood	-7.652494	-33.10079	28.85259
Akaike AIC	0.689464	2.507199	-1.918042
Schwarz SC	0.784621	2.602357	-1.822885
Mean dependent	0.195530	0.062994	0.147891
S.D. dependent	0.424183	0.829731	0.089588

We set $emc_t = \beta' y_t$, representing the error correction term, whose coefficient reflects the speed of adjustment back to long-term equilibrium from short-term deviations. According to the above,

we determined the optimal lag length for the VAR model to be 1. Therefore, for the vec model, the optimal lag length choice is lag 0. Meanwhile, considering the data deletion's impact on the actual situation, based on the model above, and relying on the first equation reported in Eviews, we obtain the results shown in Table 6.

From a theoretical perspective, the significance of the t-values of the error correction term is not substantial. This term merely serves a corrective function in the actual equation and does not play a decisive role. The actual correlation effect still needs to be observed from the aforementioned OLS regression results. From the VCE model, we can see that the coefficients for the first term (-0.782610), the second term (-0.542594), and the third term (-0.045095) are all negative. This to some extent adheres to the principle of reverse causality. When government fiscal deficits, current account surpluses, and private sector savings are temporarily imbalanced due to some unobservable reasons, they can self-adjust based on the previous period's economic conditions. In the long term, these three factors are likely to converge. Furthermore, we observe that the absolute values of the coefficients for the first and second terms in the above chart are much larger than that of the last term. This indicates that China's government fiscal deficit and current account surplus have strong adjustment capabilities and fast adjustment speeds, approximately 70% and 55% respectively. The absolute value of the third term is smaller, indicating a relatively slower adjustment speed of government fiscal deficits and current account surpluses after imbalance occurs. This also aligns with the actual situation, as the savings situation of the private sector cannot rapidly increase in the short term. Overall, its increase is a relatively slow process.

3.2.6 Pulse analysis

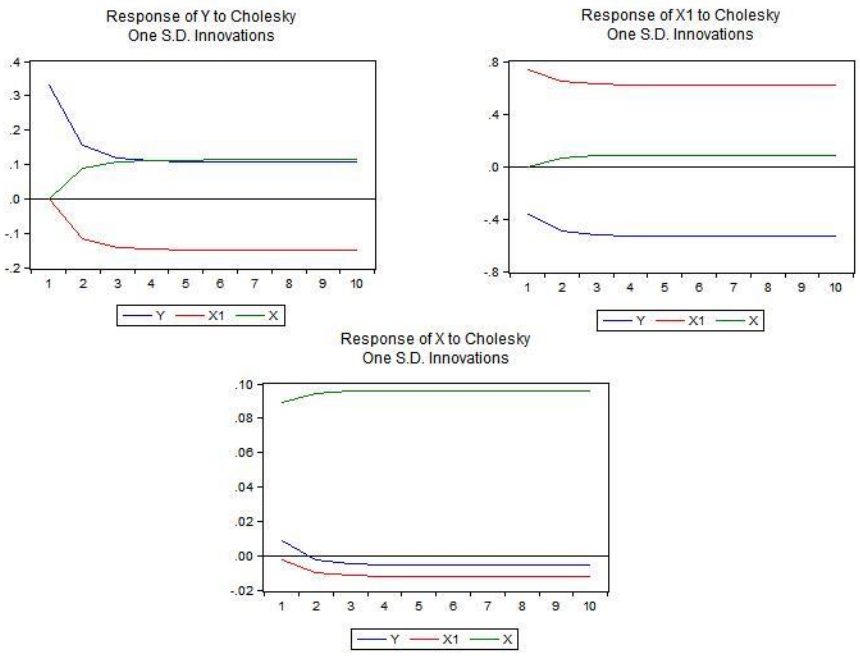

Figure 1: Pulse Response Analysis Results

The vector error correction model is actually a VAR model with cointegration constraints, so like the VAR model, the coefficient of the vector error correction model can only reflect the local dynamic relationship within the system, and cannot reflect the dynamic change law among the endogenous variables of the system. Impulse response function mainly describes the response process of a shock when other variables remain unchanged in t period and previous periods, which

can directly reflect the impact of error shock on endogenous variables.

Based on the vector error correction model established above, this paper selects generalized impulse response function to analyze the dynamic relationship between fixed asset investment and economic growth in order to avoid bias caused by variable ranking, and the number of shock periods is selected as 10.

According to the impulse response analysis in Figure 1, the upper-left graph shows the impulse response of the government fiscal deficit variable Y to its own, including lagged variables of trade surplus and private sector saving variables. The upper-right graph represents the impulse response of the trade surplus to its own, including other variables such as government fiscal deficit variable Y and private sector saving variables. The lower graph illustrates the impulse response of the private sector saving variable's lagged variable to its own, including other variables such as government fiscal deficit variable Y and trade surplus. From the above graphs, we can observe that concerning the fiscal deficit sequence, the response to its own impulse and the lagged variable impulse responses of trade surplus and private sector saving variables are relatively strong in the long run. Additionally, we notice that compared to its own shock response, the response of the trade surplus to the other two variables is stronger. Finally, we observe that the private sector saving variable only exhibits a relatively strong response to its own shock.

3.2.7 Variance Decomposition

The variance decomposition decomposes the variance of a variable in a VAR model into specific contributions from each disturbance term. Therefore, variance decomposition quantifies the relative importance of each shock factor in influencing the endogenous variables in the VAR model. In this paper, the sequence of variance decomposition is chosen as Y, X1, X, and the number of periods is selected as 10 periods.

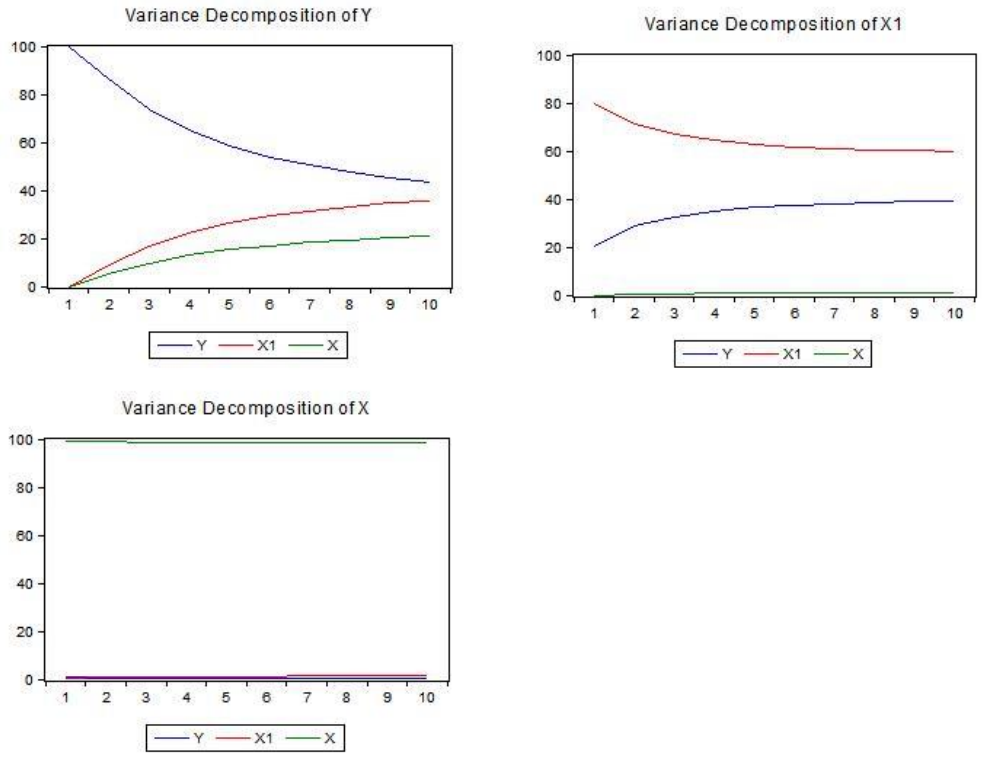

Figure 2: Variance decomposition analysis results

The figure in the top left of Figure 2 represents the variance decomposition results for the government fiscal deficit variable Y. The figure in the top right represents the variance decomposition for the trade surplus variable X1. The figure in the bottom left represents the variance decomposition for the lagged variable X representing private sector savings. The figures indicate that initially, changes in the government fiscal deficit variable are primarily explained by its own past values. Over time, the explanatory power of private sector savings and trade surplus in explaining its variation gradually increases. However, the rate at which their explanatory power increases slows down, and even after a lag of 10 periods, it does not surpass the explanatory power of the government fiscal deficit variable itself. Similarly, the changes in the trade surplus variable are initially mostly explained by its own past values. But over time, we observe that the explanatory power of the government fiscal deficit gradually increases, stabilizing at around 40%. However, private sector savings seem to have little significant impact on its variation. Lastly, changes in private sector savings are almost entirely influenced by its own past values, with minimal impact from the variations of the other two variables.

4. Conclusions and policy recommendations

From a theoretical perspective, the savings behavior of the private sector complicates the entire research issue, and also offers new insights into the study of government fiscal deficits. Based on China's government fiscal deficit, the surplus in the current account, and the consumption and savings behavior of the private sector, we have reached the following conclusions and propose certain policy recommendations based on them.

4.1 Conclusions

Based on the empirical results above, we have not found a clear Granger causality relationship between China's per capita GDP index, private sector savings, and government fiscal deficit. However, this does not imply the absence of correlation between them. Through the table above, we observe that private sector savings and per capita GDP index are both correlated with private sector consumption and current account surplus, which in turn are directly related to the government fiscal deficit. This reflects both the complexity of contemporary economic dynamics and the ability to discern the direct and indirect impacts among variables.

From the empirical results of the VAR and VCE models, we observe that government fiscal deficit is significantly influenced by its previous period. Thus, it would be challenging for China to reverse its fiscal deficit situation. However, there is feasibility in the Chinese government's efforts to enhance the level of the current account surplus through actual policies. Private sector savings are increasing slowly, and it's difficult to significantly promote private savings and net savings growth in the short term through certain measures. If we aim to reverse the fiscal deficit situation, we should start with the current account.

According to the cointegration regression and the regression of the error correction term mentioned above, when the current account surplus increases by 1%, the fiscal deficit situation decreases by 0.3%. Considering the correction term from the previous period, we can see that if the current account surplus exceeds the long-term equilibrium level in the short term, this gap will continue to widen over time, further exacerbating the situation. In summary, implementing policies to expand the trade surplus in the current account might yield greater results than expected. Moreover, in the long term, the level of private sector savings has the most significant impact on the government fiscal deficit. Despite the existence of reverse correction terms in the VEC model, their corrective ability is relatively weak. At the micro level, the savings and consumption behavior of the private sector have crucial implications for the government's fiscal balance and international

trade at the macro level. The fact that China's private sector has historically had low savings suggests that an increase in private savings will significantly improve the current account surplus and the government fiscal deficit.

At the same time, we found that the results from variance decomposition and impulse response were also highly consistent with expectations. Over time, in explaining changes in government fiscal deficits, the three variables we selected all have certain explanatory power; changes in trade surplus are mainly explained by government fiscal deficits and itself; while private sector savings are primarily explained by their own changes. This aligns with the results of the Granger causality tests we conducted.

4.2 Policy recommendations

Based on the empirical analysis and conclusions drawn from the above, we can derive the following policy recommendations.

To improve the short-term government fiscal deficit, Chinese government departments should start from a macro perspective, focusing on the current account surplus. Considering China's trade situation characterized by substantial imports and exports, adjustments can be made on both fronts. Since joining the World Trade Organization, China has consistently maintained a current account surplus, showing a trend of continuous growth. To avoid sanctions from other international markets and ensure stability, our country needs to adopt a relatively prudent trade policy.

Looking at the long term, the Chinese government should consider the situation of private sector savings. Despite being relatively high, private sector savings in China are at a globally elevated level. However, considering the government fiscal deficit and the economic and financial market investment slowdown following the pandemic, there's a risk of insufficient private sector savings. To prevent this, government departments should introduce corresponding policies to promote savings. Existing literature shows that the phenomenon of government fiscal deficits and savings-investment gaps is widespread in developed countries. Various countries are implementing policies to address the shortfall in investment and private sector savings. In China, the imbalance in household income is evident, with a small portion of wealthy individuals providing the majority of savings, while most people cannot afford substantial savings. This imbalance increases the risk of insufficient private sector savings, particularly after the pandemic.

In summary, the various economic indicators in a country's macroeconomy are not independent but rather form a complex interconnected whole. Therefore, it's crucial to focus on the interrelatedness between government fiscal deficits, current account trade surpluses, and investment-consumption imbalances to correct unhealthy economic activities. From the perspective of China's government finances, we can observe shades of Keynesian deficit spending, where fiscal measures such as issuing government bonds are used to stimulate the economy from recession to prosperity. However, over the past decade, China's fiscal deficit has not only failed to ease but has shown signs of expansion. It's important to note that no economy can sustain a perpetual deficit. For long-term stability, an economy must strive for roughly balanced revenues and expenditures over time. Therefore, the Chinese government should begin considering how to recover from long-term fiscal deficits and alleviate economic imbalances.

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