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FACTORS INFLUENCING THE FOREIGN DEBT SAFETY: AN EMPIRICAL STUDY

Abstract. *This paper analyzes the relationship between the economic development level, foreign exchange reserves, real exchange rate, the expansion of opening up (openness) and the foreign debt safety. The openness was rarely considered in the past. However, it is an important factor that can influence the foreign debt safety. In this paper, we set openness as one of the variables and constructed a special vector auto-regressive model, used 831 historical monthly data samples for empirical analysis. The result indicates that 1) economic development and openness exert long-term significant negative impact on the foreign debt-to-GDP ratio, which means they exert a positive effect on the foreign debt safety conversely; 2) the rise of real exchange rate can add to the burden of foreign debts and therefore influence debt safety; 3) a rational structure of foreign exchange reserves plays an essential role in foreign debt safety.*

Keywords*: foreign debt, debt safety, opening up, foreign exchange reserves, exchange rate.*

JEL Classification: C01, C10, C32, C51,H63, H68

1. Introduction

Foreign debt safety of a country is an important part of financial safety, which is highly associated with the stable development of national economy as well as the financial system of the country. A rational size and structure of debt constitute the foundation for financial safety of a country or a region. In recent years, the global financial crisis has become more serious and is exerting increasingly influence on national economies worldwide. Most of the financial crises that had taken place worldwide originated from countries of sovereign debt being unable to repay foreign debts due to the rapid depreciation of their currencies or decrease of foreign exchange reserves. The opening up of many sectors including finance has deepened gradually over the world and brought rapid

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economic development, accumulated massive foreign exchange reserves and seen a rapid growth of foreign debts. Meanwhile, with the rapid economic development, the imports and exports have increased sharply, leading to the acceleration of currency issue and the strong pressure to devalue currency, which will necessarily influence the foreign debt safety. In order to eliminate the potential risk in foreign debt safety, it is necessary to analyze the major factors influencing foreign debt safety first.

A fair large of literatures have researched on two relative topics: 1) the relationship between foreign debts and economic development; 2) the factors which can influence the size and utilization of foreign debts of a country. For the first topic, most of the literatures believe in the threshold effect of government debts on economic growth. Such as Reinhart and Rogoff (2010) and Woo and Kumar (2015) have found the nonlinear relationship between the central government debts and economic growth, meanwhile confirmed the critical value of a debt ratio is about 90%. Cecchetti et al (2012) has reached a conclusion that when the government debts occupied a proportion higher than 85% in the Gross National Product (GNP), the economic development of the country would be impeded. Checherita and Rother (2012) has a further study and found that the government debts would exert negative influence conversely on a long-term economic growth with a debt ration ranging between 90% to 100%. Liu et al (2014) and Gong and Cheng (2015) have found a U-shaped relationship existed between economic growth and government debts, while the fluctuation of interest rate, variation of inflation rate, changes of the current account and financial development all exerted influence on government debts. For the second field, different scholars have found different factors that could influence the size and utilization of foreign debts from different perspectives. Such as fiscal revenue and expenditure (Hemming and Petrie, 2002, Li and Ran, 2011), economic growth (Wei, 2004, Abdelhafidh, 2014, Ciftcioglu, 2018), monetary policy (Assibey, 2012, Qian and Gang , 2015), CNY/foreign currency spread, exchange rate (Couharde et al, 2016, Zhou, 2018, Guo et al, 2018) and real GDP growth (Brkic, 2016, Xu, 2018) .

On the basis of existing research, we consider the expansion of opening up as an important issue which was rarely considered before and construct a special VAR model to analyze the factors influencing the foreign debt safety.

2. Data and Methodology

2.1. Variables

2.1.1. Foreign debt-to-GDP ratio

From the related researches, three indicators consist of foreign debt-to-GDP ratio, foreign debt servicing ratio and foreign debt ratio are usually considered as the indicators to measure the safety of foreign debts. Foreign debt-to-GDP ratio means the foreign debts within a certain period to the current GDP of a country. As a long-term indicator, it can represent the dependence of the economic

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development of a country on foreign debts and reflect the risk of foreign debts. The international range of warning of this ratio is between 20% and 50%. Foreign debt servicing ratio refers to the ratio of the repayment of principal and interest on foreign debts within a certain period to current returns from export of commodities and services of a country. Foreign debt ratio is the ratio of foreign debts within a certain period to current returns from export of commodities and services of a country.

Among the three indicators, foreign debt servicing ratio and foreign debt ratio are insufficient to measure the capability to afford and repay debts, since these two indicators involve the exports, but most exports are used for import payment instead of foreign debt repayment. Therefore, foreign debt-to-GDP ratio (FD/GDP) is applied as the core leading indicator to measure foreign debt safety in this paper.

2.1.2. Real GDP

As an embodiment of the comprehensive strength of a country, GDP is closely associated with the country's capability to afford foreign debts. In general, more economically developed countries can afford more debts. In this paper, real GDP is used to reflect the economic development level, and it can be calculated as

$$GDP_{real} = \frac{GDP_{nominal}}{GDP_{deflator}} \tag{1}$$

where GDP_{real} is the real GDP, $GDP_{nominal}$ is the nominal GDP, $GDP_{deflator}$ is the GDP deflator which is also called implicit price deflator index for GDP, and the year 2004 is the base period.

2.1.3. Foreign exchange reserves-to-GDP ratio

In this paper, foreign exchange reserves-to-GDP ratio (FER/GDP) is used to reflect the structure of foreign exchange reserves which constitutes a useful indicator to measure the economic structure of a country. It should be note that an appropriate proportion of foreign exchange reserves is an important factor contributing to debt safety of a country. Usually, the indicator should be smaller than 10%, if it exceeds 10% means the irrational economic structure and there should be potential risk in foreign debts.

2.1.4. Real exchange rate

The fluctuation of exchange rate symbolizes the trend of currency value of a country. The decline of real exchange rate can indicate the constant depreciation of the currency of a country and the greater possibility of the occurrence of debt crisis. In this paper, we adopt the method applied by Li (2014) to calculate the real exchange rate of CNY as

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$$ER_{real} = E_{CNY-USD} \times \frac{CPI_{US}}{CPI_{CHN}} \quad (2)$$

where ER_{real} means the real exchange rate of CNY, $E_{CNY-USD}$ is the monthly mean value of the current exchange rate of CNY to USD, CPI_{US} is the consumer price index of the US, CPI_{CHN} is the consumer price index of China, and January 2004 is the base period.

2.1.5. Openness

Openness means the degree of opening up of a country. This analysis mainly refers to Li (1998) and measures openness of international trade in the following method

$$Openness = \frac{(E+I)}{GDP_{real}} \quad (3)$$

where E and I respectively represent the total export and total import of China.

2.2. Data source

The historical dataset consists of 831 monthly data samples from the Wind database and the statistical database of China Economic Net during the period of January 2004 to December 2017 is used for empirical analysis in this paper. To prevent multicollinearity and heteroscedasticity, the logarithm values of GDP is adopted which presents as a large value. Table 1 shows the descriptive statistics of relevant variables.

Table 1. Descriptive statistics of relevant variables

Variable	Unit	Obs	Mean	Std. Dev.	Min	Max
FD/GDP	%	168	0.1798241	0.1753572	-0.566436	0.797776
GDP_{real}	100 million yuan	159	12.45247	0.7059764	10.53658	13.59089
FER/GDP	%	168	0.525136	0.6255174	-3.149558	2.667546
ER_{real}	%	168	1482.45	79.66628	1364.3	1665.3
$Openness$	%	168	0.0628271	0.0658008	-0.267154	0.308511

2.3. Methodology

We construct a vector auto-regressive model (VAR) which was firstly proposed by Sims (1980), and mainly used for research on the relationships among economic variables in the time series is our empirical analysis. This model uses several simultaneous equations, treats each endogenous variable as the function of the lagged value of the variable, and performs regression analysis to estimate and forecast the dynamic relationships of all endogenous variables. The general VAR model can be expressed as

$$y_t = \mathbf{A_1} y_{t-1} + \mathbf{A}_2 y_{t-2} + \cdots + \mathbf{A}_p y_{t-p} + \mathbf{B}x_t + \varepsilon_t, t = 1, 2, \cdots, T \quad (4)$$

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where y_t is a k dimensional endogenous vector, x_t is a d dimensional exogenous vector, p is the lag order, T is the number of samples, $\mathbf{A_1}, \mathbf{A}_2, \cdots, \mathbf{A}_p$ are $k \times k$ dimensional coefficient matrices, $\mathbf{B}$ is a $k \times d$ dimensional coefficient matrix, and ε_t is a random error term which meets the general classical hypothesis of econometrics.

3. Empirical Test and Results

The VAR model is constructed to analyze the relationship between the real GDP (GDP_{real}), the foreign exchange reserves-to-GDP (FER/GDP), the real exchange rate of CNY to USD (ER_{real}), openness ($Openness$) and the foreign debt-to-GDP (FD/GDP) which can indicates the foreign debt safety in China. First, in order to prevent spurious regression incurred by nonstationary variable of the macro economy, we have a unit root test to evaluate the data stationarity. Then, we confirmed the model's lag order and verify the stationarity of AR root. At last, we make a test on causality between FD/GDP and other four variables, also the impulse response function analysis and variance decomposition.

3.1. Variable stationarity test

The common DF method proposed by Dickey-Fuller is applied to carry out the unit root stationarity test for FD/GDP , GDP_{real} , FER/GDP , ER_{real} and $Openness$. Table 2 shows the test results, with the significance level of 0.05, FD/GDP , GDP_{real} , FER/GDP and $Openness$ are stationary within the confidence interval of 95%. However, ER_{real} is stationary after first-order difference ($ER_{difference}$). Based on the test results and formula (4), we can construct a specific VAR model for our empirical analysis as

$$y_t = \mathbf{A_1} y_{t-1} + \mathbf{A}_2 y_{t-2} + \cdots + \mathbf{A}_p y_{t-p} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \varepsilon_t \quad (5)$$

where $y_t = FD/GDP, t = 1, 2, \cdots, T$, $x_1 = GDP_{real}$,c, $x_3 = ER_{difference}$, $x_4 = Openness$, and $\beta_1, \beta_2, \cdots, \beta_4$ are vectors.

Table 2. Unit root stationarity test result

Variable	Test of unit root t	p	Conclusion
FD/GDP	-5.320	0.0000	Stationary
GDP_{real}	-3.110	0.0258	Stationary

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FER/GDP	-6.891	0.0000	Stationary
ER_{real}	-0.612	0.8682	Non-stationary
$ER_{difference}$	-9.467	0.0000	Stationary
Openness	-5.490	0.0000	Stationary

3.2. Model's lag order confirmation

The lag order of a VAR model is determined based on the lag length criteria in the lag structure. In order to find the optimum lag order, we apply the AIC minimum standard that can be expressed as

$$AIC(p) = \ln\det\left(\sum p\right) + \frac{2n^2 p}{T} \tag{6}$$

where n is the vector dimension, p is the lag order, T is the number of samples, $\ln$ denotes the natural logarithm, $\det$ denotes the determinant of the matrix, and $\sum p$ is the estimation of the residual white noise variance-covariance matrix when the lag order is p. Table 3 shows the result that indicates the 2nd order is the optimum one. Then we make a robustness test of the model. Table 4 and Figure 1 show the test result, the reciprocals of all characteristic values of this model are smaller than 1 and all points are located within the unit circle, which fully prove the stability of the 2nd lag order of the VAR model. Therefore, we can improve the specific VAR model expressed as formula (5) to a VAR(2) model as

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 \tag{7}$$

where $\alpha_0, \alpha_1, \alpha_2, \beta_1, \beta_2, \beta_3, \beta_4$ are all coefficients should be estimated.

Table 3. Model's lag order confirmation result

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-22.1968				1.3e-06	.597732	.65339	.735691
1	424.516	893.43	25	0.000	1.2e-10	-8.67069	-8.33674*	-7.84293*
2	451.643	54.253*	25	0.001	1.1e-10*	-8.71743*	-8.10519	-7.19988
3	463.861	24.437	25	0.494	1.5e-10	-8.43651	-7.54599	-6.22916
4	482.176	36.628	25	0.063	1.8e-10	-8.28957	-7.12075	-5.39243

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Table 4. Model robustness test result

Root	Modulus
0.975111	0.975111
0.914288	0.914288
0.699451	0.699451
0.578325 - 0.065076i	0.581975
0.578325 + 0.065076i	0.581975
0.399841	0.399841
-0.158047 - 0.068663i	0.172318
-0.158047 + 0.068663i	0.172318
0.071006 - 0.105835i	0.127447
0.071006 + 0.105835i	0.127447

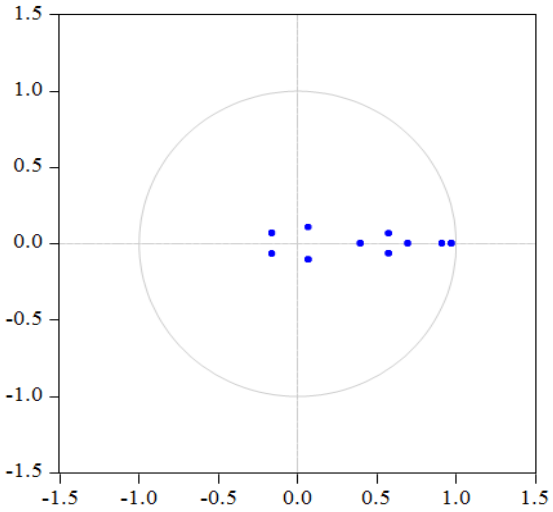

Figure 1. Inverse roots of AR characteristic polynomial

3.3. Granger causality test

We conduct a Granger causality test between the four variables which are qualified for the test and FD/GDP. Table 5 shows the result, under the condition of 2nd lag order and a significance level of 0.05, GDP_{real} constitutes an important factor contributing to the changes of FD/GDP. However, FER/GDP, $ER_{difference}$ and *Openness* exert limited influence on FD/GDP.

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Table 5. Granger causality test result

Dependent variable: FD/GDP			
Excluded	Chi-sq	df	Prob.
GDP_{real}	9.563079	2	0.0084
FER/GDP	0.060202	2	0.9703
$ER_{difference}$	0.509792	2	0.775
Openness	4.419078	2	0.1098
all	21.22418	8	0.0066

3.4. Impulse response function analysis

In order to find how the four selected factors influence FD/GDP and how the foreign debt burden of China responds to these factors, an impulse response function analysis is done. According to the capacity of sample data, we set 10 shock response periods, draw the impulse response curve of foreign debt safety of China, analyze the changing trajectory of FD/GDP and determine the influence of different factors on foreign debt safety of China.

Figure 2 shows the results, first, GDP_{real} exerts a negative impact on FD/GDP. A negative impact of standard deviation information on GDP_{real} significantly shocks FD/GDP in the 2nd and 3rd period, but the shock gradually weakens since the 4th period. It implies that the improvement of economic level will advance the comprehensive strength of China and enhance China's foreign debt affordability. Thus, it can better protect foreign debt safety of China by promoting economic development.

Second, FER/GDP exerts a positive influence on FD/GDP in the first 4 periods. In other words, along with the increase of the proportion of foreign exchange reserves in the GDP in recent years, our foreign debts are exposed to more risks. However, after the 4th period, FER/GDP shows a negative impact on China's foreign debt burden, which means that the downward adjustment of the scale of foreign exchange reserves protects foreign debt safety of China to a certain extent.

Third, under the shock of $ER_{difference}$ changes, FD/GDP gives positive response since the 1st period, reaches the positive peak at the 4th period and then falls slowly. It indicates that the higher CNY-USD exchange rate leads to more severe devaluation of CNY and more foreign debts of China, giving rise to the issue of debt safety to a certain degree.

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Fourth, *Openness* shows a negative impact on *FD/GDP* on the whole which is moderate but long-lasting. It means that *Openness* can hardly solve the issue of foreign debt safety within a short period, but will play a positive role in improving China's foreign debt safety in the long run.

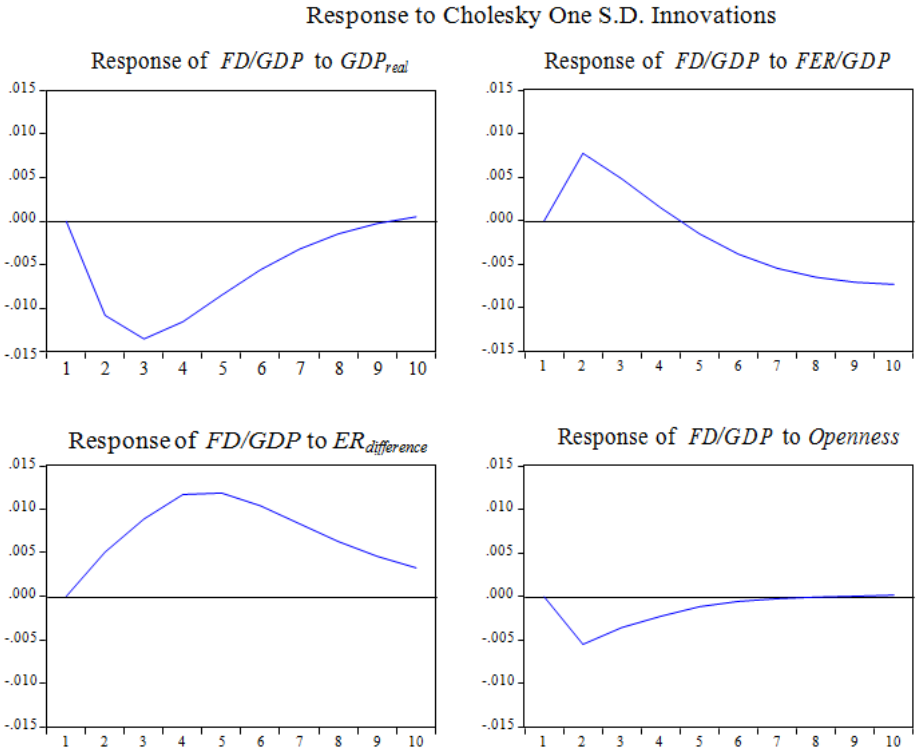

Figure 2. Impulse response analysis I

Furthermore, we also analyze how the four factors respond to *FD/GDP* and their changing trajectory.

Figure 3 shows the results, first, GDP_{real} develops from the negative peak to zero gradually. It reveals a certain pressure effect of the rise of *FD/GDP* on economic development and supports the idea that foreign debts play a threshold effect on economic development.

Second, the impact on *FD/GDP* causes negative changes of *FER/GDP*, which reduces to zero around the 10th period gradually. Therefore, the rise of *FD/GDP* (i.e. the larger size of foreign debts) proves the greater capability of China to raise capital through foreign debts. China can reserve foreign exchanges through foreign debts in case of the debt crisis. According to current statistics, China has a large accumulation of foreign exchange reserves, which protects debt safety of China. However, the large proportion of foreign exchange reserves in the

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GDP suggests the imbalance of China's economic structure, making the debt crisis more likely to happen.

Third, the impact on FD/GDP exerts an evident positive effect on $ER_{difference}$, which indicates the more severe devaluation of CNY. The shock has been decreasing and reached the minimum from the 1st to the 3rd period and rises to zero after the 3rd period. In other words, with the increase of FD/GDP, the $ER_{difference}$ declines.

Fourth, the response of *Openness* to FD/GDP is similar to the response of FER/GDP. The increase of FD/GDP promotes the opening up of China. This is mainly because China has to depend on adequate foreign exchanges to cope with the heavy burden of debts, while the major source for foreign exchanges is the import and export.

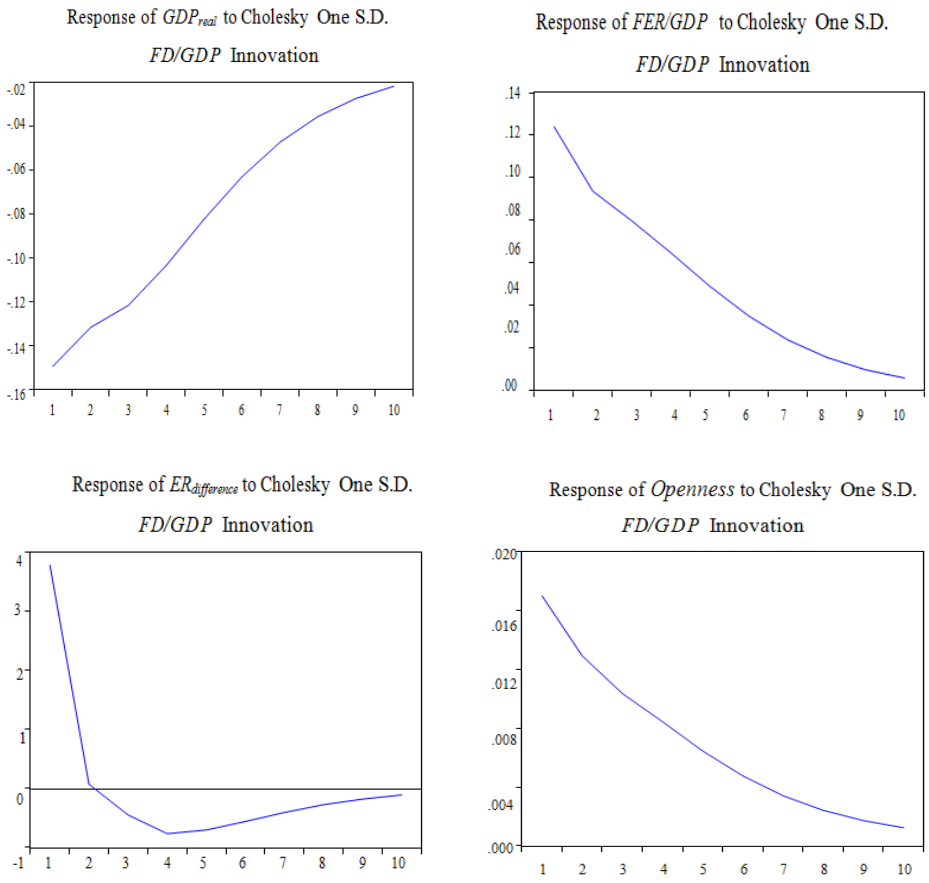

Figure 3. Impulse response analysis II

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3.5. Variance decomposition analysis

In order to evaluate the importance of each variable impact, we should analyze the contribution degree of each structural impact to the fluctuation of endogenous variables which is mainly measured through variance. In this paper, we select the 10th lag order for variance decomposition and perform variance decomposition of FD/GDP based on the VAR (2) model (formula (7)).

Table 6 shows that FD/GDP is only exposed to the influence of its own fluctuation in the 1st period. The minor impact of GDP_{real}, $ER_{difference}$, FER/GDP and *Openness* on FD/GDP only emerge in the 2nd period, which grows stronger since the 3rd period and tends to be stable since the 5th period. The contribution degrees of GDP_{real} and $ER_{difference}$ to FD/GDP have maintained high between 8% and 10% after the 6th period. The contribution degree of FER/GDP is relatively low, around 1%. Meanwhile, we find that *Openness* has constantly caused a perturbation on FD/GDP, which falls down gradually. It means that *Openness* exerts long-term influence on FD/GDP and the influence reduces gradually as time goes by. Conversely, it exerts a positive effect on the foreign debt safety of China.

Table 6. Table of FD/GDP variance decomposition

Period	S.E.	FD/GDP	GDP_{real}	FER/GDP	$ER_{difference}$	*Openness*
1	0.045022	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.058321	93.12623	3.459259	1.768212	0.760264	0.886033
3	0.067033	88.16623	6.693942	1.855958	2.332720	0.951149
4	0.072690	84.67968	8.224867	1.619234	4.570988	0.905228
5	0.076126	82.29389	8.748140	1.514951	6.594954	0.848070
6	0.078149	80.67342	8.810457	1.679078	8.027334	0.809711
7	0.079354	79.51494	8.708068	2.104196	8.886570	0.786223
8	0.080132	78.60095	8.573289	2.722506	9.332143	0.771108
9	0.080699	77.80810	8.454362	3.453150	9.524024	0.760364
10	0.081162	77.08151	8.361779	4.227306	9.577241	0.752159

Table 7 shows that GDP_{real} is affected by the fluctuation of its own, FD/GDP, FER/GDP and $ER_{difference}$, while the impact of *Openness* only reveals since the 2nd period. The influence of FD/GDP on GDP_{real} is even greater than

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the influence of itself in the first nine periods, reaching a contribution degree above 30%. The contribution degree of $ER_{difference}$ has been increasing year by year but has been lower than 30%. The contribution degree of FER/GDP to GDP_{real} is decreasing between the 2nd and the 4th period and tends to be stable after the 6th period, which has always ranged between 6% and 7%. The influence of *Openness* on GDP_{real} also increases every year, but has maintained below 3%.

Table 7. Table of GDP_{real} variance decomposition

Period	S.E.	FD/GDP	GDP_{real}	FER/GDP	$ER_{difference}$	*Openness*
1	0.045022	72.79745	14.32598	9.460019	3.416542	0.000000
2	0.058321	54.36394	27.69637	11.58363	6.345121	0.010932
3	0.067033	46.63440	32.81406	10.03748	10.39073	0.123336
4	0.072690	42.21791	34.30342	8.481970	14.58376	0.412939
5	0.076126	39.32601	34.58639	7.334886	17.94955	0.803167
6	0.078149	37.33959	34.49618	6.603313	20.34303	1.217887
7	0.079354	35.92604	34.29859	6.217462	21.93442	1.623486
8	0.080132	34.88174	34.06797	6.096913	22.94644	2.006932
9	0.080699	34.07597	33.82267	6.170174	23.56680	2.364388
10	0.081162	33.42573	33.56759	6.379509	23.93155	2.695615

Table 8 shows that FER/GDP is affected by the fluctuation of the proportion its own, FD/GDP and $ER_{difference}$, while the impact of GDP_{real} and *Openness* only emerges in the 2nd period. The influence of FD/GDP on FER/GDP attains a contribution degree over 50%, even greater than the influence of the proportion itself. The contribution degree of $ER_{difference}$ to FER/GDP increases year by year but maintains within 10%. The contribution degree of GDP_{real} to FER/GDP rises rapidly in the first five periods, and tends to be stable since the 6th period and reaches a high rate of 16%.

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Table 8. Table of FER/GDP variance decomposition

Period	S.E.	FD/GDP	GDP_{real}	FER/GDP	$ER_{difference}$	*Openness*
1	0.045022	87.53461	0.000000	11.87431	0.591089	0.000000
2	0.058321	71.00314	6.345596	20.54995	1.045911	1.055395
3	0.067033	63.11175	11.57426	21.91747	2.256664	1.139847
4	0.072690	58.68350	14.21314	21.76525	4.262461	1.075651
5	0.076126	55.98415	15.42968	21.38929	6.195481	1.001402
6	0.078149	54.35639	15.96896	21.08335	7.636194	0.955111
7	0.079354	53.40613	16.20465	20.89764	8.560488	0.931085
8	0.080132	52.87325	16.30750	20.80274	9.096353	0.920165
9	0.080699	52.58488	16.35275	20.76183	9.384483	0.916054
10	0.081162	52.43290	16.37294	20.74852	9.530502	0.915128

Table 9 shows that $ER_{difference}$ is only exposed to the influence of its own and FD/GDP in the 1st period. The minor impact of GDP_{real} , FER/GDP and *Openness* on $ER_{difference}$ only emerge in the 2nd period, and grows stronger later. The influence of FD/GDP on $ER_{difference}$ becomes stable since the 5th period and maintains high at 11%. Meanwhile, we find that *Openness* has caused a perturbation on $ER_{difference}$ constantly, which rises gradually.

Table 9. Table of $ER_{difference}$ variance decomposition

Period	S.E.	FD/GDP	GDP_{real}	FER/GDP	$ER_{difference}$	*Openness*
1	0.045022	13.32715	0.000000	0.000000	86.67285	0.000000
2	0.058321	10.95424	0.000409	0.206238	88.37961	0.459499
3	0.067033	10.67024	0.197680	1.037853	87.65280	0.441429
4	0.072690	10.90436	0.587592	1.710819	86.32949	0.467741
5	0.076126	11.11177	0.964802	2.214555	85.18922	0.519650
6	0.078149	11.22099	1.254565	2.558875	84.39652	0.569047
7	0.079354	11.25704	1.457837	2.792367	83.88609	0.606668
8	0.080132	11.25662	1.596699	2.953217	83.56046	0.633008
9	0.080699	11.24275	1.692058	3.067212	83.34697	0.651004
10	0.081162	11.22638	1.758989	3.150586	83.20064	0.663411

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Table 10 shows that *Openness* is affected by all factors including its own in the first period. The influence of FD/GDP on *Openness* is even greater than the influence of itself, reaching a contribution degree above 50%. The contribution degree of $ER_{difference}$ to *Openness* has been increasing year by year but has been lower than 11%. The contribution degree of FER/GDP to *Openness* is unstable in the first five periods and becomes more stable between 8% and 9% after the 6th period. The influence of GDP_{real} on *Openness* also increases rapidly in the first five periods and becomes more stable after the 6th period.

Table 10. Table of *Openness* variance decomposition

Period	S.E.	FD/GDP	GDP_{real}	FER/GDP	$ER_{difference}$	*Openness*
1	0.045022	82.81163	0.004691	3.136058	0.867670	13.17995
2	0.058321	76.68660	5.231688	8.374620	1.439443	8.267652
3	0.067033	70.75135	10.58798	9.722414	2.426788	6.511463
4	0.072690	66.64031	13.71844	9.688845	4.269461	5.682940
5	0.076126	63.73316	15.38839	9.320501	6.226496	5.331449
6	0.078149	61.76778	16.26637	8.931470	7.829151	5.205232
7	0.079354	60.46570	16.73697	8.632833	8.977667	5.186828
8	0.080132	59.60216	16.99587	8.440199	9.744158	5.217613
9	0.080699	59.01348	17.14070	8.338277	10.23848	5.269063
10	0.081162	58.59163	17.22120	8.305115	10.55434	5.327712

4. Conclusions

In this paper, we considered the expansion of opening up as an important factor which can influence the foreign debt safety, analyzed the relationship between the economic development level, the foreign exchange reserves, real exchange rate, openness and the foreign debt safety. We have constructed a special VAR (2) model, used 831 monthly data samples during the period of January 2004 to December 2017 for empirical analysis. Moreover, we have adopted the method of generalized impulse response variance decomposition based on this VAR(2) model and conducted empirical research on dynamic relationships of the indicators. The analysis results shows that 1) the rise of real exchange rate can add to the burden of foreign debts and therefore influence debt safety; 2) economic development and openness exert significant negative impact on the foreign debt-to-GDP ratio and therefore exert a positive effect on the foreign debt safety; 3) more foreign exchange reserves may be not better. Though the reserves can be used to balance revenue and expenditure, they also incur spread losses. Since the managed

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floating rate system is adopted in China, exchange rate is somehow decided by the market, so the rational size of foreign exchange reserves shall correspond to the economic situation of China. Thus, a rational structure of foreign exchange reserves plays an essential role in foreign debt safety of China.

Based on this empirical analysis, we will focus on how to improve the foreign debt safety of China in our future work, such as 1) further intensify the reform of exchange rate system, 2) strive to maintain a rational structure and an appropriate size, 3) continue to maintain the growth of national economy at a moderate rate, and 4) unswervingly insist on the policy of opening up.

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