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An Empirical Analysis on Correlation between Exchange Rate and CSI 300 Index under Sino-US Trade Friction

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Abstract: *This paper studies the correlation between USD/RMB exchange rate and CSI 300 index in the context of Sino-US trade frictions. Through ADF unit root test, Johanson cointegration test, impulse response and variance decomposition, VAR model and other empirical tests, the results reveal that the correlation between USD/RMB exchange rate and CSI 300 index is subjected to the intensity of Sino-US trade friction. The escalation of trade friction confrontation introduces higher negative correlation between USD/RMB exchange rate and CSI 300 index, the depreciation of RMB, and the decline of CSI 300 index. With strong reflexivity of the stock market index fluctuation trend, the major short-term sentiment fluctuation of the stock market indicates that China's stock market is still a weak-form efficient market.*

Keywords: *Sino-US trade friction; USD/RMB exchange rate; CSI 300 index; Correlation*

1. Introduction

The Sino-US trade friction was triggered by the Trump Administration's announcement of tariffs on $60 billion of imports from China in March 2018. The intense escalation of trade friction has had a negative impact on GDP growth, price stability, exchange rate changes and stock markets in China and the United States. Especially the stock market and exchange rate market of the both started with the most direct and obvious signs, which were as follows:

1.1 The Performance of US Stock Market

On August 18, 2017, the United States Government unilaterally adopted trade protectionism policies, and major global stock market indexes fell in varying degrees. For example, the Dow Jones Industrial Average fell by -274.14 points, or -1.08%. Thus, the participants believed that these policies may temper the economic outlook. On March 22, 2018, the United States Government imposed penalty tariffs on imports from China and restricted Chinese enterprises from making strategic investments and mergers in the United States. That move caused panic in major global financial markets, with the Dow Jones Industrial Average falling by -1,149.12 points, or -4.7%, and the Hang Seng Index falling by-1,105.23 points, or-3.54%. On December 1, 2018, China and the United States suspended trade restrictions such as tariff escalation, and major global indexes also rose, with the Dow Jones Industrial Average rising by 4.8%.

1.2 Performance of China Stock Market

In the first stage of Sino-US trade friction, the CSI 300 index showed a volatile trend, with no obvious rule. In the second stage, the CSI 300 index had a hick up, from 4,403.34 to 2,935.83, as high as 33.33%, which led to continuous slow decline of CSI 300 index. It showed escalated trade friction and confrontation. In the third stage, the CSI 300 index quickly bottomed out, but with positive signs in each round of trade negotiations, and the CSI 300 index rose to 3,872.34 points, or 31.9%, indicating that trade disputes parties continue to reach settlement agreements.

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1.3 Performance of China Exchange Rate Market

In the first stage of Sino-US trade friction, the USD/RMB exchange rate was in a volatile upward trend, indicating that the RMB remained appreciation cycle. In the second stage, the USD/RMB exchange rate fell in the depreciation range, depreciating from 6.302 to 7.0011, with a decline of 6,991 basis points. In the third stage, the USD/RMB exchange rate bottomed out, but with positive signs in each round of trade negotiations, which marked the coming of hick up.

This paper is prepared focusing on the correlation between USD/RMB exchange rate and CSI 300 index in the context of Sino-US trade frictions, to provide a theoretical basis for investors to avoid systematic risk or build portfolios.

2. Literature Review

Lun Chen, Shizhong Chen (2014) mainly studied the impact of mediators such as interest rate, import and export trade balance and money supply on the market, and conducted empirical analysis by using the daily data of the USD/RMB exchange rate, the CSI 300 index and interest rate to obtain the impact of the subprime lending crisis on the correlation between exchange rate and stock price [1].

Xiaoli Cui, Dongyang Qiu (2016) elaborated on the measurement model and parameter estimation method of the volatility co-movement between the foreign exchange market and the stock market, conducted an empirical study on the volatility co-movement between the foreign exchange market and the stock market in China through the N-MSV model and MCMC method, and analyzed the volatility spillover effect between the both according to the change of exchange rate volatility [2].

Yiping Guo, Xiaofeng Li (2014) discussed the interaction between the foreign exchange market and the stock market based on the classical theory and the process of China's financial opening, established a model to empirically analyze the spillover effect of the both during the evolution of the exchange rate mechanism, and constructed a capital account openness index to study the impact of capital account openness on the relationship between the two markets by using rolling window technology [3].

Jing Chen, Handong Li (2008) used a model to analyze the positive correlation between the USD/RMB exchange rate and the SSE Composite Index [4].

Lanfu Yan (2012) took Asian emerging markets as the research object, selected monthly data from 1995 to 2010, and concluded that there is a one-way positive relationship between exchange rate and stock price in the countries except Thailand [5].

Jie Yang (2010) studied the asset bubble in Japan caused by the appreciation of the yen in the last century, which led to the Japanese stock market crash. This case revealed that the appreciation of the exchange rate would affect domestic consumption and investment, and eventually resulted the depression of the stock market [6].

Zuguo Zhang, Wenbo Luo (2009) proved a negative correlation between the USD/RMB exchange rate and the stock market index during the subprime lending crisis [7].

Fangfang Zhang, Zhuo Zhang (2009) conducted an empirical study on the relationship between the RMB/USD exchange rate and the SSE Composite Index from the start date of the RMB exchange rate reform to 2009 through the error correction model (ECM), and concluded with a long-term stable cointegration relationship between them, as well as reciprocal causation [8].

Jun Zhao (2011) conducted an empirical study by referring to five A-share indexes and the daily data of USD/RMB exchange rate from July 2005 to July 2010, and also found a two-way relationship between them [9].

Caporale, G.M., Hunter, J. and AJi, F.M (2014) argued that the bursting of the Japanese bubble is a typical case to prove that there will be a close correlation between the exchange rate and the stock market index. In the 1980s, the rising of Japanese industries caused long-term international trade deficit and USD/YEN exchange rate was high. As a result, the European and American countries had trade frictions with Japan due to huge deficits, and European and American countries intervened in the international exchange rate market, forcing the yen to appreciate actively in order to reverse the international trade deficit [10].

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3. Empirical Analysis

3.1 Data Processing

The logarithmic difference and standardization are used to deal with price data.

$$dLnE_t = 100 \times (LnE_t - LnE_{t\text{-}1}); dLnCSI300_t = 100 \times (LnCSI300_t - LnCSI300_{t\text{-}1}) \quad (1)$$

Wherein, $dLnE_t$ represents the closing price volatility of the USD/RMB exchange rate in period t; dLnCSI300 represents the closing price volatility of CSI 300 index in period t. Based on the intensity of trade friction, the empirical test interval is divided, and the exchange rate volatility of the sequence from 2017/08/18 to 2018/03/22 is recorded as $dLnE_1$, and the CSI 300 index as dLnCSI300A. The exchange rate volatility of the sequence from 2018/03/22 to 2018/12/01 is recorded as $dLnE_2$ and the CSI 300 Index as dLnCSI300B. The exchange rate volatility of the sequence from 2018/12/01 to 2019/03/29 is recorded as $dlnE_3$ and the CSI 300 Index as dlnCSI300C. Excluding the non-common trading day data, this paper included 392 sets of closing price, which was taken from the eastmoney.com.

3.2 Descriptive Statistics of Data

Table 1: Descriptive Statistics of Data Sequence

Variable	Standard deviation	Skewness	Kurtosis	JB	Q(20)	Q2(20)
$dLnE_1$	0.269	-0.0173	4.2503	9.3212	-4.55	10.2749
$dLnE_2$	0.2973	-0.0524	4.1219	9.0464	10.2	111.8404
$dLnE_2$	0.2849	-0.3744	4.8911	13.444	-3.61	6.2508
dLnCSI 300A	0.8875	-1.4016	7.5852	172.08	9.32	111.8404
dLnCSI 300B	1.4311	0.0225	3.8046	4.6274	-22.9	348.19
dLnCSI 300C	1.4926	0.7066	5.1839	21.99	20.8	171.5349

The data in Table 1 shows that, from the perspective of the standard deviation of volatility, the fluctuations of the USD/RMB exchange rate and the CSI 300 stock index are gradually increasing with the intensity of trade frictions. Compared with the USD/RMB exchange rate, the volatility of the CSI 300 index is stronger. The lack of price limit system for the stock market index is also related to the formation mechanism of China's exchange rate price. In terms of skewness, the statistics of USD/RMB exchange rate volatility and the CSI 300 index volatility in the first stage are negative and follow the left-skewed distribution; While the statistics of the CSI 300 index volatility in the second and third stages are positive and follow the right-skewed distribution. The kurtosis value of each group is greater than 3, indicating that the distribution of the sequence is more gentle than the standard normal distribution. By comparison, it is found that the distribution of the sequence in the second stage is the most gentle. Under the 5% of confidence probability, the fluctuation of USD/RMB exchange rate and the volatility of CSI 300 index reject the original hypothesis, that is, the sequence distribution does not follow the normal distribution. The Q (20) and Q2 (20) values are significant, which proves the self-correlation between the fluctuation of USD/RMB exchange rate and CSI 300 index.

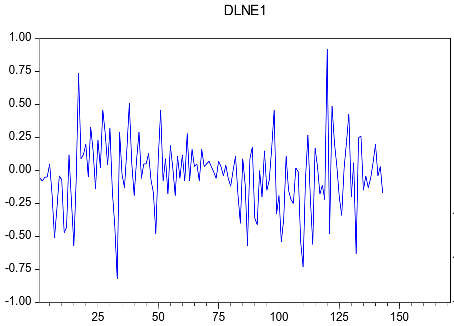

Figure 1: dLnE1 Volatility Chart

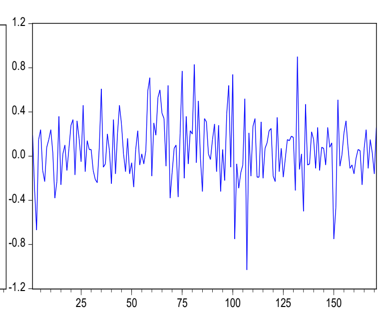

Figure 2: dLnE2 Volatility Chart

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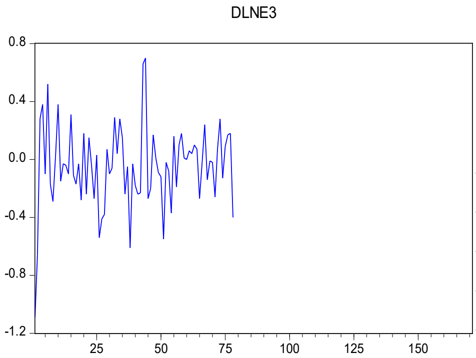

Figure 3: dLnE3 Volatility Chart

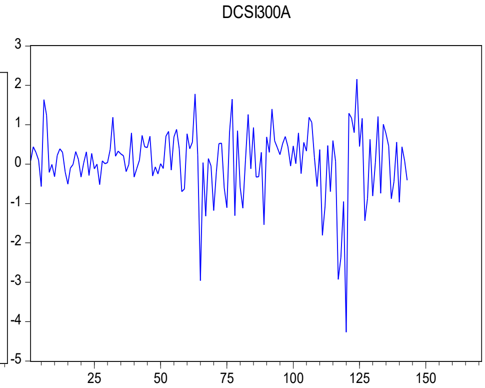

Figure 4: dLnCSI300A Volatility Chart

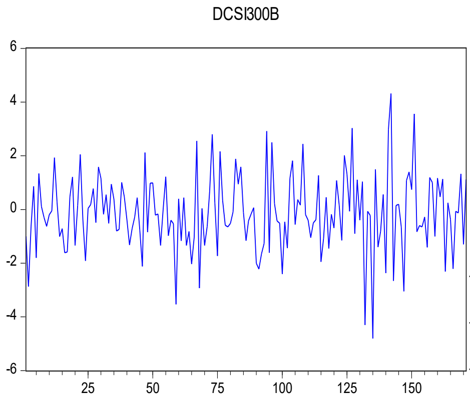

Figure 5: dLnCSI300B Volatility Chart

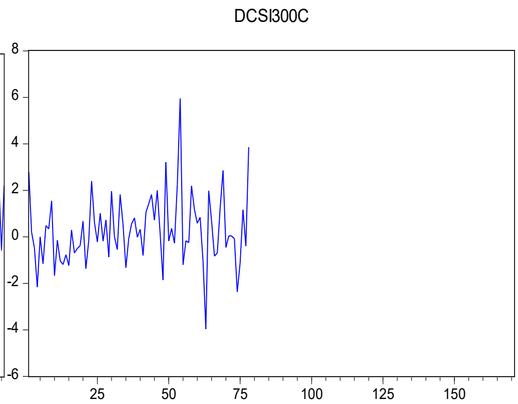

Figure 6: dLnCSI300C Volatility Chart

Fig.1, 2, 3, 4, 5 and 6 show multiple abnormal peaks in the volatility trend of the USD/RMB exchange rate and the CSI 300 index. The volatility range of the second stage sequence is larger than that of other stages, indicating that there is a phenomenon of volatility clustering, and the interval of abnormal peaks is regular.

3.3 Correlation Coefficient Analysis

The correlation is a statistical method to study the correlation form and influence between sequences. The correlation coefficient can measure the linear correlation degree between sequences. Eviews9 software is used to analyze the correlation degree between sequences.

Table 2: Correlation Coefficients in the First Stage

	$dLnE_1$	dLnCSI300A
$dLnE_1$	1	-0.17
dLnCSI300A	-0.17	1

Table 3: Correlation Coefficients in the Second Stage

	$dLnE_2$	dLnCSI300B
$dLnE_2$	1	-0.26
dLnCSI300B	-0.26	1

Table 4: Correlation Coefficients in the Third Stage

	$dLnE_3$	dLnCSI300C
$dLnE_3$	1	-0.28
dLnCSI300C	-0.28	1

According to the table 2, 3 and 4, the correlation coefficient between $dLnE_1$ and dLnCSI300A sequences in the first stage of trade friction is -0.17, showing a significant negative correlation. The correlation coefficient between $dLnE_2$ and dLnCSI300B sequences in the second stage is -0.26, showing a significant negative correlation. The correlation coefficient between $dLnE_3$ and dLnCSI300C sequences in the third stage is -0.28, showing a significant negative correlation. It can be said that there is a negative co-movement between the fluctuation of the USD/RMB exchange rate and the volatility of the CSI 300 index, that is, there is an opposite development trend between the two groups of time sequences. When the USD/RMB exchange rate appreciates, the CSI 300 index declines, presenting gradually increasing correlation between them as time passing.

3.4 ADF Unit Root Test

The ADF test is used to verify whether the sequence is transformed into a stationary time sequence after N-order difference. The ADF test expression is:

$$y_t = c + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \ldots + \alpha_p y_{t-p} \Leftrightarrow \Delta y_t = c + \rho y_{t-1} + \sum_{i=1}^{\rho-1} \varphi_t \Delta y_{t-1} + u_t \quad (2)$$

Wherein, u_t is white noise,

$$\rho = \left(\sum_{i=1}^{\rho} \alpha_i\right) - 1; \varphi_i = -\sum_{i=1}^{\rho} \alpha_j \quad (3)$$

The null and alternative hypotheses of the ADF test model are:

$$H_0: \rho = 0; H_1: \rho < 0$$

Table 5: ADF Unit Root Test Results

Sequence			$dLnE_1$	$dLnE_2$	$dLnE_3$	dLnCSI300A	dLnCSI300B	dLnCSI300C
ADF test	t-Statistics		-10.98	-14.97	-8.297	-10.4524	-14.268	-8.2593
	McKinnon critical value	1%	-2.581	-3.469	-2.595	-2.5813	-2.5786	-2.5953
		5%	-1.943	-2.878	-1.945	-1.9431	-1.9427	-1.945
		10%	-1.625	-2.575	-1.614	-1.6152	-1.6154	-1.614
	Stationarity		Stationary	Stationary	Stationary	Stationary	Stationary	Stationary
	Significance level		5%	5%	5%	5%	5%	5%

Basis: The value of t should be compared with the absolute value of the corresponding McKinnon critical value of 1%, 5% and 10%. If the value of t is always greater than the McKinnon critical value, it indicates that the null hypothesis is rejected at this level, and the time sequence is a stationary sequence.

The data in Table 5 shows that under the confidence probability of 1%, 5% and 10%, the absolute value of the t-value of each group of sequences is greater than the McKinnon critical value, so the null hypothesis is rejected, indicating that each group of sequence data is stationary.

3.5 Johansen Cointegration Test

Johanson cointegration test is used in this paper.

Null hypothesis: no cointegration relationship between the $dLnE_t$ sequence and the dLnCSI300 sequence. Alternative hypothesis: at least one cointegration equation.

Table 6: Results of Cointegration Test in the First Stage

Trace Test				
Number of the cointegration equation hypothesis	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.2749	68.1852	15.4947	0.0006
At most 1 *	0.1556	23.5120	3.8415	0.0201
Maximum Eigenvalue Test				
Number of the cointegration equation hypothesis	Eigenvalue	Maximum eigenvalue statistics	0.05 critical value	Prob.**
None *	0.2749	44.6732	14.2646	0.032
At most 1 *	0.1556	23.5120	3.8415	0.0081

According to Table 6, in the first stage, at the 5% of significance level, both the trace statistics and the maximum eigenvalue statistics are greater than the critical value, so the null hypothesis is rejected. In other words, there is a long-term equilibrium relationship between the fluctuation of the USD/RMB exchange rate and the volatility of the CSI 300 index.

Table 7: Results of Cointegration Test in the Second Stage

Trace test				
Number of the cointegration equation hypothesis	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.2821	101.4037	15.4947	0.0046
At most 1 *	0.2382	45.7140	3.8415	0.0037
Maximum Eigenvalue Test				
Number of the cointegration equation hypothesis	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.2821	55.6898	14.2646	0.0086
At most 1 *	0.2382	45.7140	3.8415	0.0014

Table 7 shows that in the second stage, at the 5% of significance level, both the trace statistics and the maximum eigenvalue statistics are greater than the critical value, so the null hypothesis is rejected. In other words, there is a long-term equilibrium relationship between the fluctuation of the USD/RMB exchange rate and the volatility of the CSI 300 index.

Table 8: Results of Cointegration Test in the Third Stage

Trace Test				
Number of the cointegration equation hypothesis	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.4617	81.5243	15.4947	0.0001
At most 1 *	0.3645	34.4516	3.8415	0.0268
Maximum Eigenvalue Test				
Number of the cointegration equation hypothesis	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None *	0.4617	47.0727	14.2646	0.0117
At most 1 *	0.3645	34.4516	3.8415	0.0095

Table 8 shows that in the third stage, at the 5% of significance level, both the trace statistics and the maximum eigenvalue statistics are greater than the critical value, so the null hypothesis is rejected. In other words, there is a long-term equilibrium relationship between the volatility of the USD/RMB exchange rate and the volatility of the CSI 300 index.

3.6 Granger Causality Test

The Granger causality test expression is:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \ldots a_m y_{t-m} + e_t \tag{4}$$

Null hypothesis:H_0: $\alpha_{12}^{(1)} = \alpha_{12}^{(2)} = \ldots = \alpha_{12}^{(\rho)} = 0$; H_1:At least one $\alpha_{12}^{(j)} \neq 0$

LR test statistics asymptotically obey$\chi^2(\rho)$

Table 9: Results of Granger Causality Test

	First stage		Second stage		Third stage	
Null Hypothesis:	F-Statistic	Prob.	F-Statistic	Prob.	F-Statistic	Prob.
dLnCSI300 does not Granger Cause dLnEt	1.08512	0.375	0.38249	0.928	0.548	0.817
dLnEt does not Granger Cause dLnCSI300	0.18049	0.024	0.25601	0.031	1.152	0.016

Table 9 shows that, at the 5% of significance level, observing the P value in the F statistic, $dLnE_t$ rejects null hypothesis of dLnCSI300 at any stage. In other words, $dLnE_t$ is the Granger cause of dLnCSI300, indicating that at any stage, the fluctuation of the USD/RMB exchange rate leads to the correlation co-movement of the CSI 300 index. However, dLnCSI300 accepts null hypothesis, that is, dLnCSI300 is not the Granger cause of $dLnE_t$. That means that the volatility of CSI 300 index is not the factor leading to the fluctuation of the USD/RMB exchange rate at any stage. Therefore, the following impulse response and variance decomposition take $dLnE_t$ as the explanatory variable and dLnCSI300 as the dependent variable.

3.7 Impulse Response and Variance Decomposition

The following part discusses the dynamic change process of the model sequence by using VAR model to set specific impact variables.

3.7.1 Variable Exogeneity Test

Table 10: Results of Variable Exogeneity Test in the First Stage

Dependent variable: dLnCSI300A		
Excluded	Chi-sq	Prob.
$dLnE_1$	1.505	0.035

Table 11: Results of Variable Exogeneity Test in the Second Stage

Dependent variable: dLnCSI300B		
Excluded	Chi-sq	Prob.
dLnE2	1.787	0.019

Table 12: Results of Variable Exogeneity Test in the Third Stage

Dependent variable: dLnCSI300C		
Excluded	Chi-sq	Prob.
$dLnE_3$	0.521	0.012

Table 10, 11 and 12 show that the $dLnE_t$ sequence rejects null hypothesis of the dLnCSI300 sequence, indicating that the fluctuation of the USD/RMB exchange rate is one of the exogenous factors affecting the volatility of the CSI 300 index.

3.7.2 Judging the Stability of the VAR Model Based on its Root Distribution Range

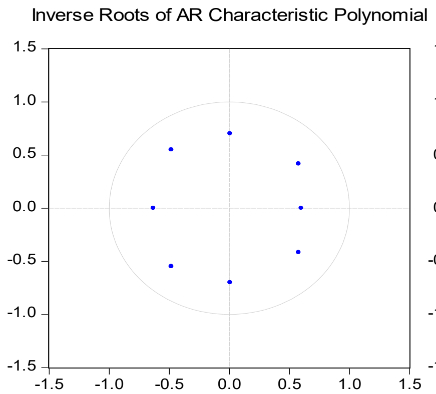

Figure 7: Root Distribution in the First Stage

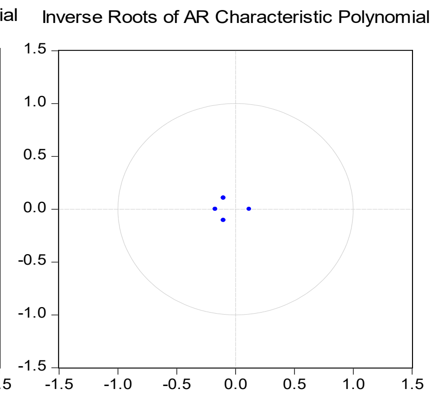

Figure 8: Root Distribution in the Second Stage

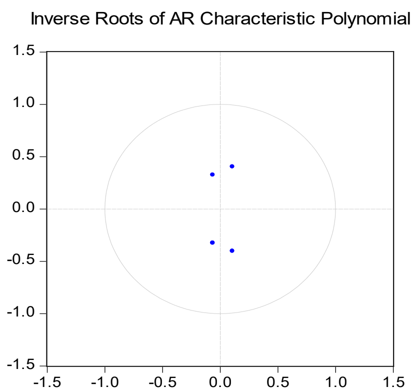

Figure 9: Root Distribution in the Third Stage

Fig.7, 8 and 9 show that the eigenroots of VAR model are located within the circle, indicating that the VAR model is stationary at any stage:

3.7.3 Variance Decomposition

Taking one unit of standard deviation $dLnE_1$ as the impulse variable to impact dLnCSI300A, as shown in the figure:

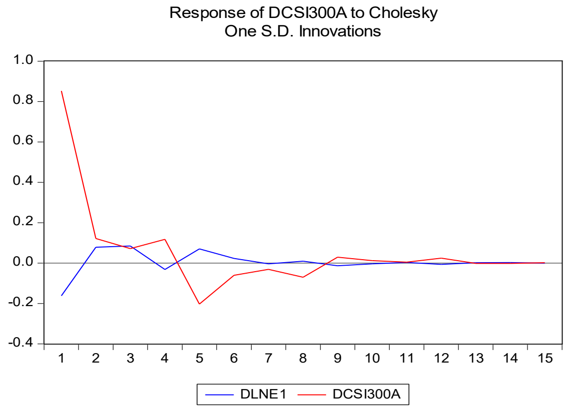

Figure 10: dLnCSI300A Impulse Response

Fig.10 shows that when a dLnCSI300A positive impact of one unit of standard deviation is applied to dLnCSI300A sequence in the first stage, an irregular impact occurs. During the process, the maximum positive impact occurs in period 1 and has plummeting effect. The maximum negative impact occurs in period 5 and diminishes slowly. A weak positive impact occurs in period 9 and reduces to zero in period 13. It shows that the abnormal change of one unit of standard deviation of CSI 300 index has the most vigorous positive impact on the volatility of CSI 300 index at the beginning of the stage, and plummeting effect. About the abnormal volatility, investors sentiment fluctuates greatly in short term, which has the maximum negative impact on the volatility of CSI 300 Index in period 5 and fading effect, following slight positive impact on the volatility of the CSI 300 index in period 9, finally reducing to zero. When a $dLnE_1$ positive impact of one unit of standard deviation is applied to dLnCSI300A sequence, the irregular impact occurs. During the process, the positive impact occurs in period 1, reaches the peak in period 3 and reduces to zero in period 7, which indicates that the abnormal volatility of one-unit USD/RMB exchange rate produces a positive impact on the volatility trend of the CSI 300 index. However, the positive impact weakens slowly. And in period 3, the maximum positive impact on the volatility of the CSI 300 index occurrs, with reducing negative impact to zero in period 7.

Table 13: Variance Decomposition in the First Stage

Period	$dLNE_1$	dCSI300A
1	0.0000	100.00
2	8.6876	91.3124
3	8.8549	90.1451
4	11.7458	88.2542
5	12.3646	87.6354
6	13.9116	86.0884
7	15.0463	84.5937
8	15.5176	84.4824
9	15.9735	84.0265
10	16.0882	83.9118

Table 13 shows that the contribution of dLnCSI300A to the volatility of its own sequence is gradually weakened. While the contribution of $dLnE_1$ volatility to the volatility of dLnCSI300A is gradually strengthened and tends to be stable around the period 7. That is, the contribution of d LnE_1 to the dLnCSI300A volatility is about 16%. It shows that the volatility trend of the CSI 300 index has a strong reflexivity, or the historical volatility trace has a great impact on its volatility trend. We can also say that the A-share market is still a weak-form efficient market, and the market participant structure dominated by individual investors leads to a major fluctuation of market sentiment.

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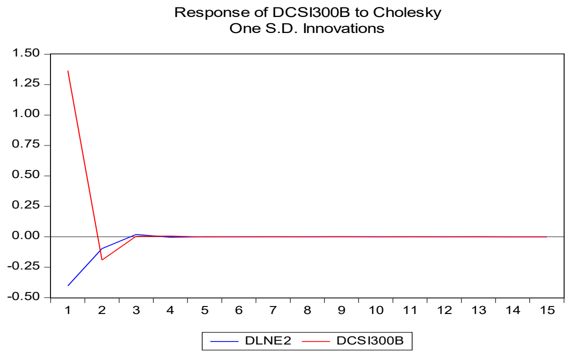

Figure 11: dLnCSI300B impulse response

Fig.11 shows that when a dLnCSI300B positive impact of one unit of standard deviation is applied to dLnCSI300B sequence in the second stage, an irregular impact occurs. During the process, the maximum positive impact occurs in period 1 and has plummeting effect. The maximum negative impact occurs in period 2 and reduces to zero in period 3. About the abnormal volatility, investors sentiment fluctuates greatly in short term. When a $dLnE_2$ positive impact of one unit of standard deviation is applied to dLnCSI300B sequence, the irregular impact occurs. During the process, the maximum negative impact occurs in period 1 and reduces to zero in period 3, which indicates that the abnormal volatility of one-unit USD/RMB exchange rate produces a negative impact on the volatility trend of the CSI 300 index. However, the negative effect reduces to zero in period 3. The $dLnE_2$ impact would not lead to positive volatility of dLnCSI300B sequence.

Table 14: Variance Decomposition in the Second Stage

Period	$dLnE_2$	dLnCSI300B
1	0.0000	100.00
2	7.2548	92.7452
3	9.1544	90.8456
4	11.8329	88.1671
5	14.5517	85.4483
6	16.3583	83.6417
7	17.8227	82.1773
8	18.6563	81.3437
9	19.4833	80.5167
10	19.7017	80.4983

Table 14 shows that the contribution of dLnCSI300B to the volatility of its own sequence is gradually weakened. While the contribution of $dLnE_2$ volatility to the volatility of dLnCSI300B is gradually strengthened and tends to be stable around the period 9. That is, the contribution of d LnE2 to the dLnCSI300B volatility is about 20%, and the contribution of dLnCSI300B to itself is 80%. It shows that the volatility trend of the CSI 300 index has a strong reflexivity, or the historical volatility trace has a great impact on its volatility trend. We can also say that the A-share market is still a weak-form efficient market, and the market participant structure dominated by individual investors leads to a major fluctuation of market sentiment.

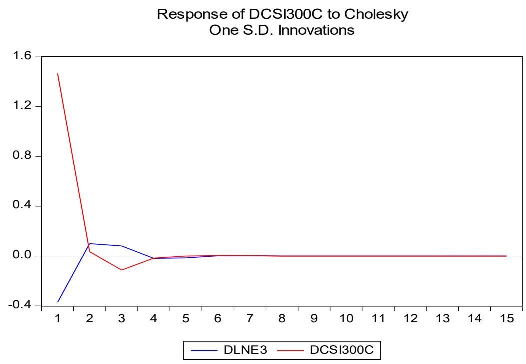

Figure 12: dLnCSI300C Impulse Response

Fig.12 shows that when a dLnCSI300C positive impact of one unit of standard deviation is applied to dLnCSI300C sequence in the third stage, an irregular impact occurs. During the process, the maximum positive impact occurs in period 1 and has plummeting effect. The maximum negative impact occurs in period 3 and reduces to zero in period 4. It shows that dLnCSI300C has major positive response, with plummeting effect, and negative effect in period 3, reducing to zero. About the abnormal volatility, investors sentiment fluctuates greatly in short term, which leads to abnormal volatility of CSI 300 index. When a $dLnE_3$ positive impact of one unit of standard deviation is applied to dLnCSI300C sequence, the irregular impact occurs. During the process, the maximum negative impact occurs in period 1, reduces slowly and adjusts. The positive impact occurs in period 2 and reduces to zero in period 4, which indicates that the abnormal volatility of one-unit USD/RMB exchange rate produces a negative impact on the volatility trend of the CSI 300 index. However, the negative impact reduces to zero in period 4. The $dLnE_3$ impact leads to stable volatility of dLnCSI300C sequence.

Table 15: Variance Decomposition in the Third Stage

Period	$dLNE_3$	dLnCSI300C
1	0.0000	100
2	8.2155	91.7845
3	9.6418	90.3582
4	11.3184	88.6816
5	13.5473	86.4527
6	14.8637	85.1363
7	16.2518	83.7482
8	16.6638	83.3362
9	16.9824	83.0176
10	17.5297	82.4703

Table 15 shows that the contribution of dLnCSI300C to the volatility of its own sequence is gradually weakened. While the contribution of $dLnE_3$ volatility to the volatility of dLnCSI300C is gradually strengthened and tends to be stable around the period 7. That is, the contribution of $dLnE_3$ to the dLnCSI300C volatility is about 17.5%. And the contribution of dLnCSI300C is 80%. It shows that the volatility trend of the CSI 300 index has a strong reflexivity, or the historical volatility trace has a great impact on its volatility trend. We can also say that the A-share market is still a weak-form efficient market, and the market participant structure dominated by individual investors leads to a major fluctuation of market sentiment.

4. Empirical Study Results

4.1 Descriptive Data Analysis Results

The standard deviation between the USD/RMB exchange rate volatility and the volatility of CSI 300 index is increasing, which means larger volatility of foreign exchange market and stock market. There is a significant self-correlation between the exchange rate and the index, which proves that the historical development trend of the sequence has a greater impact on its expected volatility trend.

4.2 Data Correlation Coefficient Analysis Results

The data volatility chart reports that the abnormal peak interval is regular, and the second stage has the largest volatility range, which is related to the intensity of Sino-US trade frictions. As a result, the USD/RMB exchange rate is negatively correlated with the CSI 300 index, and the correlation is gradually increasing. In other words, the depreciation of RMB is accompanied by the decline of CSI 300 index.

4.3 ADF Unit Root Test Results

The selected sequence is stationary. The cointegration test proves a long-term equilibrium relationship between the fluctuations of the USD/RMB exchange rate and the CSI 300 index in any stage.

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4.4 Granger Causality Test Results

In terms of impulse response and variance decomposition, the volatility of the CSI 300 index is greatly impacted at the early stage, and reaches the peak in the second stage. And the fluctuation of the USD/RMB exchange rate contributes to the volatility of the CSI 300 index at maximum, which discloses the correlation to the escalation of trade friction. In conclusion, the impact on the CSI 300 index is dominant in the second stage, followed by the third stage, and the first stage at minimum.

4.5 Variance Decomposition Results

The contribution of CSI 300 index to its own trend is more than 80%, indicating that the volatility trend of CSI 300 index still has a strong reflexivity, that is, the historical volatility trace has a great impact on its trend.

5. Conclusions

In summary, the correlation between the USD/RMB exchange rate and the CSI 300 index is subject to the intensity of Sino-US trade friction. With the escalation of trade friction and confrontation, the negative correlation between the USD/RMB exchange rate and the CSI 300 index becomes higher. In other words, the depreciation of RMB is accompanied by the decline of CSI 300 index. The stock market index volatility trend is highly reflexive, and the short-term sentiment fluctuations in the A-share market are relatively large, indicating that the A-share market is still a weak-form efficient market.

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