The impact of the US-China trade war on China's vehicle and vehicle chip industry

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Abstract. On 22 March 2018, US President Donald Trump signed a presidential memorandum on the 301- investigation, which will impose 25% tariff on specific Chinese goods. The trade war between China and the US officially started and during this time, several US measures influence China's vehicle industry and vehicle chip industry. This paper selects the China auto industry indexes, China Auto chip indexes and US dollar exchange rates from 6 months before the trade war to 24 January 2020.This paper uses VAR and ARMA-GARCH models to model and analyses the data, to study how the Chinese vehicle industry and vehicle chip industry have been affected by the US-China trade war, and to predict the future development of the Chinese vehicle industry and vehicle chip industry. This paper also suggests that in the current chip war between China and the United States, China can strengthen its technological development, strengthen trade exchanges with technological powers, and enhance exchanges with the United States to gain benefits.

Keywords: Trade War, Vehicle Industry, Vehicle Chip Industry.

1. Introduction

Since 1993, the amount of China's exports to the United States has been greater than the amount of imports (6.27 billion US dollars). By 2000, the trade balance between China and the United States was only 29.74 billion US dollars. In the second year after China's accession to the WTO (that is, 2002), the trade balance between China and the United States expanded to 42.708 billion US dollars. In 2005, the trade balance between China and the United States exceeded 100 billion US dollars, reaching 114.269 billion US dollars. In only three years, the trade balance more than doubled; In 2011, the trade balance between China and the United States exceeded 200 billion US dollars, which was 202324 million US dollars. In 2018, the trade balance reached 323273 million US dollars, which was the first time in history that the trade balance exceeded 300 billion US dollars. It decreased in 2019[1].Due to the growth of significant interest margin between US and China in 2016 and 2017, US pointed out the “unfair trade”, which means the international competitiveness of its commodities was weakened, and the country's foreign trade was in a disadvantageous position during that period. Besides, with the development of economic and trade relations between the two countries after China's "WTO entry", the frequency of trade frictions has increased, and the United States has become the country with the most trade frictions with China. More than 20% of the dumping charges filed by US companies against overseas competitors involve China. Since trump has an obvious tendency of trade protection, he advocated the principle of “America First” and tried to start the US-China trade war, which focused on the export areas where China has comparative advantages and the import areas where China has no advantages in technical knowledge, such as chips. The former is basically competitive, while the latter is not fully functional. Their impact on the economic welfare and long-term development of the two countries is different.

Because ZTE's key components such as chips are completely dependent on imports from the US, ZTE's production stalled after the US announced the ban. In 2017, the US implemented a seven-year ban on ZTE. In 2018, ZTE paid a fine of US $2.59 billion to the US government, which exceeded 80% of the total net profit of ZTE in 30 years. In this respect, US can have a great impact on some Chinese enterprises by stopping chip supply. Those high-tech companies might be forced to stop operation if the chip supply is cut. In addition, US is the world's largest chip exporter and occupied the main chip market in China. That is why the Trump-dominated US administration focused its sanctions against China primarily on the chip industry. In short, US took advantage of China's chip

industry disadvantages and China's dependence on chips to implement technical sanctions against China.

On April 4, 2018, the US government released a list of goods with additional tariffs, which will impose 25% tariffs on 1333 US $50 billion goods imported from China to the United States, which includes the vehicle. And in the list of commodities published by the Tariff Commission of the State Council of China, many domestic brand cars and brand cars produced in the United States are subject to 25% tariff. China's vehicle market showed negative growth for the first time in 2018 and the growth rate declined seriously in 2019. There is no doubt that the trade war has also brought great negative effects to the vehicle industry.

The rest of this paper is organized as follows: Part 2 is the literature review, which includes relevant research on the causes and impacts of the US-China trade war and how the US-China trade war has brought about changes in the vehicle industry and vehicle chip industry in each of the two countries, concluding with a summary of the literature review. Then it is followed by Part 3, which uses certain data and images as an aid and focuses on the impact of the US-China trade war on the vehicle industry and vehicle chip industry and illustrates the impact of the US-China trade dispute on the vehicle industry and vehicle chip industry in China and the world at large from various perspectives. After that, the fourth section will then conduct an ARMA-GARCH model analysis using the relevant data obtained. The results of empirical analysis used to demonstrate results of the empirical analysis are used to demonstrate the impact of the US tariff increase and a series of trade restrictions on Chinese vehicle companies and vehicle chip companies, and finally to draw conclusions and make predictions and give feasible and innovative suggestions for the future development of the Chinese vehicle industry and vehicle chip industry.

2. Literature Review

2.1 Studies related to the US-China trade war

In order to stabilize the global hegemony,the United States has taken China as a strategic competitor, and the national security strategic objective of suppressing China and protecting the interests of the United States will be formed. After the new national security strategy is determined, its implementation is crucial. As a global hegemon, there can only be two strategies: internal strength and external pressure. Due to the trade interest difference between China and the United States, section 301 of the US trade act which retaliates against other countries whose trade practices are considered "unreasonable" and "unfair" has become a gimmick for the United States to launch a trade war. The trade interest margin is mainly due to the following reasons:First, the price of China's export products is higher than that of the United States, so China's export products have price advantages. Second, as the world's largest economy, the United States has a very strong consumption capacity. Finally, the United States has been suppressing China's technology, so it exports less to China in this field [2].

2.2 US-China vehicle Trade dispute

From the perspective of China's trade volume of vehicle products exported to the United States, the overall trend of 2018 was upward, but the trade volume in December was lower than before; From the perspective of China's trade volume of imported vehicle products to the United States, the import volume in the first half of 2018 showed an upward trend, reaching a peak in July, and a downward trend in the second half of 2018. From this, this paper can infer that the Sino US trade war in 2018 had a greater negative effect on the export of vehicle products from the United States to China than the export of Chinese vehicle products to the United States [3]. In 2018, China's exports of complete vehicles to the United States accounted for 11.9% of China's total exports of vehicle products to the United States, while exports of parts and components to the United States accounted for 88.1% of the total exports. In short, China's vehicle products exported to the United States were mainly parts and components. From the perspective of the United States, in 2018, the total export volume of the United

States to China accounted for 60.9% of the total export volume of China's vehicle products, while the export volume of parts and components to China only accounted for 39.1% of the total export volume of China's vehicle products. It can be seen that the United States mainly exports complete vehicle products to China. In a short time, the quantity of Chinese auto parts exported to the United States has a very small change, mainly because the United States has advanced its consumption in 2019. Therefore, the trade war will still have an impact on the growth time of Chinese production [4].

2.3 US-China vehicle chip Trade dispute

The scale of China's automotive chip market accounts for about 20% of the world, and the demand is still growing. However, in 2018, China's automotive chips were heavily dependent on imports, and domestic automotive chips accounted for less than 1% of the world. The vehicle chip industry has been monopolized by foreign manufacturers for a long time. The domestic vehicle chip industry is small in scale and low in technical level, and its development lags behind the whole vehicle industry seriously [5].As the largest chip supplier in China, more than one-third of American chips are exported to China every year. ZTE had to stop the operation when US stopped the chip supply. Similarly, China’s huge vehicle chip market still depends on the chip supply of the United States.

The reason why the United States uses the abnormal means of science and technology war to suppress China is that technology monopoly has become a redundant factor that hinders productivity in the US economy and the international economy. Monopoly has become a way that does not adapt to social and economic development. This way has promoted trade imbalance to a certain extent, so it finally chose to launch a technological war.[6]

The researchers pointed out several suggestions: Firstly, combining with China's national conditions, China's vehicle chip reliability standard should be formed as soon as possible. Secondly, strengthen the research of vehicle chip reliability testing methods and establish a third-party testing and certification service platform. Finally, further strengthen the guidance and support for the development of automotive chips and promote collaborative innovation [5].

2.4 Review of the literature

Overall, the research on the causes, processes, and impacts of the US-China trade war has been relatively well researched, but there is still relatively little research on the impact of the trade war on the semiconductor industry, especially on China's domestic vehicle industry and vehicle chip industry. It is difficult to predict the future development of China's domestic vehicle industry and vehicle chip industry. Therefore, this paper hopes to do more to fill the gaps in the research in this area and use empirical data to demonstrate the impact of the trade war on the current and long-term development of China's domestic vehicleand vehicle chip market.

3. Research Design

3.1 Data source

This paper uses the Choice financial terminal to search and get data of the opening and closing prices and stock returns of China’s the vehicle industry and vehicle chip industry, from six months before the trade conflict between China and the United States to the COVID-19,and to highlight the stock price fluctuations of the two industries before and after the five times when the United States imposed tariffs on China, as a data source and data basis for empirical analysis to study the impact of the trade war between China and the United States on China's vehicle industry and vehicle chip industry.

3.2 ADF test

When using the time series model, the time series is required to be stable. Therefore, when studying the time series from six months before the Sino US trade war to the COVID-19 epidemic, the first

step is to carry out the stationarity test. This time, the ADF test (unit root test) is used, which is the test method for dealing with high-order lag situations. The principle of this test is that if the unit root does not exist, then the sequence can be considered to be stable. Therefore, the original hypothesis established is that the unit root exists. When the significance test statistic is less than 10%, 5%, and 1%, the original hypothesis can be rejected. The p value in Table 1 can be seen that is less than 0.01. Therefore, the original hypothesis can be rejetcted that the time series is stable.

Table 1 ADF test

Variables		t-statistic	p-value
Price			
	Vehicle	-1.4920	0.8320
	Vehicle chip	0.0940	0.9951
	USD-RMB	-1.4160	0.8561
Yield			
	Vehicle	-16.540	0.0000***
	Vehicle chip	-16.3730	0.0000***
	USD-RMB	-17.0650	0.0000***

3.3 VAR model

VAR models are usually used to care about the prediction and dynamic dependence among multiple variables. This paper puts the logarithm rate of return on exchange rate, the logarithm rate of return on vehicle chip and the logarithm rate of return on vehicle chip together to explore the impact of tariff changes on the domestic vehicle industry and the vehicle chip industry. So a ternary VAR (P) system can be constructed:

$$Y_t = \alpha_1 + \phi_{11}Y_{t-1} + \cdots + \phi_{1p}Y_{t-p} + \beta_{11}X_{t-1} + \cdots + \beta_{1p}X_{t-p} + \delta_{11}Z_{t-1} + \cdots + \delta_{1p}Z_{t-p} + e_{1t} \quad (1)$$

$$X_t = \alpha_1 + \phi_{21}Y_{t-1} + \cdots + \phi_{2p}Y_{t-p} + \beta_{21}X_{t-1} + \cdots + \beta_{2p}X_{t-p} + \delta_{21}Z_{t-1} + \cdots + \delta_{2p}Z_{t-p} + e_{2t} \quad (2)$$

$$Z_t = \alpha_1 + \phi_{31}Y_{t-1} + \cdots + \phi_{3p}Y_{t-p} + \beta_{31}X_{t-1} + \cdots + \beta_{3p}X_{t-p} + \delta_{31}Z_{t-1} + \cdots + \delta_{3p}Z_{t-p} + e_{3t} \quad (3)$$

Y_t, X_t, Z_t represent the logarithm rate of return on exchange rate, the logarithm rate of return on vehicle chip and the logarithm rate of return on vehicle chip. And e_{it} represent the white noise process.

3.4 ARMA-GARCH model

3.4.1. Model specification: ARMA

After that, this paper construct ARMA-GARCH models of the returns and volatilities of the stocks of two Chinese industries simultaneously. This paper uses the time points of each of the five US tariff increases on China in the US-China trade dispute as dummy variables and add them to the model for calculation. As a result, this paper can assess the correlation between the US-China trade dispute and the returns and volatilities of the China's vehicle industry and vehicle chip industry.

$$x_t = \phi_0 + \sum_{i=1}^{p} \phi_i \, x_{t-i} + \alpha_i - \sum_{i=1}^{q} \phi_i \, a_{t-i} \quad (4)$$

The autoregressive moving average model is divided into two parts: auto regressive model (AR) and moving average model (MA). AR, which is the $\phi_0 + \sum_{i=1}^{p} \phi_i \, x_{t-i}$ part, uses the known autocorrelation function or data to obtain the parameters of the model, and using the obtained model

parameters to estimate the power spectrum of the signal. And MA is the $\alpha_i - \sum_{i=1}^{q} \phi_i a_{t-i}$ part. When the input of MA model is impulse function or white noise, the output of MA model should be equal to the studied signal, which should be at least a good approximation to the signal. The parameters of the MA model are obtained by using the known autocorrelation function or data, and the power spectrum of the signal is estimated by using the obtained model parameters.

Specifically, in this paper, the AR model uses the historical returns of two Chinese industries over the period from six months before the start of the US-China trade dispute to the COVID-19, while the MA model uses an error term to forecast the future.

3.4.2. Model specification: GARCH

Compared with the arch model, the GARCH model not only reduces the number of parameters to be estimated, but also can better fit the data when a high-order arch model is needed [7].

The model GARCH (p, q) is set as follows:

$$\alpha_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \cdots + \alpha_q \varepsilon_{t-q}^2 + \gamma_1 \sigma_{t-1}^2 + \cdots + \gamma_q \sigma_{t-q}^2 + \beta_1 D_1 + \cdots + \beta_5 D_5 \quad (5)$$

In equation above, the term $\alpha_1 \varepsilon_{t-1}^2 + \cdots + \alpha_q \varepsilon_{t-q}^2$ is the ARCH part, σ_t^2 is the conditional variance of the disturbance term ε_t, the subscript t indicates that variance changes over time. σ_t^2 depends on the square of the disturbance term in the previous p periods. And the last part of the model $\beta_1 D_1 + \cdots + \beta_6 D_6$ represents the impact of adding five separate dummy variables, i.e., the five US tariff hikes on China in the US-China trade war, on the stock returns of the two selected Chinese industries.

GARCH model is set up based on the ARCH model, with the addition of autoregression of σ_t^2. The term $\gamma_1 \sigma_{t-1}^2 + \cdots + \gamma_q \sigma_{t-q}^2$ is GARCH part. GARCH model is designed to reduce the number of parameters. Simplify ARCH(p) as GARCH (1,1) by iteration.

4. EMPICAL RESULTS AND ANALISIS

4.1 VAR order selection

This paper needs to first determine the order according to the information criterion. In Table 2, a third-order model with LR as the criterion can be established. Or establish a 0-order model based on FPE, AIC, and SBIC. Later, we found that the latter was not feasible, so we used LR as the criterion.

Table 2 VAR model identification

Lag	LL	LR	df	p	FPE	AIC	SBIC
0	5743.8000				3.7e-13*	-20.1079*	-20.0850*
1	5745.7300	3.8705	9.0000	0.9200	3.8e-13	-20.0831	-19.9918
2	5750.8500	10.2250	9.0000	0.3330	3.9e-13	-20.0695	-19.9096
3	5759.3400	16.9860*	9.0000	0.0490	3.9e-13	-20.0677	-19.8393
4	5763.3600	8.0368	9.0000	0.5300	3.9e-13	-20.0505	-19.7534
5	5771.2800	15.8530	9.0000	0.0700	3.9e-13	-20.0465	-19.6811
6	5777.6300	12.6870	9.0000	0.1770	4.0e-13	-20.0372	-19.6032
7	5780.7400	8.6459	9.0000	0.7170	4.1e-13	-20.0166	-19.5141
8	5787.0200	12.5570	9.0000	0.1840	4.1e-13	-20.0071	-19.4361
9	5791.3400	8.6459	9.0000	0.4710	4.2e-13	-19.9907	-19.3512
10	5797.1200	11.5420	9.0000	0.2400	4.2e-13	-19.9794	-19.2713
11	5798.3700	2.5051	9.0000	0.9810	4.3e-13	-19.9523	-19.1757
12	5802.9700	9.2089	9.0000	0.4180	4.4e-13	-19.9369	-19.0917

4.2 LR likelihood method has the model:

$$LR = -2(\log L_k - \log L_{k+1}) \quad (6)$$

When the LR statistic is less than the critical value, the lag order of the VAR model is considered appropriate. When LR statistic is greater than the critical value, it is considered that the lag order of VAR model is not high enough, and more lag variables need to be added as explanatory variables. When the sample size is not sufficiently large compared with the number of estimated parameters, the finite sample distribution of LR and the asymptotic distribution of LR will be greatly different.

Therefore, this paper needs to check whether the VAR system is stable. OLS estimation can be used. Because only the OLS estimation of VAR model composed of stationary variables can obtain consistent estimation parameters, the three variables are found to be stable before.

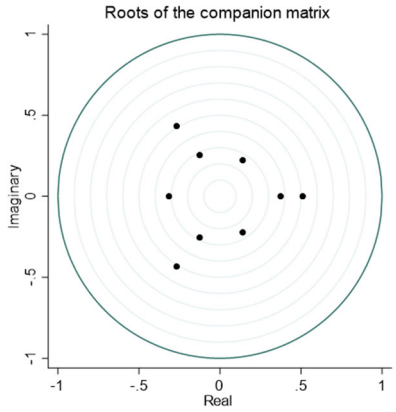

Figure 1 VAR stability

Stability conditions of VAR model requires all points to be in the circle (as shown in Figure 1). So the VAR system is stable.

4.3 Impulse response

During the Sino-U.S. trade conflict, the United States imposed tariffs on China, which caused the appreciation of the US dollar and the depreciation of the RMB in a short period. However, the economic consequences caused by the exchange rate changes in this period are completely different from those in the free trade period.

The appreciation of the US dollar will cause capital flow, and the international capital market and international hot money will increase their holdings of the US dollar due to profit seeking factors, and short the RMB with the escalation of the two trade conflicts. The following changes may occur during the free trade period:

First, the increase in international capital's holdings of US dollars may cause a large amount of US dollars to flow into the US stock market or bond market. This behavior means that there is a net inflow of US domestic capital. Similarly, there is a net outflow of Chinese capital. The direct economic consequence of this behavior is to raise (lower) the stock price or yield of the US (China) stock market;Second, the appreciation of the US dollar means that the purchasing power of the US dollar will increase, which will definitely promote the import of the United States, inhibit the export of American enterprises, promote the export of China, and inhibit the import of China. There are a large number of multinational enterprises in the US market. It is obvious that suppressing exports will harm the interests of these enterprises, but it will promote the interests of Chinese enterprises.

However, in the period of trade conflict, the United States restricted the import of Chinese products by increasing high tariffs, and the Chinese government countered the tariff restrictions. These actions will block the second channel during the period of trade freedom.

From this result, it seems that trade conflicts are beneficial to the US market and harmful to China. But these behaviors will have a series of new effects.

For example, the appreciation of the US dollar in the international market must mean the depreciation of the RMB. In this case, it will stimulate the demand of other countries for Chinese products.

To sum up, the vehicle and vehicle chip industries are highly internationalized and highly dependent on import and export trade. It is difficult to infer the net effect of trade conflict on them from theoretical analysis alone. The impulse response function examines how much other variables change with time due to the impact of one unit.

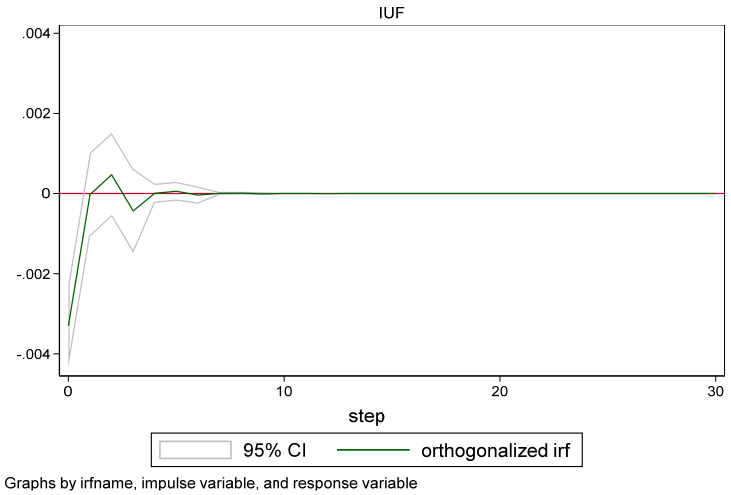

Figure 2 Impulse variable: USD-RMB exchange rate

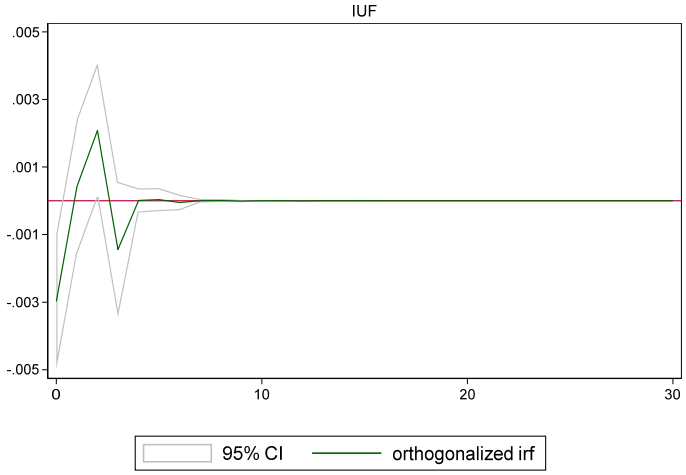

Figure 3 Impulse variable: USD-RMB exchange rate

Take the logarithm rate of return of exchange rate as the impulse variable, and the logarithm rate of return of vehicle chip and the logarithm rate of return of vehicle as the response function to explore the relationship between them.

According to the estimation result of impulse response function (Figure 2 and Figure 3), during the trade conflict, the positive effect of the rapid depreciation of RMB on the export of vehicle and vehicle chip industry is smaller than the negative effect of capital flow.

Specifically, in the period of T = 0, the exchange rate impact of one unit will quickly reflect on the yield of the vehicle and vehicle chip industry, and the negative effect is about 0.3%. For the automotive chip industry, although there is a positive effect, the effect is small and cannot offset the negative effect.

4.4 ARMA order selection

Use PACF and ACF to order the first log-return series.

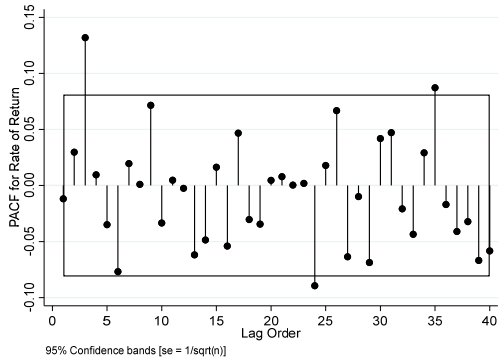

Figure 4 Vehicle PACF

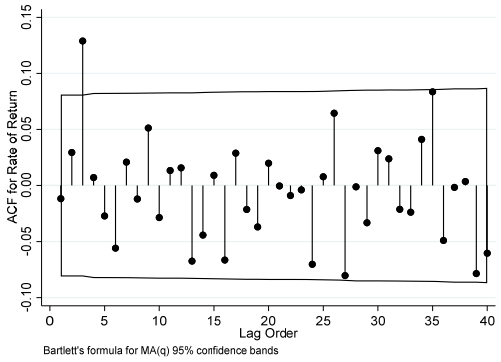

Figure 5 Vehicle ACF

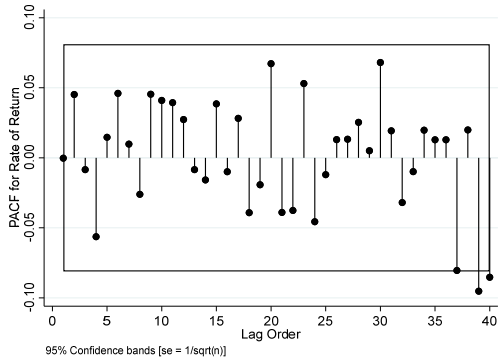

Figure 6 Vehicle chip PACF

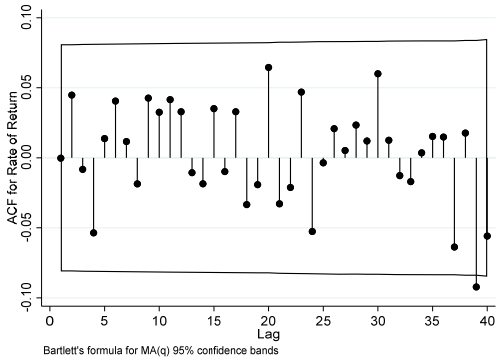

Figure 7 Vehicle chip ACF

Note: The Y-axis is the dependent variable, PACF, and ACF of the log of Logarithmic return on the two industry indexes, and the X-axis is the time lag order. The area bounded by y=-0.1 and y=0.1 refers to the 95% confidence interval for AR(p) and MA(q).

First, this paper needs to order the log returns of the vehicle industry and present the results from Figure 4 to Figure 7.

From the fixed order result of the two images in the first row in Figure 4,5, the first part beyond the x-axis is 4, so AR(P) is of order 3, MA(q) is also of order 4 i.e., the value of p and q is 3.

Then this paper needs to order the log-returns of the vehicle chip industry and present the results in the figure above.

From the fixed order result of the two images in the second row in Figure 6,7, the first part beyond the x-axis is 39, so AR(p) is of order39, MA(P) is also of order 39, so the value of p and q are all equal to 39.

4.5 ARMA-GARCH

To better forecast the variance of future industry returns, the ARCH model is next used to look at the characteristics of industries return volatility. And the consequences are shown in Figure 8 and 9.

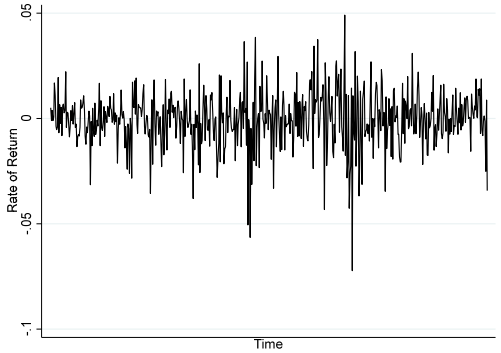

Figure 8 Vehicle

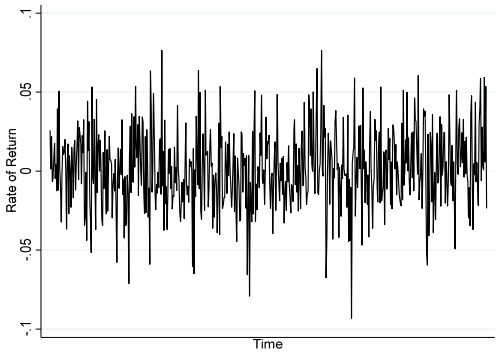

Figure 9 Vehicle chip

From the time chart, there is obvious aggregation in the returns of the vehicle and vehicle chip industries, but whether the effect is statistically significant needs further empirical testing.

4.6 Estimation results

According to the estimation results in Table 3, the arch term and GARCH term of the income of the vehicle and vehicle chip industries are significant, indicating that there are statistically significant conditional heteroscedasticity in the returns of these two industries, and GARCH Modeling can be conducted.

It should be noted that since the maximum likelihood estimation (MLE) does not converge in the process of numerical simulation, this paper does not give the estimation results of the GARCH model in which the external explanatory variable is a dummy variable in the return rate of the automotive chip industry.

According to the estimation results of external explanatory variables, the logarithm return of exchange rate is increased by 1 unit, and the volatility of the vehicle industry is increased by 224.2873 units. The coefficient is significant at the level of 1%.

In addition, dummy 2 in column (2) is significantly positive, indicating that the volatility of the vehicle industry has increased by 1.6223 units after this period.

Exchange rate changes have no significant impact on the volatility of the automotive chip industry.

On June 15, 2018, the United States included a large number of spark ignition vehicles in the tariff list of China, so it can be found that the second dummy variable is significantly positive.

Table 3 ARMA-GARCH estimation results, variance equation

	(1) Vehicle		(2) Vehicle		(3) Vehicle chip	
	Coefficient	p>|Z|	Coefficient	p>|Z|	Coefficient	p>|Z|
Exchange rate	224.2873**	0.0040			9.7682	0.5720
Dummy 1			0.5557	0.3140		
Dummy 2			1.6223***	0.0200		
Dummy 3			-1.1229**	0.0310		
Dummy 4			-0.5392	0.1110		
Dummy 5			-0.7611 ***	0.0000		
ARCH, L1	0.0719***	0.0000	0.0196	0.2070	-.0399***	0.0000
GARCH, L1	0.8801***	0.0000	0.8954***	0.0000	-.3208***	0.0000
Constant	-11.8997***	0.0000	-11.5694***	0.0000	-7.0870***	0.0000

5. Discussion

According to the data, the export of Chinese hybrid vehicles to the United States accounts for 48.4% of the total quantity. Based on this export percentage, it can be reflected that Chinese hybrid vehicles have a great dependence on the American market. However, the Sino US trade dispute has created a high-risk international market environment for the development of the automobile industry, which has deterred Chinese automobile enterprises committed to international development [8].

In terms of the results, it seems that the vehicle industry and the vehicle chip industry should have been greatly affected. The two are the largest part of China's trade interest margin and the largest part of exports, and the latter should be greatly affected due to the technological constraints of the United States. However, the results show that only the second tariff increase has had a significant impact on the vehicle industry. However, the same as other documents, the imposition of tariffs has a negative impact on China's vehicle industry and vehicle chip industry.

This study is mainly application oriented, and the understanding of some models has not reached a very thorough understanding, and some model phenomena are confused. Recently, the chip war broke out again between China and the United States. The United States has restricted the export of chips to China and the manufacturing of chips in China.Recently, the chip war broke out again between China and the United States. The United States has restricted the export of chips to China and the manufacturing of chips in China. In a report entitled "US sanctions help China quickly charge domestic chip manufacturing", Bloomberg pointed out that among the 20 fastest-growing chip industry companies in the world in the past four quarters, 19 were Chinese enterprises, while only 8 were Chinese enterprises in the same period last year.[9] The asymmetric dependence between China and the United States is one of the important reasons why China is in a passive position in Sino US economic and trade relations. The dependence of the Chinese economy on Sino US bilateral trade is always higher than that of the American economy, which makes the United States have greater negotiation ability in the process of Sino US high-level economic and trade consultations [10]. Then, China needs to protect talents, reduce the loss of talents, and provide a talent base for technological development. At the same time, this paper also needs to establish a chip manufacturing system that belongs to China. In addition, China should respond according to the market. The establishment of tariff barriers between China and the United States has had a negative impact on domestic industries. Therefore, strengthening trade exchanges with the United States is conducive to industrial development. Because of the monopoly of the United States on technical products, this paper can choose to communicate with other chip powers, such as South Korea or Japan. The chip alliance recently launched by the United States tries to pull South Korea in, but South Korea has not shown a positive attitude towards this matter, so South Korea may be a good choice.In addition, the vehicle industry is the same. Except for the second tariff increase, the vehicle trade war between China and the United States has not had a significant impact on the domestic vehicle industry. In fact, to a certain extent, it is because Chinese people choose to use domestic cars as substitutes, so it will have a subsidizing effect on the domestic vehicle industry. China still has to insist on developing our own vehicle technology so as not to be restricted by other countries. To sum up, although both the vehicle industry and the vehicle chip industry have been affected by the trade war, if they can coordinate and advance together, complement, and help each other, and form a scientific production system, then it is bound to reduce the gap with the technological powers.

6. Conclusion

In this paper, ADF is used to test whether the time series is stable. Then, the VAR model is used to determine the order, and the LR model is selected as the judgment standard with the order of 3. It is determined that the VAR system is stable under this order, and then the impulse response is used to determine the impact of the exchange rate change on the index of the vehicle chip and the vehicle industry. In addition, PACF and ACF are used to determine the order of ARMA-GARCH model, and finally the model is used to draw a conclusion according to the obtained order

From the pulse result, although the devaluation of RMB has led to the expansion of China's goods in other countries' markets, the appreciation of the US dollar has brought about the increase in China's exports and the decrease in imports, as well as the decrease in US exports and the increase in exports. This favorable condition for Chinese enterprises has weakened with the establishment of tariff barriers between the two sides. During the trade conflict, the positive export effect caused by the rapid depreciation of RMB on the automobile and automobile chip industries was smaller than the negative effect caused by capital flows.

Then according to ARMA-GARCH model. After the implementation of the tariff increase strategy, it was found that only the second tariff increase had a significant impact on the domestic vehicle industry.

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