The Impact of Sino-US Trade Frictions on Foreign Trade in the Yangtze River Delta Region

Ju Yang[✉] and Tinglu Guo

Department of Economics and Management, West Anhui University, Lu'an, China
ophelia8@sina.com

Abstract. As an important region of China's foreign trade, Sino-US trade frictions will have a certain impact on the development of foreign trade in the Yangtze River Delta region. In order to test the impact of Sino-US trade friction on the import and export trade of the Yangtze River Delta region, a mathematical model is constructed, and the least squares method is used for linear regression, and the effect of key factors such as the exchange rate, the weighted average tariff imposed by the United States on China, and the tariff revenue of the Yangtze River Delta region on the total import and export trade of the Yangtze River Delta region is empirically tested. The study found that the exchange rate had a significant positive and negative impact on the total import and export trade of Shanghai and Anhui Province, respectively, but not significantly on the import and export trade of Zhejiang Province and Jiangsu Province. The weighted average tariff rate imposed by the United States on China has a significant positive impact on the import and export of Zhejiang Province, while the import and export trade in Anhui Province shows a significant negative impact, and the impact on Shanghai Municipality and Jiangsu Province is not significant; The tariff revenue of the Yangtze River Delta region only has a significant negative impact on the import and export trade of Anhui Province, while it has a significant positive impact on the three provinces of Jiangsu, Zhejiang and Shanghai.

Keywords: Sino-US Trade Frictions · Yangtze River Delta · Import and Export Trade

1 Introduction

The Yangtze River Delta region integrates "excellent coast" and "golden waterway", has obvious economic and geographical location advantages, strong innovation ability, high degree of opening up, and is one of the regions with the most active economy, the most international competitiveness and development potential in China. In December 2019, the Outline of the Regional Integration Development Plan for the Yangtze River Delta stipulated that the new planning scope of the Yangtze River Delta is the four provinces and cities of Jiangsu, Zhejiang, Shanghai and Anhui. Eight prefecture-level cities along the Anhui River are classified as 27 central cities, and the provincial capital, Hefei,

has become one of the sub-centers of the world-class city cluster in the Yangtze River Delta. Anhui Province is located in the lower reaches of the Yangtze River Delta, the geographical position is superior, as a sea-land transition zone, not only the core of the Yangtze River Economic Belt, but also an important driving force for the rise of central China.

The external environment for the development of China's foreign trade has become more and more severe under the background of the outbreak of the new crown pneumonia epidemic in 2020, foreign trade and investment have shrunk significantly compared with previous years, and the world economy has changed rapidly and deeply declined. Since the outbreak of the new crown pneumonia epidemic, residents' desire to consume has been suppressed, and the consumer market has been violently impacted. Since 2018, under the multiple challenges such as Sino-US trade frictions, China's economy is in a downturn, the real economy is facing an existential crisis, and crises such as stock market shocks have followed. According to the data released by China's Ministry of Commerce, China's import and export of goods in 2020 was 32.2 trillion yuan, an increase of 1.9%. Although China is the only major economy in the world to achieve positive trade growth, compared with previous years, China's foreign trade growth rate still shows a downward trend. As the world's largest trading country, the Yangtze River Delta is also China's largest foreign trade region, foreign trade dependence is much higher than that of inland cities, Sino-US trade frictions have brought a relatively violent external impact to the foreign trade of the Yangtze River Delta region. When studying the impact of Sino-US trade frictions on the Yangtze River Delta region, the research objects often include only Shanghai, Jiangsu and Zhejiang, and the study of Anhui into the Yangtze River Delta region is a strong supplement to the research related to the development of foreign trade in the Yangtze River Delta region (Table 1).

Table 1. Total Export Trade by Region in the Yangtze River Delta from 2015 to 2019 (by Export Region) (Units: US$100 million, US$100,000, 10,000 US dollars)

Year	2015	2016	2017	2018	2019
Asia					
Shanghai	911.33	858.55	873.59	956.2	976.73
Jiangsu	15800319	14400664	15906263	18007960	1806485
Zhejiang	60567330	61610804	65770518	69477039	80726279
Anhui	1440279	1225398	1326346	1414321	1147926
Africa					
Shanghai	41.8	36.52	38.09	43.46	48.77
Jiangsu	870077	770577	864741	993321	1126757
Zhejiang	14355671	13894941	14742278	16598995	19583921
Anhui	225137	171694	175590	211101	90916

(*continued*)

Table 1. (*continued*)

Year	2015	2016	2017	2018	2019
Europe					
Shanghai	387.61	328.67	377.08	411.12	388.19
Jiangsu	6614319	6533305	7520398	8285730	8470231
Zhejiang	43580012	45987804	51082893	55283448	60164118
Anhui	629911	577359	597048	723070	284499
Latin America					
Jiangsu	1893283	1690380	1908734	2153438	2268631
Zhejiang	15472339	15203813	17535968	19866448	21223593
Anhui	326093	233266	264027	355511	615433
North America					
Jiangsu	7837689	7697566	9119619	9893661	8481373
Zhejiang	33313020	35423580	40323000	45076522	43222230
Anhui	616974	584637	617840	836369	278188
Oceania					
Jiangsu	851136	841932	1010017	1069310	1065954
Zhejiang	4413381	4543863	4940550	5442578	5842962
Anhui	73030	56018	67312	79325	258713
America					
Shanghai	559.97	543.57	582.14	595.88	518.91
Oceania and the Pacific Islands					
Shanghai	68.99	67.37	65.8	65.04	56.79

2 The Current Situation of Import and Export Trade in the Yangtze River Delta Region

2.1 Analysis of the Quo Status of Import and Export of Shanghai

Shanghai's exports to Asia have fallen below $90 billion since 2016 and have been rising ever since. Among them, Shanghai's exports to Asia increased by 9.46% in 2018 compared with 2017; Imports to Asia have been rising between 2015 and 2018, but fell by 0.25% in 2019. Shanghai's exports to Africa have shown a growing trend since 2016, with exports increasing by 16.67% in four years; Its imports to Africa fell by 18.31% in 2019, and has been in a growth trend before. Shanghai's import and export volume to the European region has also been in a growth trend until 2019, with its export value falling by 5.58% in 2019 and import value falling by 8.17% in 2019. Shanghai's import and export volume to the Americas declined in 2016, but it was in a growth trend from 2016 to 2018, and declined again in 2019, with its exports falling by 12.91% in 2019

and imports falling by 10.40% in 2019. The change law of Shanghai's export value to Oceania and Oceania islands in the five years from 2015 to 2019 is similar to that of Europe and the Americas, and its export value decreased by 12.68% in 2019; Its import volume changes similarly to That of Asia, rising by 26.92% in 2018.

2.2   Analysis of the Quo Status of Import and Export of Jiangsu Province

Jiangsu's exports to Asia fell by 8.86% in 2016 between 2015 and 2019, but have been growing for the next four years; Jiangsu's imports to the Asian region fell by 9.35% in 2016, and although it peaked at $18009987 million in 2018, it fell by another 11.82% in 2019. Jiangsu's total import and export volume to the African region has always been the lowest, and its export value fell by 11.44% in 2016, but has been growing since 2016; However, imports to Africa have been on a growing trend from 2015 to 2018, until 8.8% decline in 2019. Jiangsu's exports to the European region fell by 1.22% in 2016, but exports have been rising since 2016; The same was true for imports from the European region, but fell by another 1.8% in 2019. Jiangsu's exports to Latin America have been on a growing trend after falling by 1.77% in 2019; Imports have been rising since 2015 until they fell by 1.75% in 2019. In 2019, Jiangsu's exports to North America and Oceania fell by 6.45% and 0.31% respectively, and imports to them fell by 17.6% and 0.09% respectively, and imports to them fell by 17.6% and 0.09% respectively, while the import and export volume in the first three years was in an increasing trend.

2.3   Analysis of the Quo Status of Import and Export of Zhejiang Province

From 2015 to 2019, the total import and export volume of Zhejiang Province to different regions was in a rising trend, with exports rising by 34.3% in five years, while imports rose by 76.73% in five years. Overall, Zhejiang Province accounts for the largest proportion of imports and exports to Asia, followed by Europe and the least in Oceania. Among them, Zhejiang's import and export volume to Asia has been in a growing trend in the past five years. In 2018, Zhejiang's exports to Africa fell by 3.21% in 2016 and have been growing for four years since then; Imports to Africa also fell by 21.35% in 2016 and have been rising ever since. Zhejiang's exports to Europe have been rising over the past five years; Zhejiang's imports of it fell by 0.36% in 2019, after rising for four years. Zhejiang's exports to Latin America have been rising for the rest of the year, except for a slight decline in 2016; Its import volume has been in a rapid growth trend, and in 2017, it suddenly increased by 65.56%. Zhejiang's exports to North America were in a growing trend before 2018, falling by 4.11% respectively in 2019; Imports to it fell by 0.24% and 24.62% in 2018 and 2019, respectively. Zhejiang's exports to Oceania have been growing rapidly, with imports to it only starting to rise after a slight decline in 2016.

2.4   Analysis of the Quo Status of Import and Export of Anhui Province

The total import and export volume of Anhui Province and various regions was in an increasing trend in 2018 and 2019. In 2019, the total import and export volume of the same region in Anhui Province reached 6873252 million US dollars, an increase of

9.1% compared with 2018; In 2019, the total export volume of the same region increased by 11.57% compared with 2018; In 2019, the total import volume of the same region increased by 5.9% compared with 2018. Among them, only the total import and export volume with North America, the total import value and the total export value fell by 3.8%, 0.52% and 13.5% in 2019. The total import and export volume of Anhui Province and Asia increased by 10.6% in 2019, and the total import and export volume of Africa, Europe, Latin America, Oceania and other regions increased by 16.5%, 15.1%, 11.92% and 9.02% in 2018. Among them, the total import and export volume of Anhui Province and Africa has grown the fastest, and the total import and export volume of the same Oceania region has the slowest growth rate.

3   Theoretical Analysis

The mechanism of the impact of trade frictions on import and export trade is mainly achieved by using tariff barriers and non-tariff barriers. Given the unquantifiable nature of non-tariff barriers, this article only considers the impact of tariffs on the quantity and amount of imports and exports. In addition, trade friction countries may adjust the exchange rate of their own currency, and changes in exchange rates will affect the general price level of the country, which will affect a country's trade balance and the amount of goods for importers and exporters.

3.1   The Impact of Tariffs on Import and Export Trade

The imposition of tariffs will have an impact on import and export trade, which is conducive to maintaining the stability of the domestic market and safeguarding national interests. When some countries take extensive measures to strengthen non-tariff barriers and raise tariffs, the number of imports and exports of goods in these countries will be reduced. Over time, the number of imported and exported goods will continue to decrease, ultimately affecting the development of international trade. Other premises are stable, the higher the tariff rate of each country, the slower the growth rate of trade; The more non-tariff barriers are strengthened, the slower the rate of international trade development.

Changes in the structure and geographical orientation of international trade commodities are also affected to some extent by tariff barriers and non-tariff barriers. In advanced capitalist countries, import tariffs on manufactured goods have not only fallen sharply, but also far more than agricultural products, but agricultural products are affected by tariff barriers far more than manufactured goods; Tariff reductions between developed capitalist countries and developing and socialist countries are much smaller than those between advanced capitalist countries. Tariffs can trigger higher prices of goods, ultimately to the detriment of consumers. Tariffs are closely related to the price of imported goods, and the price of imported goods will be increased by the imposition of tariffs; The quantity of imported goods will be reduced due to the adoption of non-tariff policies to restrict imports; Other conditions remain unchanged, which can also trigger an increase in the price of imported goods. Tariffs affect a country's balance of payments and trade balance. If measures such as raising import tariffs are adopted to restrict imports, it may

play a role in temporarily reducing imports, improving the balance of payments and narrowing the trade deficit when a country has a serious trade surplus and a balance of payments deficit.

3.2 The Impact of Exchange Rates on Import and Export Trade

The level of the exchange rate affects international trade. According to economic principles, the appreciation of the local currency means that the currency of other countries depreciates, and the price of export commodities will increase when import and export trade is carried out, and the same import and export countries need to take out more local currency to purchase commodities [4], and their commodity competitive advantage will be greatly reduced, which is not conducive to the export of domestic goods [3]; The depreciation of the local currency means that the currencies of other countries have appreciated, and the price of export commodities will fall when import and export trade is carried out, and the same import and export countries need to take out less local currency to buy commodities, and their commodity competitive advantage will be greatly enhanced, which is conducive to the export of domestic goods. Exchange rates have an impact on the balance of payments. Currency depreciation would lead to an increase in imports and a decline in exports, which would exacerbate the deterioration of the terms of trade [1]. When commodity prices rise and consumption levels remain unchanged, consumers can only buy less of this commodity, essentially leading to a decline in real incomes, a decline in the country's spending, and an improvement in the trade balance [2].

In today's economic globalization, prices in domestic and foreign markets affect each other. First, changes in the exchange rate affect the general price level of the country, and then affect a country's trade balance and the amount of goods imported and exporters. The most intuitive manifestation of currency appreciation is the decline in the local currency price of imported goods, and after price transmission, the final cost of goods is affected and the price falls [6]. Secondly, exchange rate changes are also closely related to the trade balance, and currency depreciation will bring about a series of problems such as inflation [5].

4   Empirical Analysis

4.1 Equations

Based on the above theoretical analysis, the model is constructed as follows:

$$\ln trade_t = \beta_0 + \beta_1 \ln rate_t + \beta_2 \ln ct\_tariff_t + \beta_2 \ln am\_tariff + \varepsilon \qquad (1)$$

To avoid the problem of heteroscedasticity, the variables on the left and right sides of the equation take the natural logarithm. $\ln trade_t$ indicates the total import and export volume of the Yangtze River Delta region; $rate_t$ represents the exchange rate of the US dollar against the Renminbi; ct_tariff_t represents tariff revenues in the Yangtze River Delta region; am_tariff Indicates the weighted average tariff rate imposed by the United States on China.

Table 2. Descriptive statistical results

Variables	Observation	Ave.	Std. error	Min.	Max.
trade	40	36152077	86295410	282.4	308400000
rate	40	6.504	0.263	6.14	6.91
ct tariff	40	1753.701	1196.521	225.523	5979.08
am tariff	40	0.058	0.003	0.051	0.063

Table 3. Correlation coefficient matrix analysis

Variables	trade	rate	ct tariff	am tariff
trade	1			
rate	0.19*	1		
ct tariff	0.38*	0.24*	1	
am tariff	0.12*	−0.11*	−0.01*	1

4.2   Variable Descriptions and Data Sources

The data used in this article are from the National Bureau of Statistics, the State Administration of Foreign Exchange and WITS. A sample of the total foreign trade imports and exports of Shanghai, Jiangsu, Zhejiang and Anhui from 2010 to 2020, the exchange rates between China and the United States over the years, the tariff revenues of the Yangtze River Delta region and the weighted average tariff rate imposed by the United States on China are sampled.

4.3   Empirical Analysis

This paper provides a descriptive statistical analysis of the independent, dependent, and control variables of the model.

Furthermore, this article examines the correlation between variables, and the results are shown in Table 2.

As can be seen from the data in Table 2, all variables passed the correlation coefficient test at a 10% confidence level. Among them, the total import and export volume of the explanatory variable is positively correlated and the correlation is large, and the tariff revenue in the Yangtze River Delta region, corresponding to the correlation coefficient is 0.38; There is also a significant positive correlation between the exchange rate and the total import and export value, and the corresponding correlation coefficient is 0.19; The weighted average tariff rate imposed by the United States on China also shows a significant positive correlation with the total import and export volume, corresponding to a correlation coefficient of 0.12. Therefore, the regression results of the built model can be considered reliable.

Table 4. Regression results

Variables	Jiangsu	Shanghai	Zhejiang	Anhui
Variables	lntrade	lntrade	lntrade	lntrade
Lnrate	−0.0839 (0.474)	−0.494* (0.210)	8.742 (6.777)	31.62*** (7.708)
Lnct tariff	0.194*** (0.0436)	0.276** (0.110)	1.123*** (0.193)	−3.755*** (0.641)
Lnam-tariff	9.289 (8.257)	3.242 (4.210)	155.4*** (28.90)	−514.3*** (67.42)
Constant	6.932*** (1.095)	6.913*** (0.849)	−15.35 (13.67)	−0.821 (13.33)
Observations	10	10	10	10
Rsquare	0.549	0.841	0.611	0.901

Note: ***, ** and * indicate significant at 1%, 5%, and 10% confidence levels, respectively, none * indicates no significance, and standard errors are in parentheses

Based on the import and export trade data of the Yangtze River Delta region from 2010 to 2019, this paper uses the multiple linear regression method to explore the impact of Sino-US trade friction on the import and export trade of the Yangtze River Delta region, and uses Stata 15.0 to return to the Yangtze River Delta region according to the model constructed above. To avoid "pseudo-regression", a multicollinearity test is performed first, and the results show that the VIF values are all less than 2, and when $0 < VIF < 10$, we can assume that there is no multicollinearity in the model. The specific regression results are shown in Table 4.

According to the results of the return in Table 3, the first column analyzes the import and export trade of Jiangsu region, and the results show that the exchange rate does not have a significant impact on the total import and export volume of Jiangsu region; The tariff revenue of the Yangtze River Delta region has a significant positive impact on the total import and export volume of Jiangsu region, and for every 1 unit increase in the tariff revenue of Jiangsu region, the total import and export volume of Jiangsu region will increase by 0.194 units; The weighted average tariff rate imposed by the United States on China also has no significant impact on the total import and export volume of the Jiangsu region.

The second column analyzes the import and export trade in Shanghai, and the results show that the exchange rate has a significant negative impact on the total import and export volume of Shanghai, and for every unit increase in the exchange rate, the total import and export volume of Shanghai area will decrease by 0.494 units; The tariff revenue of the Yangtze River Delta region has a significant positive impact on the total import and export volume of the Shanghai area, and for every 1 unit increase in the tariff revenue of the Shanghai region, the total import and export volume of the Shanghai region will increase by 0.276 units; The weighted average tariff rate imposed by the

United States on China does not have a significant impact on the total import and export volume of the Shanghai area.

The third column analyzes the import and export trade of Zhejiang region, and the results show that the exchange rate does not have a significant impact on the total import and export volume of Zhejiang region, but the tariff revenue of the Yangtze River Delta region and the weighted average tariff rate imposed by the United States on China have a significant positive impact on it, and for every unit of tariff revenue in the Yangtze River Delta region, the total import and export volume of the Yangtze River Delta region increases by 1.123 units; For every unit increase in the weighted average tariff rate imposed by the United States on China, the total import and export volume of the Yangtze River Delta region increases by 155.4 units.

Similarly, the fourth column analyzes the import and export trade of Anhui region, and the results show that the exchange rate has a significant positive impact on the total import and export volume of Anhui region, and for every unit increased in the exchange rate, the total import and export volume increased by 31.62 units; The tariff revenue of the Yangtze River Delta region and the weighted average tariff rate imposed by the United States on China have a significant negative impact on the total import and export volume of the Anhui region, and for every unit of tariff revenue in the Yangtze River Delta region, the total import and export volume decreases by 3.755 units; For every unit increase in the weighted average tariff rate imposed by the United States on China, its total import and export volume decreases by 514.3 units.

5 Conclusions

In this paper, the linear regression method of least squares method is used to empirically analyze the impact of Sino-US trade friction on import and export trade in the Yangtze River Delta region. The study found that during the sample period, the change of RMB exchange rate had a more prominent impact on the import trade volume of Anhui Province and the export trade volume of Shanghai Municipality, and this part of the impact offset the effect of RMB exchange rate change on The export trade of Anhui Province and the import trade of Shanghai Municipality. The impact of tariff revenue on the total import and export volume of Anhui Province in the Yangtze River Delta region is in line with theoretical expectations, and has a significant positive impact on foreign trade in other regions; The weighted average tariff rate imposed by the United States on China has a significant negative impact on Anhui Province and a significant positive impact on the import and export of Zhejiang Province. As a result, the article put up with the following three policy suggestions.

First, maintain the stability of the currency value and reform the exchange rate system. On the basis of grasping the law of changes in the RMB exchange rate, China should control the magnitude of its changes, make the economy develop steadily, put the impact of exchange rate changes on the agenda of improvement, improve the awareness of exchange rate risks, and control the stable and slow appreciation of the RMB. In addition, the central bank should promote further marketization of the foreign exchange market and reduce policy intervention in it.

Second, implement a more targeted tariff adjustment policy. China's tariff authorities should take the initiative to implement more targeted import tax reduction measures.

For the Yangtze River Delta region, Shanghai will reduce import tariffs on travel and transportation services; Jiangsu Province should reduce import tariffs on non-raw materials and manufactured goods and machinery and transportation equipment; Zhejiang Province should reduce import tariffs on mechanical and electrical products, high-tech products and clothing products; Anhui Province should reduce import tariffs on primary products and non-food raw materials.

Third, accelerate the upgrading of the industrial structure. The government should first encourage the development of high-tech industries and increase subsidies; Second, the government should make use of the geographical advantages and industrial base of the Yangtze River Delta region to increase investment in high-tech industries in the Yangtze River Delta region and use the Yangtze River Delta region to radiate the interior; Finally, the government should improve the import and export management system to prevent malicious competition. Anhui Province should make full use of its strengths and avoid its weaknesses and accelerate the construction of a "famous city of the Great Lakes and a highland of innovation".

Of course, we have to admit that the impact mechanism of Sino-US trade frictions on foreign trade in the Yangtze River Delta region is multi-dimensional. This article identifies the impact of only some of these key factors. In future studies, the analysis of the influence of more factors will be expanded.

References

1. C. Lianbiao, Z. Lei. "Assessment of the International Economic Impact of Sino-US Trade Friction," Journal of Finance and Economics, pp, 4–17, December 2018.
2. D. Lu, S. Weilin. "Should the trade surplus be responsible for Sino-US trade frictions? The perspective of recalculation based on the principle of ownership," Statistics and Management, pp, 18–23, March 2021.
3. F. Yi, J. Yanyan, Z. Yang. "Research on the generation mechanism of global foreign exchange market risk under major shocks," Finance and Trade Economics, pp, 76–92, May 2021.
4. J. Jiandong, W. Xiaoyan. "The Impact of Tariff Disputes on Trade Balance, Terms of Trade and Trade Structure between China and the United States," International Economic Rev., pp. 71–92+6, March 2021.
5. L. Yue, L. Chengrong. "Analysis on the Effect of Trade Friction Based on The Taxation List of China and the United States," Journal of Finance and Economics, pp, 59–72, January 2019.
6. W. Guangcai, C. Xinxin. "Game analysis of Sino-US trade friction under the impact of the new crown epidemic," Journal of Ocean University of China (Social Science Edition), pp. 73–83, May 2021.