The Impact of Tariff Increases on Agricultural Exports in Guangdong, Hong Kong and Macao Greater Bay Area Based on the Perspective of China-US Trade Friction

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Abstract. Both the international economic scene and trade between the United States and China have been significantly impacted by the trade tension between the two nations. In light of these circumstances and potential trade threats, the author investigates the policy implications of the US tariff increase on China's agricultural products as well as the consequences of trade friction between the US and China on the agricultural exports of the Guangdong, Hong Kong, and Macao Greater Bay Area. The study combines qualitative and quantitative analyses, selecting China's agricultural export trade data from 2010-2022 and the Greater Bay Area's agricultural export data to major countries or regions, and uses the double-difference method to assess the current state of China-US trade in agricultural products. The study summarises the effects of tariff increases on China's agricultural exports, and puts forward revelatory recommendations sat the government, industry and enterprise levels respectively to help agricultural exports from the Guangdong, Hong Kong and Macao Greater Bay Area to embark on a path of high-quality growth.

Keywords: Sino-US trade friction, agricultural products, tariff, double-difference modelling.

1. Introduction

Since China's accession to the WTO at the turn of the centt23, the scale and volume of trade between China and the U.S. has grown year after year. In 2018, U.S. trade tensions between China and the U.S. escalated when the U.S. imposed tariffs on Chinese exports. China then responded with equivalent tariff countermeasures, and ever since, trade tensions between the two countries have escalated into a full-blown conflict. A total of 5,772 HS eight-digit products, including 997 types of agricultural products, make up the $200 billion second wave of tariff products issued by the US in the Sino2S trade friction. This represents 17.27%of the HS eight-digit code number in the tariff list.

In 2018, China's total exports to the United States amounted to $3.649 billion, accounting for 45.68%of China's total agricultural exports to the United States in terms of the value of agricultural products exported with additional taxes. Affected by the trade friction between China and the United States, China's agricultural exports to the United States have been affected to a certain extent, and the export situation of s part of agricultural products and its export mode has become an important issue to be studied. The nine cities in the Guangdong-Hong Kong-Macao Greater Bay Area are important export markets for agricultural products, and their exports of agricultural products to the United States have shown a growing trend in recent years. Examining how tariffs affect the export of agricultural goods in the Greater Bay Area is crucial in this regard, especially in view of the national strategy for building the Guangdong-Hong Kong-Macao Greater Bay Area. The majority of current studies that have already been done employ global macro analysis models, like the Global Trade Analysis Project (GTAP), for simulation evaluation. This makes it challenging to apply these models to analyze how tariffs affect local and domestic trade [1-4]. This paper uses a difference-in-difference model to evaluate the impact of US tariffs on agricultural exports in the Greater Bay Area and its mechanism, and better reveals the impact of additional tariffs on agricultural exports in the Greater Bay Area.

2. Literature Reference

As for the cause of the Sino-US trade friction, some scholars believe that the main reason is the export control imposed by the United States on China's high-tech products, while others believe that the direct cause is intellectual property issues [5-7]. The impact of the Sino-US trade frictions is also the focus of scholars' research, and most scholars have studied economic globalization, import and export trade, and employment [8-13]. Taking agricultural products as a starting point, it is necessary to study the impact of tariffs on trade in the context of Sino-US trade frictions. Based on the data released by the Ministry of Commerce, Jiping Zhao used statistical analysis and literature research methods to analyze the import and export situation and structure of China's international trade of agricultural products [14]. Lingling Wu et al. analyzed the tariff price pass-through effect of tariff control policies on agricultural products based on tariff theory, which laid the foundation for empirical analysis [15]. Moreover, Dongsheng Sun et al. used the method of index system construction to study the impact of Sino-US trade friction on the trade structure of agricultural products between China and the United States [16-18]. Lu Liu empirically analyzes the multi-dimensional correlation characteristics of agricultural product prices between China and countries along the Belt and Road by using the spillover network method and focuses on the impact of the Sino-US trade war on the price correlation [19]. Difference-in-difference (DID) is a method chosen by many scholars to study the effects of tariff upward policy. Based on the difference model, Jianwu Zhang et al. found that China's additional tariffs on agricultural products imported from the United States greatly reduced China's imports of agricultural products from the United States [20]. With a focus on the examination of the total import value and import price of the agricultural product industry, Jiawei Gao employed the difference-in-difference approach to investigate the effects of the mutual tariffs between the two nations on the agricultural product industry [21]. Chenxu Zhou conducted the research using a difference-in-difference model using panel data on the volume of agricultural commodity import and export trade between China and 16 major trading nations, including the United States [22]. Existing studies have mainly examined the impact of the US-China trade friction on China's macroeconomy at the national level, but it is extremely rare to explore the impact of tariffs on agricultural exports in the Guangdong, Hong Kong and Macao Greater Bay Area in the context of national strategies.

3. Analysis of the Current Situation of China's Agricultural Exports

3.1. The Scale of China's Agricultural Exports

Based on the collected data on China's agricultural export trade from 2017 to 2022, this paper conducts a qualitative analysis of the current situation of China's agricultural export trade and combines it with the empirical analysis below for better analysis. The import and export data of Chinese agricultural products used here are from the China Statistical Yearbook and the UN Comtrade database. In the definition of the classification of agricultural products, with reference to the WTO Agreement on Agricultural Products, the HS code system is used to classify agricultural products. Figure 1 reflects the scale of China's agricultural export trade before and after the official outbreak of the Sino-US trade frictions. As can be seen from the figure, the scale of China's agricultural exports first increased and then decreased, and the export volume reached a peak in 2018, and then affected by the Sino-US trade war, the scale of China's agricultural exports declined, but after 2020, it began to grow sharply, and by 2022, it has reached 654.7 billion yuan in exports.

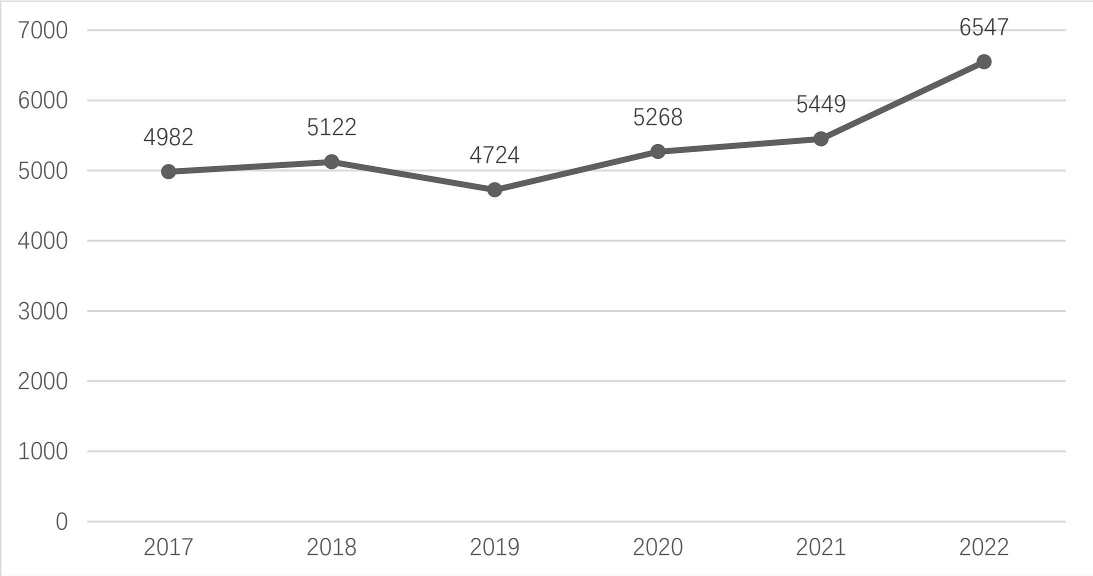

Fig. 1 China's agricultural export scale from 2017 to 2022

3.2. The Export Pattern of Agricultural Products in the Greater Bay Area

Figure 2 shows the export pattern of agricultural products in the Guangdong-Hong Kong-Macao Greater Bay Area from January to November 2023. The criteria for selecting economies in this chapter are mainly based on the current Sino-US trade, especially the trade of agricultural products, and the countries and regions with closer economic ties with the Guangdong-Hong Kong-Macao Greater Bay Area, with larger scale of agricultural trade and more research value. They are the United States, the European Union, ASEAN, Japan, South Korea, and China, Hong Kong and Taiwan. From the perspective of exports, in addition to Hong Kong and Taiwan, China's largest agricultural export market is the United States, accounting for about 23% of China's total agricultural exports. It is followed by ASEAN and the European Union, which respectively account for about 20% of China's agricultural export market share.

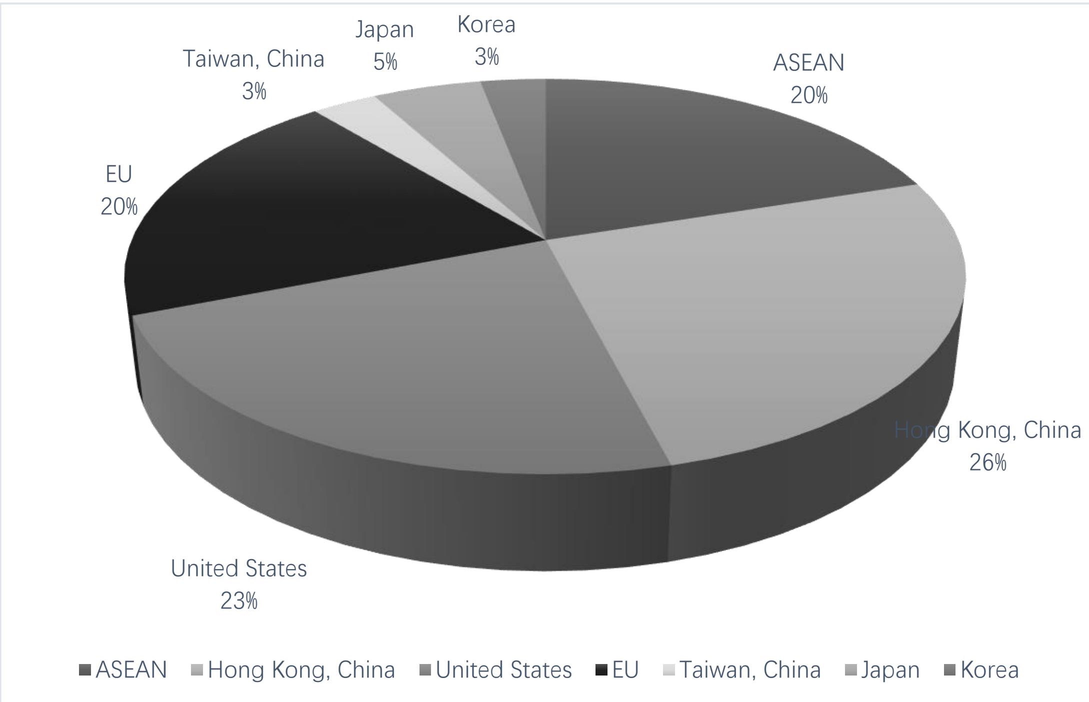

Fig. 2 Export pattern of agricultural products in the Greater Bay Area in 2023

4. Model Construction and Variable Description

4.1. Model Construction

Due to the suddenness of the trade friction, it is difficult to accurately predict it based on previous theories, so it is unlikely that the industries affected by the trade friction will predict the series of impacts of the tariffs. In addition, the steep tariffs have led to significant changes in tariffs at the product and time level. In the process of imposing tariffs on China's agricultural products by the United States, not only did the export value and export volume of the same product show significant differences before and after the tariffs were imposed, but also the products subject to additional tariffs at the same point in time (i.e., the treatment group) and the products without tariffs (i.e., the control group) also showed significant differences in terms of export value and export volume. This means that the U.S. tariffs on Chinese agricultural products provide an ideal "quasi-natural experiment" for this paper to evaluate the effects of tariff policy. Therefore, this paper will use the difference-in-difference model to evaluate the export trade effect of the U.S. tariffs on China's agricultural products. The products subject to tariffs were used as the treatment group, and the products that were not subject to tariffs were used as the control group, and the following model was set:

$$\ln y_{i,t} = \alpha_0 + \beta_0 Treatment_i * post_{i,t} + \beta_1 X_{i,t} + \lambda_i + \lambda_t + \varepsilon_{i,t} \tag{1}$$

In the above model, the subscript i represents the HS8-digit code for export agricultural products, and the subscript t represents the time. α_0 refers to the intercept term, λ_i represents the fixed effect of the product, and$\lambda_t$is the fixed effect of the year. $\varepsilon_{i,t}$ refers to the error term in the model. $\ln y_{i,t}$ is the explanatory variable in this paper. $Treatment_i$ represents a grouped dummy variable for additional U.S. tariffs on Chinese agricultural products. $post_{i,t}$ represents the time dummy variable in which the United States imposes tariffs on Chinese agricultural products. The interaction item $Treatment_i * post_{i,t}$ is the core explanatory variable of this paper, and its coefficient β_0 is the policy effect studied in this paper. $X_{i,t}$ is the general term for the control variables in this paper, and its coefficient is represented by β_1. It should be noted that if the estimated β_0 coefficient of the cross-item $Treatment_i * post_{i,t}$ is not significant, it means that the additional tariffs imposed by the United States on China's agricultural products have not affected the prices of China's agricultural exports, the cost of additional tariffs is completely passed on to the domestic prices of American imported products and borne by American importers and consumers. If the estimation coefficient β_0 is significantly negative, it means that the cost of additional tariffs may be fully borne by Chinese exporters, or by Chinese exporters, US importers and consumers.

4.2. Explanation of Variables

Table 1. Variables explained

Variable Type	Representative Symbol	Variable Interpretation
Dependent Variables	$\ln y_{i,t}$	China's Agricultural Exports
Independent Variables	$Treatment_i * post_{i,t}$	Policy Effect
Control Variable	$price$	China's Export Commodity Price Index
	$REER$	Exchange Rate of RMB

The time span of this study is from 2010 to 2022 and mainly involves the HS8-digit export data of agricultural products of China Customs, including the total export value and average export price data of agricultural products in the Guangdong-Hong Kong-Macao Greater Bay Area, and the total export value and average export price data of agricultural products in major agricultural export countries and regions such as the United States, the European Union, and ASEAN. The explanatory variable in this paper is $\ln y_{i,t}$, which represents China's exports of agricultural products. The core explanatory variable is $Treatment_i * post_{i,t}$, which is the interaction term of the group dummy variable and the time dummy variable of the tariff. The control variable $X_{i,t}$ is a general term for the average export price (price), exchange rate (REER) and tariff (tariff). Table 1 describes the variables in this document.

4.3. Empirical Results

In this paper, the difference-in-difference method is used to regress the model of total agricultural exports, and the regression results are shown in Table 2. In the model in Table 2, the core explanatory variable DID passed the significance test, and the R values of the regression equations were all greater than 90%, indicating that the model had good goodness of fit and strong explanatory ability. Among them, the core variable DID of total agricultural exports is significantly at the 10% confidence level, and the regression coefficient is negative.

Table 2. Regression Results

VARIABLES	(1) ln_exports
did	-0.130*
	(0.0654)
treatment	-0.350***
	(0.0157)
post	0.185**
	(0.0733)
price	0.0129**
	(0.00559)
reer	-0.0366
	(0.0751)
Constant	5.922***
	(0.417)
Observations	18
R-squared	0.934

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the control variable export commodity price index, the results obtained from the regression show that there is a significant relationship between the control variable export commodity price index and China's total agricultural exports to the United States. In the regression results, the export commodity price index has a positive and significant relationship with the export value of agricultural products. However, the empirical results of the RMB exchange rate and agricultural import and export trade are not significant.

5. Suggestions

5.1. Government level: take the initiative to respond and plan

Due to the importance of the US market for agricultural exports in the Greater Bay Area, it is difficult to find alternative markets in the short term. China should continue to strengthen trade friction negotiations with the United States and do its best to ensure the stability of the US export market. Government departments should guide enterprises to formulate countermeasures and disposal plans to effectively alleviate the impact of the decline in exports on enterprises.

5.2. Industry level: study and judge risks and standardize behaviors

The agricultural products industry should strengthen the monitoring and early warning of the agricultural product market, improve the monitoring and early warning mechanism of the agricultural product import and export trade market, improve the domestic and foreign risk early warning and information release system, release market information in a timely and efficient manner, ensure that market participants can obtain it, and scientifically guide the agricultural product market and the import and export trade market in the Greater Bay Area. It is also necessary to improve the supervision and management mechanism of the industry and strengthen the guidance of the industry.

5.3. Enterprise level: pay attention to innovation and expand the market

Enterprises should improve the level of automation and intelligent production, and their own strength and core competitiveness are the foundation for survival, which is reflected in the production technology and management level of enterprises. Through the development of innovative production models, the improvement of agricultural production technology, the combination of traditional production methods with modern technology, and strive to make breakthroughs in the intensive processing and series development of agricultural products. Agri-food enterprises in the GBA should actively explore emerging markets or strive to find alternative markets [23-24].

6. Conclusions

The quantity of agricultural export commodities in China has fallen as a result of tariffs, according to an analysis of the effects of Sino-US trade frictions on the size of China's agricultural commerce and the structure of agricultural trade in the Greater Bay Area. Following 2018, China's agricultural export pattern underwent a reorganization due to trade frictions between the US and China. The country sought out new exporters of agricultural products to offset the abrupt decrease in exports and bring the agricultural product market back into balance. The main way that Sino-US trade frictions affect China's trade deficit is by raising export costs following tariff imposition, which reduces the competitiveness of China's agricultural exports. The US trade policy toward China is heavily influenced by the political and economic ties between the two countries as well as by shifts in the global political landscape. The outcomes of these shifts in the political landscape between the US and China are also clearly seen in the US trade policy toward China. Conversely, when political relations between the two nations are strained, US trade policy toward China tends to be tough, and trade fluctuations in agricultural products will be extremely sharp. After the political relations between the two countries are stabilized, US trade policy toward China tends to be friendly and cooperative, and Sino-US trade in agricultural products will always maintain steady growth.

References

[1] Saiful Alim Rosyadi, Tri Widodo. Impact of Donald Trump’s tariff increase against Chinese imports on global economy: Global Trade Analysis Project (GTAP) model. Journal of Chinese Economic and Business Studies, 2018.

[2] Corong Erwin, Thomas Hertel, Robert McDougall, Tsigas Marinos, van der Mensbrugghe Dominique. The standard GTAP model, version 7. Journal of Global Economic Analysis, 2017.

[3] Zhou Zhengning, Shi Xinlu. The impact of trade friction on China and the United States: An analysis based on dynamic GTAP model. International Economic and Trade Exploration, 2019, 35(02):20-31.

[4] Li Xin. Sino-US trade friction: An analysis of computable general equilibrium model based on GTAP. Journal of International Trade, 2012, 11: 50-65.

[5] Chen Jiyong. The background, causes, essence and China's countermeasures of the Sino-US trade war. Geomatics and Philosophy and Social Science, 2018, 71(05): 72-81.

[6] Liang Ming. The origin, impact and future trend of Sino-US trade friction. International Trade, 2019, 7:25-36.

[7] Ma Shuna. Analysis on the causes and countermeasures of the Sino-US trade war. Modern Commerce & Trade Industry, 2021, 42(05): 66-67.

[8] Sheng Bin, Yan Bing. Sino-US trade conflict and U.S. economic interests in China. People's Forum, 2018, 16: 30-33.

[9] Zhang Guofeng, Lu Yi, Jiang Lingduo. Tariff shock and China's import behavior. Journal of Financial Research, 2021, 10: 40-58.

[10] Huang Peng, Wang Jianxin, Meng Xue. Economic globalisation rebalancing and US-China trade friction. Journal of China Industrial Economy, 2018, 10: 156-174.

[11] Yu Zhen, Zhou Binghui, Xie Xubin et al. Participation in global value chain reconstruction and US-China trade friction. Journal of China Industrial Economy, 2018, 7:24-42.

[12] Xue Tongrui, Zhou Shen. The impact of U.S. trade protection on labor and employment in China in the post-crisis era. Asia-Pacific Economy, 2017, 1: 85-92+175.

[13] Cui Lianbiao, Zhu Lei, Song Malin, et al. International economic impact assessment of Sino-US trade friction. Journal of Finance and Economics, 2018, 44(12): 4-17.

[14] Zhao Jiping, Zhang Jingxia, Wu Yunxia. The impact of Sino-US trade friction on China's international trade of agricultural products. Journal of Northern Agricultural Sciences, 2021, 49(03): 110-115.

[15] Wu Lingling. Research on the trade effect of import tariff control of bulk agricultural products. Master’s Thesis. China Jiliang University, 2021.

[16] Sun Dongsheng, Su Jingxuan, Li Ninghui, et al. Research on the impact of Sino-US trade friction on the trade structure of agricultural products between China and the United States. Issues in Agricultural Economics, 2021, 1: 95-106.

[17] Ding Cunzhen, Xiao Haifeng. Research on the ternary marginal measurement and tariff effect of bilateral agricultural exports between China and the United States. Journal of Agricultural Technology and Economics, 2019, 3: 118-131.

[18] Ni Hongfu, Gong Liutang, Chen Xiangjie. Analysis of tariff cost effect in global value chain: On the price effect and welfare effect of Sino-US trade friction. Journal of Quantitative and Technical Economics, 2018, 35(08): 74-90.

[19] Liu Lu, Jiang Yixuan, Zhang Bangzheng. Research on the correlation between agricultural product prices in China and the "Belt and Road" countries: and on the impact of Sino-US trade frictions. Issues in Agricultural Economics, 2021, 3: 126-144.

[20] Zhang Jianwu, Zhong Xiaofeng. The impact of Sino-US trade friction on China's agricultural product imports. Journal of South China Agricultural University (Social Sciences), 2022, 21(03): 102-114.

[21] Gao Jiawei. Research on the impact of China's counter-tax on U.S. agricultural products. Master’s Thesis. Shanghai University of Finance and Economics, 2023.

[22] Zhou Chenxu. Research on the impact of trade war on Sino-US agricultural trade. Master’s Thesis. University of International Business and Economics, 2023.

[23] Jin Jieying, Hua Jing. On the impact of the Sino-US trade war on China's economy in 2018: A case study of agricultural product imports. Economic and Trade Practice, 2018, 11: 72-73.

[24] Zheng Shi, Li Rui, Wang Zhigang. The impact of Sino-US trade friction on China's agriculture: opportunities and challenges. Teaching and Research, 2019, 6: 33-44.