Analysis of the Impact of China-US Trade Structure on Bilateral Relations

-- Quantitative Measurement based on GDELT Database

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Abstract. From the perspective of trade structure, analyzing the impact of the Sino-US trade structure on bilateral relations has expanded the research on the impact of Sino-US bilateral relations. This paper uses a panel data model of China and the United States from 2001 to 2020 to empirically study the impact of import and export trade structures (the proportion of different categories of imported and exported goods) on bilateral relations. The study finds that the import and export trade structure of the two countries has a significant impact on bilateral relations, and the changes in the proportion of different categories of goods trade have obvious differences in the Sino-US bilateral relations. The use of the GDELT database for big data analysis and the division of trade structure based on SITC codes helps to analyze bilateral relations between countries. This study enriches the research on the relationship between China's import and export trade and bilateral relations, and provides a certain value reference for academic research and policy formulation for the academic community and policy makers.

Keywords: Import and Export Trade Structure; Bilateral Relations; GDELT.

1. Introduction

The research object of international bilateral relations is the relationship between countries. In fact, the relationship between countries is often complex, so the research perspective on bilateral relations should be multidimensional and multi-angled[1]. As Marx said, "the economic base determines the superstructure." In the world, bilateral relations between countries are the most important superstructure, so it is particularly important to approach and analyze the problem from an economic perspective. The international relations community generally believes that the cause of the trade friction between China and the United States is the competition of capital-intensive and technology-intensive industries[2]. Analyzing the current situation of Sino-US bilateral trade, it is not difficult to find that the total volume of Sino-US bilateral trade has not been affected by the deterioration of bilateral relations, so the reason for the escalating Sino-US trade friction is likely to be due to the structural imbalance of the Sino-US bilateral trade structure.

Since the establishment of diplomatic relations in 1970, the bilateral trade between China and the United States has shown a positive growth trend with the total volume of imports and exports increasing year by year. However, the changes in trade structure have remained relatively stable, often synchronizing and changing direction with major policy reforms, changes in bilateral relations, and significant events. Therefore, considering that China-US trade has not yet reached a "platform period," analyzing the bilateral relationship from the perspective of import and export trade structure is more reasonable. According to international conventions, the import and export trade structure between China and the United States can be divided into labor-intensive industries, resource-intensive industries, and capital and technology-intensive industries. With the continuous acceleration of economic globalization, the basic pattern of China-US international division of labor has been mutually complementary and balanced development: the United States is in the middle-to-high end of the value chain, mainly in capital and technology-intensive industries, while China is in the middle-to-low end of the value chain, mainly in labor-intensive and resource-intensive industries[2]. However, with China's continuous breakthroughs in capital and technology-intensive industries in the middle-to-high end of the value chain, China's international division of labor status has threatened the United States.

Therefore, to understand and analyze the reasons for the changes in the bilateral relationship between China and the United States, the analysis of the import and export trade structure has become a novel entry point. Therefore, the following questions are worth exploring in depth: Can the trade structure between China and the United States affect bilateral relations? Are the mechanisms of the three trade structures the same? To address these questions and provide a reasonable explanation, this paper conducts in-depth research and analysis of the trade structure and bilateral relations between China and the United States by selecting panel data from 2001 to 2020.

2. Literature Review

2.1 Review of Trade Structure Studies

The earliest research on trade structure appeared in the international trade of manufactured goods. The main method used was to classify trade goods, and then explore the import and export trade of each country to determine whether a country is a net importer or exporter. This method has been the basis of international trade research. For example, the internationally recognized SITC and HS systems for classifying goods have successfully coordinated international trade using this method. Currently, the internationally recognized 5-digit and 6-digit codes provide convenience for research on international trade structure.

The above method of research has its limitations: First, as the form of international trade becomes increasingly diversified and the globalization of services and technology trade exposes the limitations of purely commodity trade, it becomes more difficult to meet the actual research needs. Second, the international trade flow is complex, and the study of bilateral trade has become an important direction of trade structure research, with empirical-based research on bilateral trade structure becoming a focus. Based on these issues, the final trade analysis report can still only be explained based on general categories[3].

This article focuses on the study of the import and export structure of China-US bilateral trade. Domestic scholars have conducted extensive and multifaceted discussions on the trade structure between China and the US. Boquan Chen (1996) analyzed the trend of China's foreign trade commodity structure evolution since 1980 using the newly emerging trade structure four-stage theory internationally, and compared it with the US, believing that China can enhance complementary effects and reduce the adverse effects of excessive competition, thus possibly obtaining more comparative benefits[4]. Chen Cheng and Xin Zang (2007) explored the situation and trends of the commodity trade structure between China and the US after China's accession to the WTO by calculating the Lawrence index and other indicators, and believed that there is a strong complementarity in the overall China-US manufactured goods trade, and vertical division of labor is the main form of international division of labor[5]. Ling Wang (2008) analyzed and found that China's foreign trade structure has the characteristic of "one strong and many weak," and it relies heavily on foreign trade with the US. Its competitiveness mainly lies in the labor-intensive industries at the low end of the industrial structure, which can absorb a large amount of labor but is prone to anti-dumping or "safeguard measures" sanctions from the US[6]. Xuandeng Xue (2009) compared the trade structures between China and the US from multiple perspectives, such as goods trade, service trade, and trade balance structure, and pointed out the problems in China's foreign trade structure and proposed a scientific development path for China to transform from a trading power to a trading powerhouse[7]. Qiang Li and Lei Tang (2009) explained the stability of the China-US trade structure based on the product cycle theory and found that the product cycle between China and the US tends to upgrade from low-tech to high-tech[8]. Hong Liu (2013) found that the commodity trade structure of China's exports to the US has an optimizing trend, and tried to summarize the characteristics of the "China exporting to the US" commodity trade structure, analyzed the reasons from the perspective of resource endowment, and finally predicted the future trend of the China-US trade structure[9]. Junhui Yang (2016) analyzed the monthly data of China-US trade based on HS codes and deeply explored the relationship between exchange rates and the imbalance of China-US trade structure, believing that the imbalance of China-

US trade structure is the result of the comprehensive effect of multiple factors[10]. Zhongliang Deng (2018) believed that a comparative study of the trade structure between China and the US can accurately understand the basic theoretical logic of China-US trade friction and put forward policy suggestions through analysis[11]. Linghui Cai and Yanfu Zhu (2020) used the stochastic frontier gravity model to measure the export efficiency of different types of China-US trade products, analyzed and proposed that China and the US should establish a mechanism for mutual trust and communication, and further increase the import of US goods with China's domestic demand as the guide[12]. Tongbin Zhang and Zongli Zhou (2021) measured the value-added trade structure between China and the US from 2001 to 2014 using the world input-output table and concluded that the unit export profitability in China's bilateral trade is slightly lower than that in the US, and the difference in the international division of labor status between China and the US makes the trade structure between the two countries show strong complementarity[13].

In summary, Chinese scholars have focused their research on the optimization of the structure of China-US trade and how to influence the international division of labor between the two countries. The goal is to promote the gradual development of China's import and export trade to a higher level through the optimization of trade structure, and to gain an advantageous position in US import and export trade.

2.2 Literature Review on Quantitative Measurement of Bilateral Relations

Quantitative research on bilateral relations between countries based on big data has become a popular topic in recent years, but social research based on recorded data has a long history. Foreign research on this topic started earlier than domestic research, and it can be traced back to the origin of event databases and the behavioral revolution around 1960 (Zhipei Chi and Na Hou, 2019). In the field of international relations, the earliest data that could be measured were events. The early international relations community adopted the method of manually coding and assigning values to events. However, due to the limited speed of manual sorting and the limited amount of data that can be accommodated, this research was not part of the mainstream school of thought. Nevertheless, there are still many representative databases, such as Edward Azar's "Conflict and Peace Data Set" and Charles McClelland's "World Event Interaction Survey"[1].

The measurement of bilateral relations in China started relatively late, and the earliest literature came from Shaojun Li (2002), who selected 642 fields related to China-US relations from the People's Daily for value measurement. However, the most influential and pioneering work was Professor Xuetong Yan 's “Quantitative Measurement of National Bilateral Relations”, in which he proposed a value measurement method for national bilateral relations and conducted tests on the method in different dimensions. The International Relations Institute of Tsinghua University has been continuously updating the “China's Relations with Major Powers Value Table” according to Professor Yan's value measurement method, measuring the bilateral relations between China and nine countries including the US and Russia, and making positive contributions to the research of quantitative measurement of international relations. However, the downside is that the value measurement method is manually assigned, and due to the huge workload in data processing, there are inevitably limitations, which also lead to many suggestions for modification[14].

Different from the aforementioned database or manual coding methods, the GDELT database is much larger .Chinese scholars have recently begun to utilize the massive GDELT (Global Database of Events, Language, and Tone) database for studying international bilateral relations, particularly the relationship between China and the United States. Unlike previous databases or manual coding methods, the GDELT database is much larger and covers over 100 languages, tracking news information dating back to 1979 and updating every 15 minutes with an average of 100,000 new entries per day. In 2019, Zhipei Chi and Na Hou used the GDELT database to measure the China-US relationship from 1993 to 2016 and proposed five methods for measuring bilateral relations and their respective limitations, demonstrating the feasibility and accuracy of using big data for measurement[1]. In 2021, Lin Qi et al. proposed a method for quantifying conflict intensity using

global and local conflict indices based on big data[15], and Jianbo Gao et al. (2021)analyzed the application problems of the GDELT database and used the BLR index to analyze whether there has been a qualitative change in China-US relations. They concluded that flexible use of big data and the development of more flexible and adaptable strategies are necessary to truly take the initiative in bilateral exchanges between the two countries[16].

Chinese scholars' research achievements on measuring bilateral relations can be divided into two parts. One part is dedicated to developing measurement indicators for China's bilateral relations and has made remarkable progress. The other part of scholars use existing data indicators and different measurement methods to calculate bilateral relations, aiming to explore the most suitable measurement methods that comply with political and economic laws. Meanwhile, the introduction of the GDELT database provides a more international measurement indicator and platform for measuring bilateral relations.

2.3 The Impact of Trade Structure on Bilateral Relations

The correlation between national relations and international trade can be traced back to the 17th and 18th centuries. At that time, mercantilism prevailed in European countries, and scholars generally believed that a country's political status was closely related to its trade balance, and therefore the task of international trade was limited to increasing exports and reducing imports, with the aim of accumulating wealth and gaining higher international influence.In 1945, Hirschman argued in his book "National Power and the Structure of Foreign Trade" that trade structure could affect the political relations between countries and constrain other countries. He gave examples of how Nazi Germany, on the eve of World War II, used the transformation of its trade structure to enhance its international influence, forcing other countries to support its reforms and adjusting both the import and export structure of its trade goods and the flow of international trade.

In the 1970s and 1980s, some scholars once again emphasized the correlation between international trade and international relations, and put forward the proposition that international trade suppresses political conflicts and promotes political cooperation. For example, liberal scholars proposed the "trade for peace" theory, and after the end of the Cold War, with the rise of "democracy and governance" research, this topic was once again given attention. Liberal scholars believe that a good trade structure increases the cost of conflict between countries, and therefore rational states are unlikely to engage in conflict easily.

In recent years, with the unpredictable changes in international relations, Chinese scholars have paid more attention to China's bilateral trade and relations with other countries, especially after the escalation of China-US trade frictions. The study of China-US trade and bilateral relations has become a hot topic.

Taking into account the existing research, the impact of import and export trade structure on bilateral relations can be summarized as follows: First, the import and export trade structure affects bilateral relations between countries by changing the actual income of the import and export sectors under "comparative advantage". A win-win trade structure can optimize the relationship between the two countries and effectively promote more international cooperation. Second, a good import and export trade structure can bring sustained economic income to both countries, enhance the confidence of governments' cooperation, and promote the good development of bilateral relations. Third, rational allocation of labor-intensive products, resource-intensive products, and capital-intensive products in the import and export trade structure, and correct positioning of international specialization, are conducive to the sustained development of bilateral relations between countries. Fourth, adjustments to the import and export trade structure can affect the transfer of export sectors and the accelerated establishment of import sectors, thereby affecting the establishment of bilateral relations between countries. Fifth, the adjustment trend of a country's trade structure may affect corporate decision-making and thus influence bilateral relations between countries.

However, some scholars still believe that the impact of bilateral relations from a trade perspective is not significant[1]. Becker (1994) even pointed out that many economists believe that the political

relationship between countries is not worth formal analysis. Therefore, in the face of the current complex and fluctuating relationship between China and the United States, whether the adjustment and changes in the bilateral import and export trade structure can become an important factor affecting bilateral relations or further enhance the importance of China's trade policy tools with the United States is increasingly evident. Therefore, this article takes this as a starting point and has certain theoretical basis and practical significance.

3. Theoretical Analysis and Research Hypotheses

According to liberal theory, economic and trade relations can strengthen bilateral relations between countries, effectively establish a mutual trust mechanism between markets, and thus establish collective identity[17]. By continuously optimizing bilateral trade, misunderstandings and conflicts between countries can be reduced, thus achieving the goal of stabilizing bilateral relations. Based on the theory of international trade, a good import and export trade structure between countries can increase the opportunity cost of conflicts[18]. That is, the stability of bilateral relations between countries is maintained to maintain the import and export trade structure. Based on this theory, the import and export trade structure between countries can become an important policy tool for stabilizing bilateral relations between countries, and accelerating the optimization of the import and export trade structure on the basis of opening up to the outside world has become an important way for many developing countries to accelerate economic development and consolidate their national status.

The discussion on trade structure and bilateral relations in the Hecksher-Ohlin model provides insightful implications for the hypothesis proposed in this article. International trade has the ability to cause a redistribution of domestic assets, and different trade structures can have vastly different impacts on bilateral relations. Analysis of the distribution of interests among trade groups reveals that different trade structures correspond to different profit-seeking interest groups, whose actions and political influence directly determine the quality of bilateral relations. Adjusting the bilateral trade structure can directly lead to the transfer or acceleration of domestic industries and change a country's specialization in the international division of labor. However, in the current era of economic globalization, the factors that modern states consider in their political decision-making are much more numerous and complex than the original understanding of the Hecksher-Ohlin model. Nevertheless, the Hecksher-Ohlin effect remains effective. In the era of globalization, the trade structure formed by economic logic can lead to domestic political interactions and ultimately affect the stability or change of bilateral relations. This process can be referred to as the "Hecksher-Ohlin effect" in contemporary international relations[17]. According to the contemporary Hecksher-Ohlin effect, the foreign economic and trade structure is an exogenous variable, which can be understood as a trade structure established by economic logic rather than an economic policy that exists to pursue a specific goal directed by state policy. However, the trade structure can still be linked to bilateral relations in contemporary times because the international trade structure can still affect the domestic interest distribution mechanism, ensuring or changing policies, and thus having an impact on bilateral relations between states.

Based on the above analysis, the academic community has proposed the concept of a "ballast" effect in economic and trade cooperation[17]. The mechanism of bilateral trade structure is more complex than the trade volume, and its impact on bilateral relations is also more important. If the proportion of any category of goods in bilateral trade structure changes significantly, the interest groups that are harmed in both countries will lobby government decision-makers through non-institutional means. The international trade community also refers to the causes of this phenomenon as "political economy of trade policy". Therefore, the relevant interest groups will stabilize diplomatic relations through political channels, and then stabilize economic and trade relations, which is manifested as the "ballast" effect of economic and trade relations.

Furthermore, taking into full account the theoretical perspective that trade structure plays a role in bilateral relations, the author finds that on the one hand, idealistic international relations theory suggests that public sentiment perception can influence bilateral relations, and on the other hand, public sentiment perception can also affect the construction of bilateral trade structure.

Based on the theoretical analysis above, this paper proposes the following three hypotheses:

Hypothesis 1: The import and export trade structure between countries can affect their bilateral relationship.

Hypothesis 2: The impact of different import and export trade ratios on the China-US bilateral relationship varies.

Hypothesis 3: Public sentiment and perception will affect the impact of the trade structure between China and the United States on their bilateral relationship.

4. Empirical Analysis

4.1 Model Construction, Variable Selection , and Data Description

4.1.1 Model Construction

To verify the theoretical hypothesis of this article, the following econometric model is established:

$$AVEGS_{it} = \beta_0 + \beta_1 Lab_{it} + \beta_2 Resource_{it} + \beta_3 Capital_{it} + \beta_4 X_{it} + \mu$$

Where i and t represent the region and year, AVEGS represents the dependent variable of US-China bilateral relations, Lab, Resource, and Capital represent the core explanatory variables categorized according to SITC codes of the US-China trade structure, and X represents the control variables, Including population growth rate (POP), economic stability level (Inflation), technological innovation (patent), national economic development level (LAGDP), proportion of foreign direct investment (AFDI), trade openness level (open), μi is the random disturbance term, β_0, β_1, β_2, β_3 are the estimated coefficients of the constant term and each explanatory variable. Considering the huge differences in the levels of economic development (LAGDP) and technological innovation (patent) with other variables, this article takes the logarithm of LAGDP and patent to handle them.

4.1.2 Variable Selection , and Data Description

This article focuses on the bilateral trade structure and political relationship between China and the United States from 2001 to 2020, following China's accession to the World Trade Organization. The aim is to investigate the impact of the trade structure on the political bilateral relationship between the two countries.

(1) Dependent variable. The selection of dependent variable draws on the fourth approach proposed by Zhipei Chi. and Hou, N. (2019) for constructing a quantitative measure of bilateral relations using the GDELT database. This approach involves summing up all Goldstein scores that impact the relationship between China and the United States in a given year, and dividing it by the number of events, to obtain an average Goldstein value for all events as an indicator of bilateral relationship (AVEGS)[1]. Data for this approach is obtained by calculating the ratio of Goldstein values to the number of events in the GDELT database.

(2) Independent variable. Following the approach of He, Q. and Zhou, R. (2022), the import and export trade structure is classified using the Standard International Trade Classification (SITC) system[19]. The proportion of the trade value of such goods between China and the United States, as a share of the total trade value between the two countries, is used to measure the import and export trade structure. Based on the third revised edition of the "United Nations Standard International Trade Classification", all traded goods are classified into three categories: categories 0-4 are resource-intensive products (Resource), categories 6 and 8 are labor-intensive products (Lab), and categories 5, 7, and 9 are capital or technology-intensive products (Capital)[20]. The core explanatory variable data is obtained from the SITC statistical data in the United Nations Commodity Trade Statistics Database (COMTRADE).

(3) Control variable. The data for the control variables are sourced from the World Development Indicators (WDI) database of the World Bank. Population growth rate (POP) is measured by the actual percentage increase in population in both China and the United States from the WDI database. Economic stability level (Inflation) is measured using the unchanged inflation rate from the WDI database in 2010. The smaller the inflation rate, the more stable the economy. Technological innovation (patent) is measured by the number of patents granted to citizens of both countries in the current year from the WDI database. The level of national economic development (LAGDP) is measured using the per capita GDP from the WDI database. The higher the per capita GDP of a country, the higher the level of its economic development. The proportion of outward foreign direct investment (AFDI) is measured using the ratio of foreign direct investment to GDP from the WDI database. The degree of trade openness (open) is measured using the trade dependency ratio, which is the ratio of total imports and exports to GDP, based on existing literature.

4.2 Data Statistical Analysis

Table 1. Descriptive statistics

Variable type	Variable name	Variable symbol	N	Mean	S.D.	Min	Max
Dependent variable	bilateral relations	AVEGS	40	4.494	0.24	3.942	4.978
Independent variable	labor-intensive products	Lab	40	0.374	0.023	0.346	0.434
	resource-intensive products	Resource	40	0.11	0.02	0.052	0.141
	capital or technology-intensive products	Capital	40	0.534	0.017	0.485	0.561
Control variable	Population growth rate	POP	40	0.681	0.184	0.238	0.99
	Economic stability level	Inflation	40	2.619	2.122	-0.21	8.076
	Technological innovation	patent	40	12.511	0.913	10.31	14.148
	economic development	LAGDP	40	10.66	1.082	8.806	11.781
	proportion of outward foreign direct investment	AFDI	40	1.373	0.865	-0.637	3.619
	degree of trade openness	open	40	18.62	0.42	17.23	19.026

Table 2. Correlation coefficient matrix

variable	1	2	3	4	5	6	7
AVEGS	1						
Lab	-0.2656	1					
Resource	0.2724	-0.4243	1				
Capital	0.3470	-0.7071	-0.1871	1			
POP	-0.0487	0.3039	0.0434	-0.4064	1		
Inflation	0.2474	-0.0909	0.88	0.0877	-0.2136	1	
patent	0.0593	-0.5962	0.1565	0.5204	-0.3419	-0.1738	1
LAGDP	0.0106	-0.1892	0.0440	0.1726	0.5594	-0.3952	0.2000
AFDI	0.1772	-0.1598	0.2902	-0.0386	0.5331	-0.2796	0.1231
open	0.5249	-0.4706	0.1451	0.3957	-0.0901	0.0874	0.1436

Before conducting formal empirical testing, descriptive statistics were performed on the variables mentioned above, and the results are shown in Table 1. The standard deviation of the variables is small, and the data is relatively concentrated. Table 2 shows the Pearson correlation coefficient analysis, which indicates that most of the explanatory variables have a correlation coefficient with the dependent variable of no more than 0.6, indicating that the impact of multicollinearity on the regression is small.

Table 3. (continued) Correlation coefficient matrix.

variable	7	9	10
LAGDP	1		
AFDI	0.5766	1	
open	0.1195	0.1890	1

4.3 Baseline Estimate Results

According to the Hausman test results, a fixed effects model is used to estimate the above econometric model in Table 4. In the first column, only the core explanatory variable of trade structure (Lab, Resource, Capital) in the dependent variable of US-China bilateral relations (AVEGS) is considered. The empirical results show that the core variable is significantly positive at the 1% level, indicating that trade structure can significantly affect US-China bilateral relations, and the effect of trade structure on bilateral relations is positive and consistent with the hypothesis. Columns (2) to (7) sequentially add control variables for regression analysis based on the first column. The results fully demonstrate that although the size of the core explanatory variable changes slightly with the addition of control variables, it always has a positive effect, and the coefficient sign does not change, and the results are still significant at the 1% level. Therefore, it can be concluded that trade structure has a significant promoting effect on US-China bilateral relations.

Table 4. Baseline regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	AVEGS	AVEGS	AVEGS	AVEGS	AVEGS	AVEGS	AVEGS
Lab	10.218***	10.258***	9.969***	9.340***	11.053***	11.101***	11.968***
	(3.17)	(3.22)	(3.13)	(2.84)	(3.52)	(3.56)	(4.13)
Resource	10.748***	10.892***	10.495***	10.608***	11.006***	10.370***	10.315***
	(4.12)	(4.22)	(4.05)	(4.07)	(4.52)	(4.20)	(4.52)
Capital	16.695***	18.422***	17.726***	18.255***	19.392***	19.136***	17.624***
	(4.26)	(4.53)	(4.32)	(4.38)	(4.95)	(4.93)	(4.84)
POP		0.385	0.350	0.340	0.072	-0.050	0.128
		(1.38)	(1.25)	(1.21)	(0.25)	(-0.17)	(0.45)
Inflation			0.018	0.012	0.013	0.015	0.014
			(1.12)	(0.72)	(0.80)	(0.96)	(0.93)
Patent				-0.039	0.740**	0.728**	0.339
				(-0.84)	(2.27)	(2.25)	(1.00)
LAGDP					-2.040**	-2.034**	-0.950
					(-2.41)	(-2.43)	(-1.07)
AFDI						0.058	0.036
						(1.26)	(0.84)
Open							0.212**
							(2.47)
_con	-9.418***	-10.633***	-10.132***	-9.681**	1.207	1.486	-8.756
	(-2.74)	(-3.03)	(-2.87)	(-2.70)	(0.21)	(0.27)	(-1.33)
N	40	40	40	40	40	40	40
R-squared	0.408	0.439	0.460	0.471	0.555	0.577	0.651

t-statistics in parentheses ***p<0.01,**p<0.05,*p<0.1

From column (7) of Table 4, it is evident that the core explanatory variables of China-US trade structure divided by SITC codes: the proportion of labor-intensive products, resource-intensive

products, and capital or technology-intensive products, are all significantly positive at the 1% level, indicating a positive impact on China-US bilateral relations. The coefficients of labor-intensive product proportion, resource-intensive product proportion, and capital or technology-intensive product proportion on China-US bilateral relations are 11.968, 10.315, and 17.624, respectively. This indicates that for each 1% increase in the proportion of labor-intensive products, resource-intensive products, and capital or technology-intensive products, China-US bilateral relations will increase by 11.968%, 10.315%, and 17.624%, respectively. The coefficients show that the impact of capital or technology-intensive product proportion on China-US bilateral relations is relatively larger, indicating a greater marginal effect of capital or technology-intensive products on China-US bilateral relations. This suggests that the impact of China-US trade structure on bilateral relations mainly lies in capital or technology-intensive products, which is also consistent with the driving force behind the US-China trade friction, aiming to curb China's technological advancement[2].

The empirical results in Table 4 support hypothesis 1, namely that increasing the proportion of each country's share in bilateral trade has a positive impact on bilateral relations between the two countries.

4.4 Group Regression

Table 5. Results of Group Regression

	(1)	(2)
	Emotional tendency strong	Emotional tendency week
Lab	9.0390**	10.0051*
	(0.4888)	(1.2261)
Resource	8.4740**	10.7459**
	(0.5558)	(0.2988)
Capital	20.2794*	19.3924
	(2.1843)	(4.1490)
POP	-0.1515	1.1160
	(0.0524)	(0.3384)
Inflation	-0.0287**	0.0155**
	(0.0019)	(0.0006)
Patent	0.5107**	-0.4283
	(0.0190)	(0.3845)
LAGDP	-1.8223***	1.0960
	(0.0020)	(0.8552)
AFDI	0.0538*	0.0941
	(0.0068)	(0.0656)
open	0.2736	-0.0347
	(0.0625)	(0.0504)
_con	-2.6117*	-17.4130
	(0.3903)	(7.5591)
N	20	20
R-squared	0.904	0.583

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

The above baseline regression analysis mainly focuses on the impact of trade structure between China and the United States on bilateral relations, which tends to be at the level of government or the state. In fact, in the process of actual economic and political exchanges with foreign countries, the emotional perception of the people may also have an impact on the trade structure and bilateral relations between the two countries. The emotional perception mentioned in this paper represents the degree of emotional change of the public. Therefore, in order to clarify whether there are significant heterogeneous characteristics in the emotional perception of the public, this paper divides the sample into two categories, one with more obvious emotional perception and the other with less obvious emotional perception, based on the AvgTone value of the GDELT database to examine the impact of China-US trade structure on bilateral relations. The AvgTone value is used to measure public

emotional perception [21], and this paper calculates the mean value of AvgTone value by summing up the AvgTone values of the whole year and dividing it by the total number of events.

The results of the grouped regression are shown in Table 5, which indicates that except for the coefficient of capital or technology-intensive products in column (2) with less public emotional tendency, both regressions are significant at the 10% level. However, the significance level of the coefficients in column (1) is significantly higher than that in column (2), suggesting that the impact of China-US trade structure on bilateral relations is more significant when public emotional tendency is more pronounced. This is because only when the fluctuation of public emotions is larger and more pronounced, will it subjectively affect the national bilateral trade structure and indirectly affect bilateral relations.

In summary, this paper argues that a strong public sentiment can significantly affect the mechanism of the role of trade structure in bilateral relations. Specifically, if the public emotion is intense, the impact of changes in the China-US trade structure on bilateral relations will be significantly enhanced.

4.5 Robustness Test

Table 6. Robustness Test

	(1) ccr	(2) AVEGS
Lab	6.3512*	11.968***
	(0.9874)	(4.13)
Resource	6.1469**	10.315***
	(0.4697)	(4.52)
Capital	4.5635*	17.624***
	(0.4684)	(4.84)
POP	-0.1541	0.128
	(0.3018)	(0.45)
Inflation	-0.0065*	0.014
	(0.0007)	(0.93)
Patent	-0.0487	0.339
	(0.2266)	(1.00)
LAGDP	0.2307	-0.950
	(0.6136)	(-1.07)
AFDI	-0.0199	0.036
	(0.0044)	(0.84)
open	0.1530	0.212**
	(0.0363)	(2.47)
_con	-8.8565	-8.756
	(3.9122)	(-1.33)
N	40	40
R-squared	0.136	0.651

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

To further emphasize the accuracy of the conclusions drawn in this paper, robustness tests were conducted by testing the stability of the dependent variable. In addition to the commonly used assignment method for quantifying the bilateral relationship between China and the United States, the "cooperation-confrontation ratio (ccr)" can also be used as an alternative measure. As suggested by Zhipei Chi and Na Hou (2019), the ccr can be calculated by dividing the number of cooperation events by the number of confrontation events, which can reflect the quality of bilateral relations. The results of the robustness test are shown in Table 6, with the first column indicating the stability test based on the ccr as the dependent variable. The coefficients of the three core explanatory variables, namely, the labor-intensive product ratio, the resource-intensive product ratio, and the capital or technology-intensive product ratio, have the same positive signs as the benchmark regression coefficients, and are all significant at the 10% level. Furthermore, the coefficients of the control variables remain consistent. This indicates that the empirical results of this paper are not affected by

changes in the measurement indicators of the dependent variable, further supporting the research hypothesis.

5. Research Conclusion and Policy Recommendations

5.1 Research Conclusion

This article demonstrates the positive role of China-US trade structure in promoting bilateral relations through a theoretical analysis framework that examines the relationship between the two. Using the Goldstein value from the GDELT database as the measure of bilateral relations and conducting empirical tests on China-US bilateral trade data from 2001 to 2020 within the fixed effects model framework, the following conclusions were drawn:

(1) China-US trade structure can indeed influence bilateral relations, with the proportions of labor-intensive products, resource-intensive products, and capital-technology-intensive products all positively affecting bilateral relations. Additionally, classifying import-export trade structure based on SITC codes and utilizing big data from the GDELT database can further support relevant issues.

(2) Through further theoretical analysis, this article found that compared to labor-intensive and resource-intensive products, the impact of capital-technology-intensive products on China-US bilateral relations is more significant, while the impact of labor-intensive and resource-intensive products is relatively similar. This is generally consistent with the qualitative research on the causes of China-US trade conflicts in the field of international relations.

(3) By grouping the research according to the public's emotional perception tendencies, this article found that the impact of China-US import-export trade structure on bilateral relations is heterogeneous, showing that when the public's emotional perception tendencies are more pronounced, the impact of China-US trade structure on bilateral relations is stronger. However, this effect is less significant when the public's emotional perception tendencies are not as pronounced.

5.2 Policy Recommendations

(1) Building a new era of China-US trade structure and constructing a sustainable bilateral cooperation system.

The purpose of constructing a reasonable new era China-US trade structure is not just about gaining unilateral profits, but to establish a sustainable bilateral cooperation system. China-US bilateral trade has already deeply integrated and is difficult to cut off from each other. Therefore, launching unilateral trade conflicts is harmful and has no benefits. The United States should have a clearer understanding of the era of economic globalization. Only by jointly constructing a new type of China-US trade structure, properly giving up its hegemonic position in the middle and high-end technology-intensive industries, further accepting inputs from China's labor-intensive and resource-intensive industries, can we achieve a reasonable allocation of production factors, actively build a sustainable bilateral cooperation system, and ultimately achieve the goal of win-win cooperation.

(2) Accelerate the construction of a modern industrial system, vigorously develop the strategy of rejuvenating the country through science and technology, and carry out key research projects in high-precision and cutting-edge technology industries.

The 20th National Congress of the Communist Party of China Report clearly states that China should further accelerate the construction of a modern industrial system, and adhere to the principles of "technology as the primary productive force, talents as the primary resource, and innovation as the primary driving force." Compared with labor-intensive and resource-intensive industries, capital and technology-intensive industries have the most significant impact on Sino-US bilateral relations. In the long term, accelerating the development of a modern industrial system, increasing investment in capital and technology-intensive industries, and overcoming the "bottlenecks" in high-tech fields are the only effective ways to solve the imbalance in Sino-US bilateral relations and break down US unilateral sanctions.

Local governments at all levels should implement the spirit of the 20th National Congress of the Communist Party of China and accelerate the implementation of the innovation-driven development strategy. Guided by national strategies, they should enhance the independent research and development capabilities of technology-intensive industries, coordinate the national and global strategic layout of high-tech industries, base themselves on the integration of industry, academia, and research, and deepen the integration between enterprises and scientific research. They should continue to increase fiscal investment to obtain a higher rate of scientific and technological achievements transformation and industrialization, strengthen the status of enterprises in technological innovation, give full play to the leading role of technology-based backbone enterprises, create a favorable environment for the growth of technology-based small and medium-sized enterprises, and promote the deep integration of innovation chains, industrial chains, capital chains, and talent chains.

(3) Increase the level of opening up to the outside world and explore the development of a multilateral political and trade structure from the perspective of economic globalization.

The foundation of the China-US bilateral trade determines that the bilateral relationship will not be too good or too bad in the short term. However, China's trade still has the characteristic of strong dependence on the US and other Western countries. Under the economic globalization model, anti-globalization is not feasible. Therefore, China should increase its efforts to promote the level of opening up to the outside world, fully utilize the new emerging markets with development potential in neighboring developing countries, such as the construction of the China-ASEAN Free Trade Area, and actively expand the scale of foreign trade and cross-border investment to reverse the current situation of China's strong dependence on US trade.

Relying on China's domestic super-large market, attracting global production factors, and achieving the linkage effect of domestic and international dual circulation. "Opening up to the outside world" as a fundamental national policy of China can always play a huge role in alleviating unilateralism and trade protectionism. Therefore, further increasing China's level of opening up to the outside world in the future, optimizing and upgrading the trade structure, and building a strong trading nation are essential.

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